REPORT R142/2025

OVERVIEW OF SOUTH AFRICA'S COPPER INDUSTRY

DIRECTORATE MINERAL ECONOMICS AND STATISTICS



mineral & petroleum resources

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REPORT R/2025

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Table of Contents

List Of Figures ii
1. Introduction 1
2. Copper Occurance 1
3. Mining And Processing 2
4. Markets 3
4.1 Supply 3
4.2. Demand 4
4.3. Copper Prices 5
5. Employment 6
6. Current Developments 7
7. Challenges And Opportunities Faced By The Industry 8
7.1. Challenges 8
7.2. Opportunities In The Copper Mining 9
8. Outlook 9
9. Recommendations 10
10. References 10

LIST OF FIGURES

Figure		Page
Figure 1	Mining and Processing Copper Ore	2
Figure 2	Global Copper Reserves	3
Figure 3	South Africa's Mine Copper Production, 2015 – 2024	4
Figure 4	Major Uses of Copper	5
Figure 5	Average LME Copper Cash Price Settlement, 2015 – 2024	6
Figure 6	Primary Copper Mine Employment, 2015 – 2024	7

1. INTRODUCTION

Over the past decade, South Africa's copper industry has experienced a quiet resurgence, underpinned by renewed exploration and investment, particularly in the Northern Cape, though it remains modest compared to regional giants like Zambia and the DRC. Legacy operation and the country's only large-scale copper producer, Palabora Mining, has continued steady output from surface into underground workings. However, declining ore grades and aging infrastructure have gradually eroded production capacity. The sector stagnated in the mid-2010's due to lack of investment and regulatory uncertainty, causing South Africa to slip from global exploration prominence. This changed with a strategic pivot in the early 2020's, as the global energy transition spotlighted copper's critical role, driving renewed mergers and acquisitions as well as exploration targets.

Key developments include the rise of Copper 360, a JSE-listed pure-play focused on resuscitating old Northern Cape copper mines, which grew revenues from R38 million in 2023 to R143.75 million in 2024, with ambitious production targets and planned solar and wind integration. Meanwhile, Orion Minerals has progressed its Prieska Copper-Zinc and Okiep projects, rejuvenating dormant districts and aiming for production growth from 2025 onward. Orion is also exploring nearby areas, including the Ayoba VMS discovery, which has shown promising early drill results. Palabora Mining continues operating South Africa's only integrated copper and its Lift II expansion, targeting deeper ore, began in 2019 and is set to extend the mine's life to 2040 through an investment in advanced underground infrastructure.

Despite these advances, challenges persist, such as declining ore grades, regulatory delays, infrastructure bottleneck, environmental concerns. Also, value addition on copper ores remains weak, forcing South Africa to export unrefined ore and import refined copper. However, copper exports are expected to grow modestly driven by the green energy boom. If project execution, infrastructure investment, and regulatory clarity improve, South Africa may grow its copper role from niche to notable contributor in the global clean-technology supply chain.

This report will focus on various aspects of the South African copper industry including the different market dynamics zooming in on supply and demand issues and the role prices play in this sector. It will also look at what the current developments are as well as the challenges and opportunities in this industry.

2. COPPER OCCURANCE

Copper is a highly valued metal due to its excellent electrical and thermal conductivity, corrosion resistance, and workability. It is malleable and ductile, yet gains strength when alloyed with metals like iron, cadmium, nickel, chromium and manganese. Its resistance to corrosion improves further when alloyed with tin and aluminium. Copper is easy to weld and fabricate, making it ideal for modern infrastructure and industrial applications. As the 26th most abundant element on earth, it plays a vital role in today's global economy.

