National Employment Vulnerability Assessment

Metals Value Chain

15 October 2025

Context