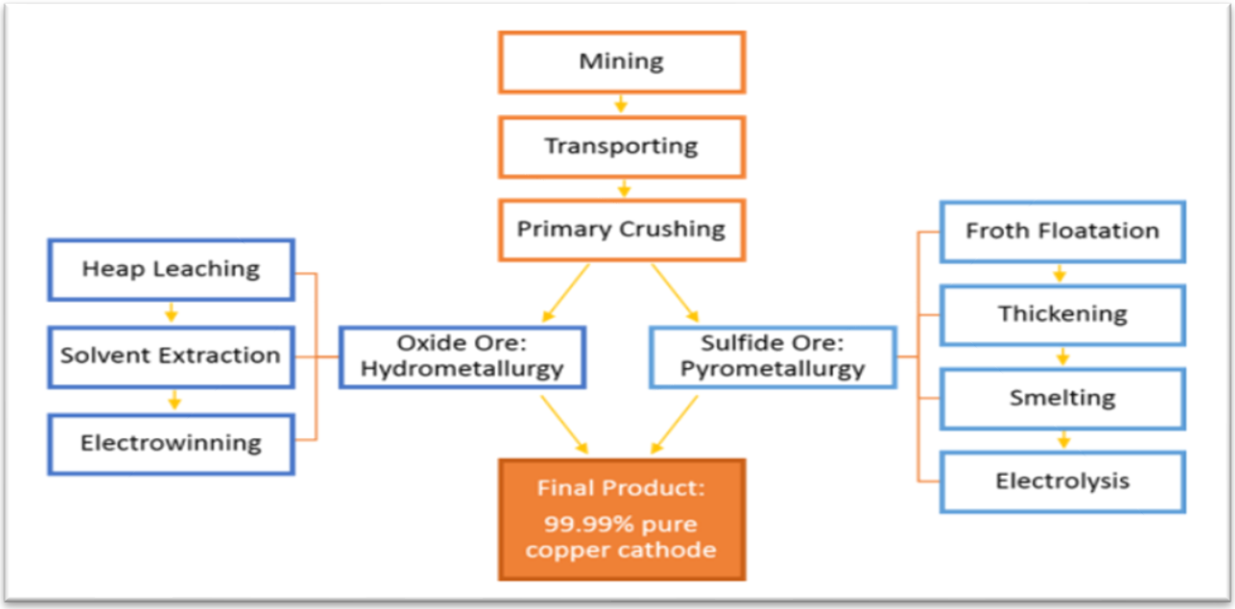
Copper resources in South Africa are primarily concentrated in the Northern Cape and Limpopo provinces as well as in the Northwest province as an associated mineral. Copper occurrences are often associated with sulphides of iron, nickel, lead, zinc, and molybdenum, and these deposits frequently contain significant quantities of gold and silver. Notable copper sulphide ores are found in the Bushveld Igneous Complex, in the Rustenburg Layered Suite and the Lebowa Granite Suite, as well as in the Areachap belt in Namaqualand, Northern Cape Province. The copper ore body hosted within the Palabora Igneous Complex, where Palabora mining operates, is one of the only known carbonatite-hosted copper deposits

globally. Copper mineralisation occurs primarily in the Loolekop carbonatite pipe, with grades highest (~1 % Cu) at its core, typically decreasing to ~0.5 % toward the edges. Other key mines include Prieska and Okiep in the Norther Cape, both owned by Orion minerals. Copper 360 Ltd, another active player, holds consolidated mining rights in the Okiep Copper District and manages stockpiles from the Reitberg mine. Additionally, significant copper production is mined as a by-product of platinum group metals (PGMs), as well as from nickel, lead and zinc operations across the country.

3. MINING AND PROCESSING

Palabora Copper, the oldest primary copper mine in the country, began operations using open-pit mining method for more than four decades. After the pit operation reached its maximum economically viable depth, the mine transitioned to an underground mining method, known as block caving. Block caving is a cost-effective underground mining technique used for large, deep ore bodies. The process includes developing underground access through constructing tunnels and shafts to reach the base of the ore body. This is followed by the creation of horizontal tunnels beneath the ore body to destabilise the rock. The undercutting allows the ore above to collapse under its weight and gravity. The broken ore falls into draw points where it is extracted using load-haul dump (LHD) machines and transported to the crushers (Figure 1).

FIGURE 1: MINING AND PROCESSING COPPER ORE



Source: Superfund Research Centre

The ore is hoisted to the surface through an underground conveyor system. Once on the surface, the run of mine takes place at the processing plant, where the ore undergoes grinding, flotation to concentrate copper and dewatering. The resulting concentrate is then smelted to produce copper matte and slag. The matted copper produced by smelting usually contains 58% – 60% copper. The molten matte is then transferred to a converter furnace where the remaining iron and sulphur are removed. At this stage, the product is referred to as blister copper, which contains 98% copper, and is then sent to the anode smelter. The copper anode

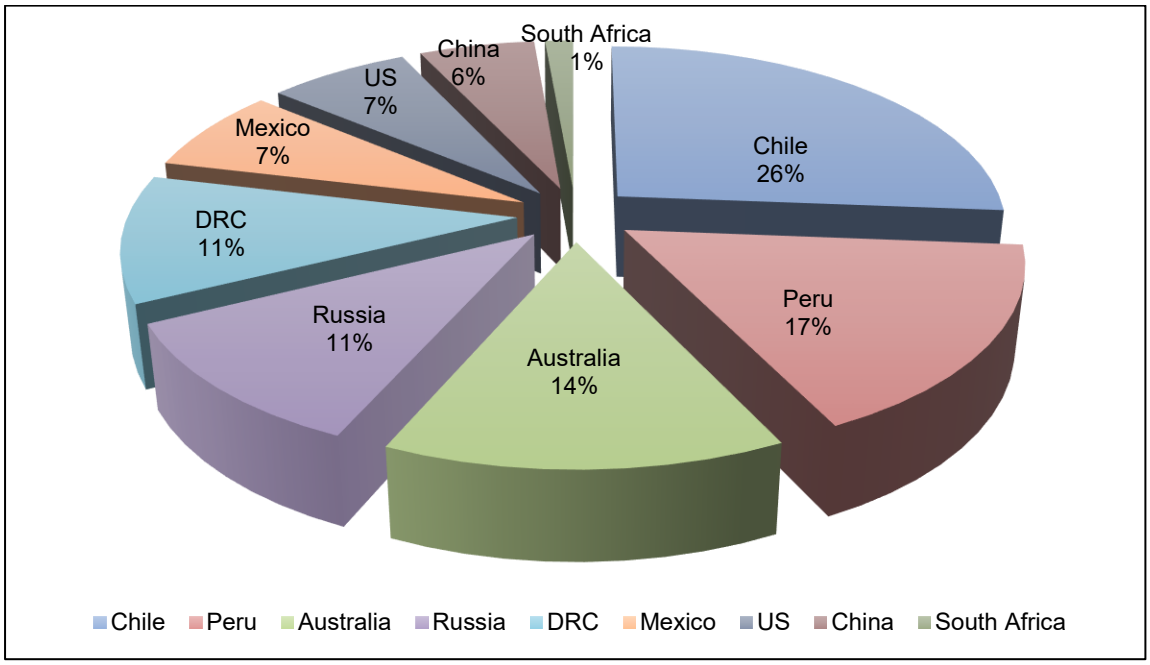
slabs are then refined in the final step through electrolysis to produce 99.99% copper cathodes that can later be converted to end-use products down the value chain.

4 MARKETS

4.1 SUPPLY

Copper reserves and production are concentrated in Latin America, Australia and Africa. Global proven copper reserves were estimated at around 1.0Bt in 2023, increasing by approximately 1000 Mt by 2024. Chile holds the largest copper reserves globally, estimated at 190Mt and accounting for 19 percent of the world's total, followed by Peru (120Mt), Australia (100Mt), Democratic Republic of Congo (80Mt) and Russia (80Mt). Copper reserves in South Africa were estimated at 10.1 Mt, which accounts for one percent of global reserves (Figure 2).

FIGURE 2: GLOBAL COPPER RESERVES



Source: Various sources

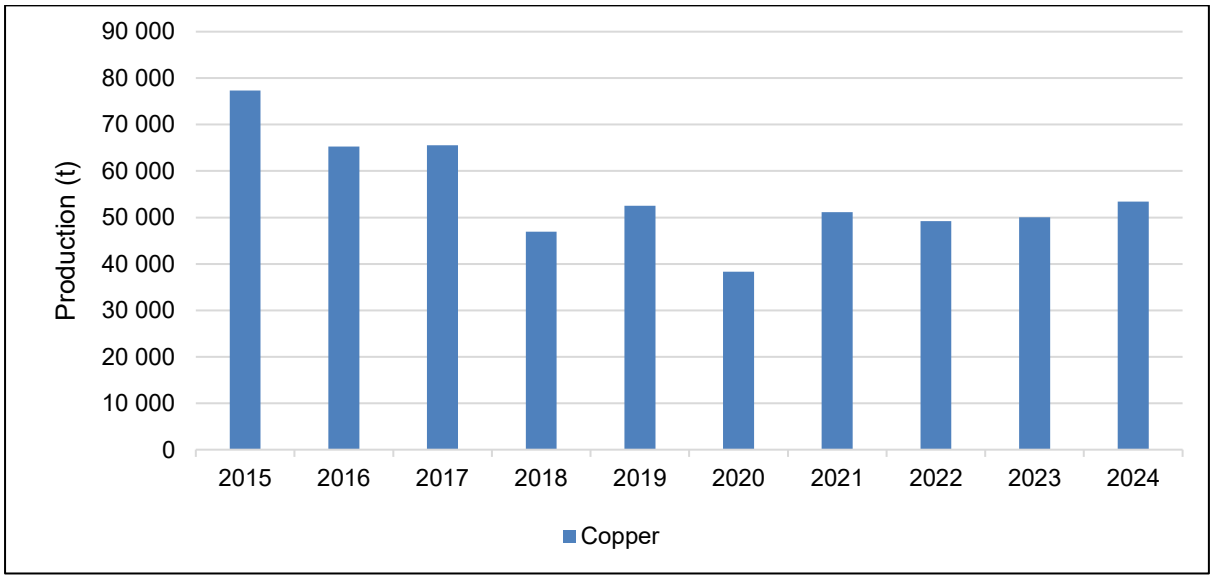
In the past decade, global copper mine production steadily increased from 19.1Mt in 2015 to an estimated 22.8Mt in 2024, an average growth of 1.8 percent. Growth was consistent through the decade, peaking in 2022 at approximately 23Mt before a moderate dip in 2023. Chile remained the top producer, followed by the DRC, Peru, China, and the U.S. The largest copper producing countries have remained relatively consistent, with Chile, Peru, and the Democratic Republic of Congo (DRC) leading global output. Regionally, Africa maintained a steady role as a significant global supplier of copper, largely driven by high-grade reserves in the Central African Copperbelt, which spans the Democratic Republic of the Congo (DRC) and Zambia. In 2015, Africa's share of global copper mine production was approximately 9 percent and has grown to approximately 16 percent in 2024. Most of the growth in Africa's output comes from the DRC, Zambia, and South Africa.

In 2024, Chile remained the leading producer with about 5.3 Mt (23 percent) of global supply, followed by the DRC (3.3 Mt), surpassing Peru, which produced approximately 2.6 Mt, and

China at 1.8 Mt. The United States Geological Survey (USGS) identified Escondida mine, situated in Antofagasta, Chile, as one of the world's largest copper-producing mines, with a capacity exceeding 1 million tons (Mt) per annum of copper output. In Africa, the Kamoa-Kakula mine, in Katanga, DRC, is the largest copper-producing mine with a capacity of 500 kt per annum.

South Africa's copper production exhibited a downward trend since 2015, marked by intermittent periods of growth and contraction. A notable trough was reached in 2020, when output fell to 38 kt. The sustained decline in production levels can be pinpointed to structural factors, including depletion of high-grade reserves, ageing infrastructure leading to inefficiencies and increased production costs. Moreover, the outlook remains constrained, with no new copper projects in the pipeline and a declining rate of new discoveries (Figure 3).

FIGURE 3: SOUTH AFRICA'S MINE COPPER PRODUCTION 2015 - 2024



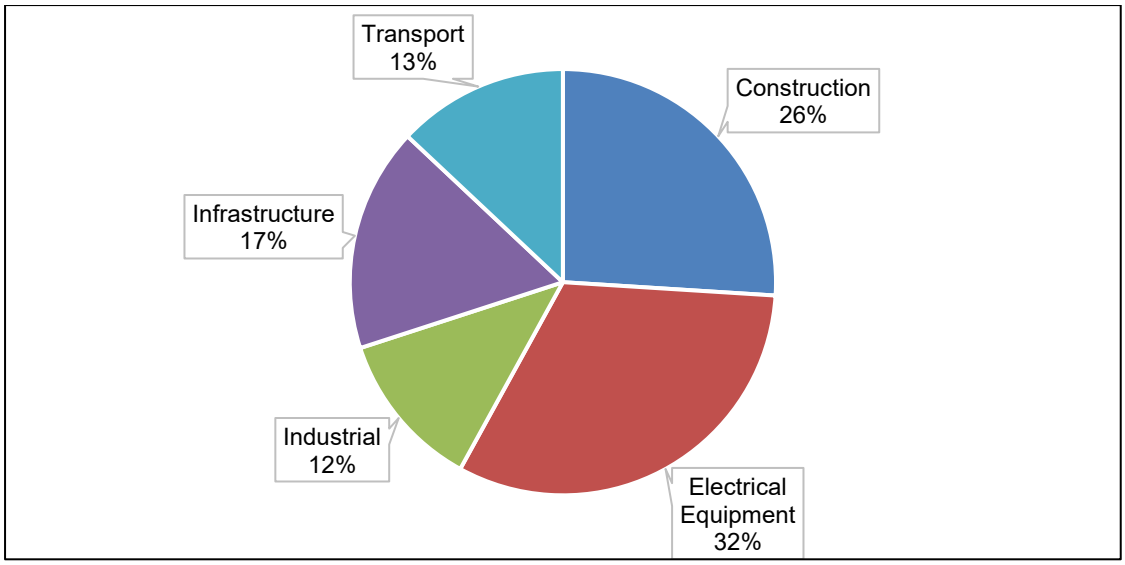
Source: DMPR, Directorate Mineral Economics & Statistics, 2025

Furthermore, copper production has shown moderate rebound in recent years, rising by an average annual rate of 4.2 percent per annum between 2022 and 2024. This recovery is driven by rising demand for copper as a critical metal for electric vehicles, renewable energy and infrastructure development. This surge in demand, intensified by the global energy transition, boosted prices, enhancing copper mining profitability and incentivised renewed investment in historic productive mining copper belts.

4.2. DEMAND

Copper demand in the past decade has been marked by baseline industrial growth of approximately 3 percent per annum, accelerating sharply in upstream areas like electric vehicles, and renewables. Before 2019 demand was driven by industrial activity, construction, and consumer electronics with significant acceleration from 2020 spurred by the global energy transition. Global refined copper consumption went up from 22.4Mt in 2015 to approximately 26.1Mt in 2024, marking a 16.5 percent increase. The 2024 increase in global refined copper demand reflected a 0.7 percent year on year increase.

FIGURE 4: MAJOR USES OF COPPER



Source: ICSG, World Copper Factbook 2024

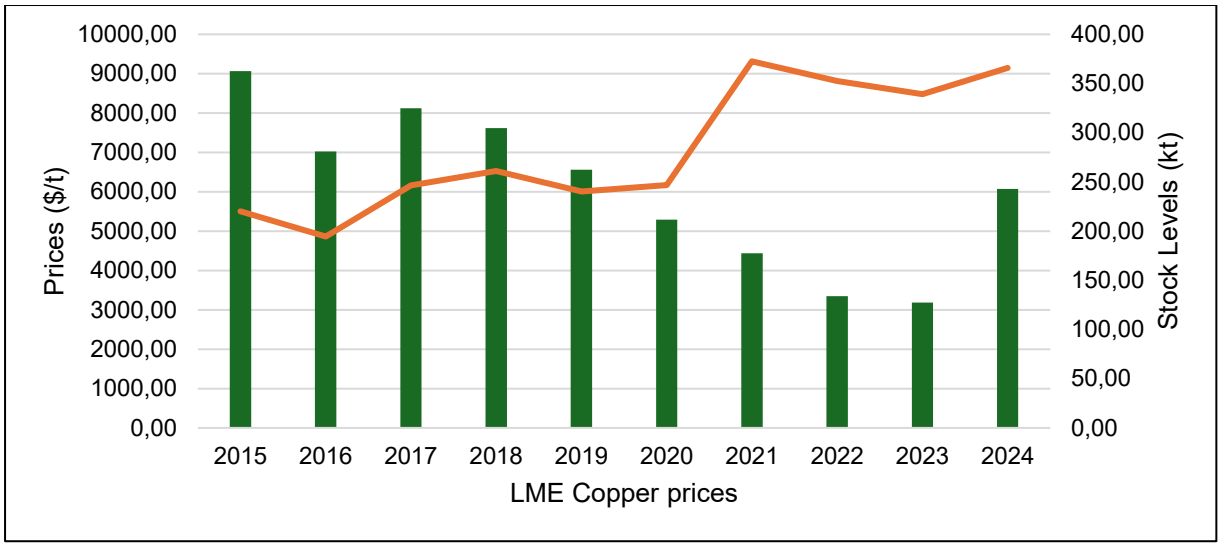
Copper is used in the downstream sectors as copper semi-finished products which are integral in the manufacturing of automobiles, appliances, electronics, and a wide range of other copper-dependent products. Due to its exceptional conductivity, 32 percent of the world's copper use in 2024 came from the production of electrical equipment, followed by 26 percent in the construction industry, 17 percent in infrastructure sector, and 13 and 12 percent in transportation and industrial sectors, respectively (Figure 4).

4.3. COPPER PRICES

Over the past decade, copper prices experienced significant fluctuations, reflecting shifts in global supply, demand, and economic conditions., As a leading economic indicator, copper price performance over the period under review has been characterised by global macro-economic events such as shifts in industrial demand, supply dynamics and geopolitical influences. The copper industry had been oversupplied going into 2015 resulting from reduced demand particularly from China, triggering a commodity downturn that troughed in 2016, with copper selling at $4 863.23 /t from 5 501.69/t in 2015. Prices recovered in 2017, increasing by 26.7 percent to $6 162.77 /t, marking the first significant rebound since 2011 (Figure 5). This upswing was attributed to factors such as sustained consumption growth in China, a depreciating US dollar, and reduced global mine production. However, this recovery was short-lived, as the trade war tensions between the US and China created uncertainty in the investment market, putting a downward pressure on copper prices.

Prices continued to fall in 2020, primarily because of sharp contractions in global manufacturing and overall economic activity due to the COVID-19 pandemic. However, in post-pandemic induced recession, prices rebounded to historic highs averaging $9 314.74 /t in 2021 driven by expansive fiscal and monetary across major economies. This upward momentum retraced in 2022 and 2023, as prices declined in response to weaker demand from China's property market, higher interest rates in major economies, higher energy prices in Europe, as well as the ongoing war between Russia and Ukraine. In 2024, copper price increased by 7.8 percent to $9,144.09/t higher than in 2023, supported by a weaker US dollar and concerns over supply constraints amid surging demand for copper from the renewable energy sector, particularly electric vehicles (EVS) and solar and wind power technologies.

FIGURE 5: AVERAGE LME COPPER CASH PRICE SETTLEMENT, 2015 - 2024



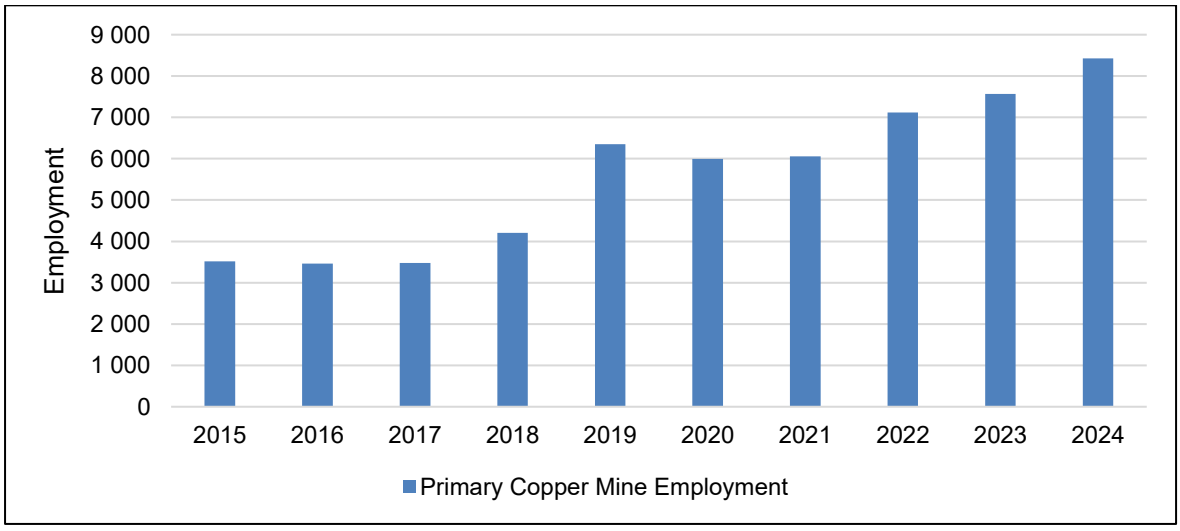
Source: London Metal Exchange, 2025 via www.westmetall.com

Copper inventories on the London Metal Exchange (LME) remained on a stable downward slope between 2017 and 2021. However, LME stock levels began to decline sharply from beginning of 2022 due to increasing global demand driven largely by the energy transition and tightening supply from key producers. By late 2022 and into 2023, LME inventories fell to multi-decade lows, with available stocks dropping to around 125kt, signalling acute supply pressure. From September 2023, LME inventories started rising well into 2024. Inventories were averaged 243kt in 2024, up by 90 percent from the 2023 average of 127kt. Throughout this period, the LME played a central role in highlighting global copper market tightness, with inventory levels often reflecting less than three days of global consumption, reinforcing strong backwardation and upward price pressure.

5. EMPLOYMENT

The broader South African mining sector has come under employment pressure due to declining commodity prices, high operational costs, and persistent logistical challenges.

FIGURE 6: PRIMARY COPPER MINE EMPLOYMENT 2015 – 2024



Source: DMPR, Directorate Mineral Economics & Statistics

In contrast, employment in the copper industry has grown at an average rate of 10.9 percent over the period under review induced by the renewed mining activities in the Northern Cape province that began in 2019 and gradually increased capacity. In that year, employment increased significantly by 51 percent to 6 353 employees from 4 208 employees in 2018 (Figure 6) propelled by the development of Lift II at Palabora Copper, along with the increased exploration and mining activities in the Areachap copper belt in the Northern Cape. The outbreak of Covid-19 led to a 5.7 percent decline in copper employment, however, post-Covid-19, the industry rebounded and continued creating jobs. Currently employment in the copper sector has reached 8 429, as mining companies move to revive the historic mines in the Northern Cape Province.

6. CURRENT DEVELOPMENTS

South Africa's copper mining sector is experiencing a revival, driven by significant exploration and redevelopment activities, particularly in the Northern Cape Province. Companies are advancing projects to unlock value from historical copper deposits and expand into new resource areas. These projects signal renewed investor confidence and a growing focus on copper as a critical mineral for the global energy transition. Below are details of these projects:

Orion Minerals' Prieska Copper-Zinc mine, located 270 kilometres south-west of Kimberly, is recognised as one of the world's 30 largest volcanogenic massive sulphide (VMS) base metal deposits. The project covers the PCZM, which was prematurely closed by previous owners, as well as the adjacent acquired Marydale and Vardocube prospective rights. Orion Minerals NL, a company dual listed on the Australian Securities Exchange and the Johannesburg Stock Exchange, is currently advancing the development of the *Prieska Copper Zinc Mine (PCZM)* in South Africa's Northern Cape Province.

Development is progressing steadily, with a Definitive Feasibility Study (DFS) completed in March 2025. Bulk sampling and essential dewatering operations have commenced. Initial output will focus on the deep sulphide orebody, estimated at 28.73Mt grading 1.2% copper and 3.8% zinc. The mining project is designed to combine underground and open-pit methods with an annual throughput of 2.4 million tonnes per annum (Mtpa) over a 12- year life of mine. Expected output includes 226000 tonnes of copper and 680000 tonnes of zinc in concentrate. The total capital investment is forecast at A$1.6 billion, with a payback period of 2.5 years. Production is scheduled to begin in late 2025. The project is anticipated to generate 1200 jobs during construction and 879 during full operations.

In parallel, Orion is exploring newly acquired areas, notably the *Ayoba VMS discovery* located 5.3 km southwest of Prieska. Drilling has intersected 9.5 metres of massive sulphide mineralisation containing 0.63% copper and 0.93% zinc, including a higher-grade section of 1.5 metres with 0.89% copper and 4.98% zinc.

Orion is also involved in the *New Okiep Mining* joint venture with South Africa's Industrial Development Corporation (IDC), where it holds a 56.25% stake. Located near Springbok, about 450 km from Prieska, the Okiep Copper Project (OCP) is based on the historically productive Okiep district, which yielded over 2Mt of copper over 150 years until 2003. Following a review of past resource estimates and a positive scoping study, the partners are proceeding with a phased development approach, starting with six deposits in the Flat Mines area. The JORC-compliant resource currently stands at 12Mt grading 1.4% copper (159000t contained). An investment of A$66.7 million has been allocated, targeting low-cost open-pit and underground mining. The operation aims to produce up to 9000t of copper annually over an initial 12-year lifespan, with potential for further expansion under consideration.

Copper 360 Ltd, listed on the JSE's AltX board, is a copper-focused mining and exploration firm operating in the Northern Cape copper belt. Formed in 2022 through the acquisition of Shirley Hayes IPK (Pty) Ltd and Cape Copper Oxide (owner of a processing plant), the company is headquartered in Nababeep, 17 km from Springbok. Currently, its efforts centre on reprocessing historic copper waste dumps and mining shallow ore from the former Okiep Copper Company (OCC) assets, following the acquisition of mining rights in October 2023.

Out of the 12 historical mines across a 19000-hectare mining right area, the *Reitberg copper mine* has been prioritised for reopening. After validating legacy drill data in early 2023, Copper 360 upgraded its resource estimate from 25275t to 81200t of contained copper. Copper 360 has invested R140 million into restarting the Reitberg underground mine, which is expected to yield 380000t of copper concentrate annually over a seven-year lifespan, employing around 376 people at full capacity.

Separately, Palabora Copper, a subsidiary of Palabora Mining Company Ltd., operates an integrated copper mining, smelting, and refining complex in Phalaborwa, Limpopo Province. Its Lift II expansion, which targets an orebody 450 metres below the previously mined-out Lift I, began in 2019 following a 2014 bankable feasibility study. The development includes a twin decline access tunnel, a completed ventilation shaft, and underground infrastructure such as crusher support and draw-bells. The R9.3 billion project is set to extend the mine's operational life to 2040, utilising advanced technology and engineering methods.

7. CHALLENGES AND OPPORTUNITIES FACED BY THE INDUSTRY

7.1. Challenges

South Africa's role in the production of copper has been significant in the country's economy. As the world transitions towards renewable energy and advanced technologies, the demand is expected to increase. However, country's copper industry faces several challenges that impact its growth, sustainability, and global competitiveness. Here are the key issues:

- **Limited New Discoveries:** South Africa has not made major new copper discoveries in recent years with relatively low exploration activities due to regulatory hurdles and limited incentives for junior mining companies.
- **Legacy Mines and declining ore grades:** Many of South Africa's historical copper mines, that are being revived in the Northern Cape dates back decades and remaining ore grades are lower, mainly with deeper underground operations that require costly rehabilitation or advanced technology to extract economically.
- **Environmental issues:** environmentally friendly methods need to be adopted by this sector to mitigate the significant greenhouse gas emissions, land degradation, and water pollution.
- **Ageing infrastructure:** Reliable infrastructure, such as transportation, electricity, and water supply, is crucial for mining operations. South Africa's infrastructure issues, particularly transportation and electricity supply disruptions, impact mining productivity and increase operational costs.
- Water scarcity: Northern Cape is arid and lack sufficient water supply for processing and dust control. This is a major operational and environmental constraint for the copper industry. However, there is potential for improvement through investment in infrastructure upgrades, innovative water recycling, stronger regulatory alignment, and stakeholder collaboration, mining operations can become more resilient and sustainable in the face of ongoing water pressures.
- Rising operational costs and community unrest: Community disputes with surrounding communities can disrupt operations and lead to operational delays.

- **Substitution:** Aluminium is the most common and readily available alternative to copper, particularly in electrical wiring and transmission lines, due to its lower cost and weight. However, aluminum has lower electrical conductivity than copper, requiring larger conductors for the same current-carrying capacity. Aluminum substitutes for copper in automobile radiators, cooling and refrigeration tube, electrical equipment, and power cable. Optical fiber substitutes for copper in telecommunications applications, and plastics substitute for copper in drainpipe, plumbing fixtures, and water pipe. Titanium and steel are used in heat exchangers.
- **Copper scrap, recycling copper scrap** offers environmental benefits and cost savings, however, has significant impact on the demand for new material.

7.2. Opportunities in the copper mining

The global push for renewable energy and EVs is driving a significant increase in copper demand worldwide. The enhancing of operational efficiency through automation, digitalisation, and advanced ore processing techniques can lead to improved productivity, reduce costs and enhance safety standards. Integrating renewable energy sources into mining operations can reduce reliance on traditional power sources, lower carbon footprints, and align with global sustainability goals. Government policies and incentives that support exploration activities and infrastructure development can stimulate investment and foster growth in the industry. Investment in the Council for Geoscience's geological mapping program will assist in identifying untapped resources, helping to counter declining ore grades. Moreover, the implementation of a new mining cadastral system is expected to improve transparency in the allocation of mining rights and streamline the application process for exploration.

8. OUTLOOK

Global outlook for copper is strongly bullish, driven by a structural rise in global demand alongside persistent supply constraints. Key drivers for growth in the copper industry will include the rapid expansion of EVs, renewable energy infrastructure like wind and solar, and large-scale power grid upgrades. It is forecast that copper demand could grow at a compound annual rate of 2.5 to 3 percent, with energy transition sectors growing even faster. However, supply is expected to lag due to geological challenges, declining ore grades, and long project development timelines leading to market deficit. These supply- demand dynamics could lead to an upsurge in copper prices regardless of impending risks associated with global economic slowdowns, trade tensions, or breakthroughs in substitute materials. The copper market appears to be entering a long-term supply-constrained super cycle fuelled by the global push toward electrification and decarbonization.

South Africa's copper industry is poised for a cautiously optimistic trajectory, driven by global demand for copper in renewable energy and electric vehicles, alongside local initiatives to revive historic mining operations. The country's copper market is forecast to expand at a compound annual growth rate (CAGR) of around 4.5 percent between 2025 and 2032, with market value rising from about US $5.2 billion to US $7.4 billion. Growth in the country's copper industry will be driven by the revival and modernization of cornerstone operations like the Palabora Mine in Limpopo, along with promising new projects in the Northern Cape, such as Orion Minerals' Prieska and Okiep initiatives and the Copper 360 program, which collectively aim to tap into South Africa's extensive reserves and extend mine life through innovation and sustainable practices. South Africa's copper production is expected to increase, as these projects come on stream and ramps up production. These projects are expected to pave the way for South Africa to be a larger supplier of copper, to support the global energy transformation. Domestic consumption is also expected to improve, as Transnet and the Passenger Rail Agency of South Africa (PRASA) embark on refurbishing their railway

infrastructure. The construction sector is also expected to improve on public infrastructure projects in the fields of energy, transport, housing and digital infrastructure. It is anticipated that despite potential market fluctuations, the copper price is likely to experience a significant increase in the next decade. This surge is expected to necessitate substantial capital investments to find, extract and beneficiate these resources to maximise the benefits from the new gold rush. South Africa's copper industry has strong underpinnings for meaningful growth in output and investment through strategic modernization and exploration.

9. RECOMMENDATIONS

Sustainability of mining depends on the exploration for and discovery of new mineral deposits. To foster growth in South Africa's copper industry, a focus should be on improving efficiency, technology, and investment. These include streamlining mining licensing processes, attracting private sector investment through a more transparent and predictable regulatory environment, and encouraging local value-added production of copper products. Additionally, government support for infrastructure development and technological advancements in mining can create a more conducive environment for the industry to thrive.

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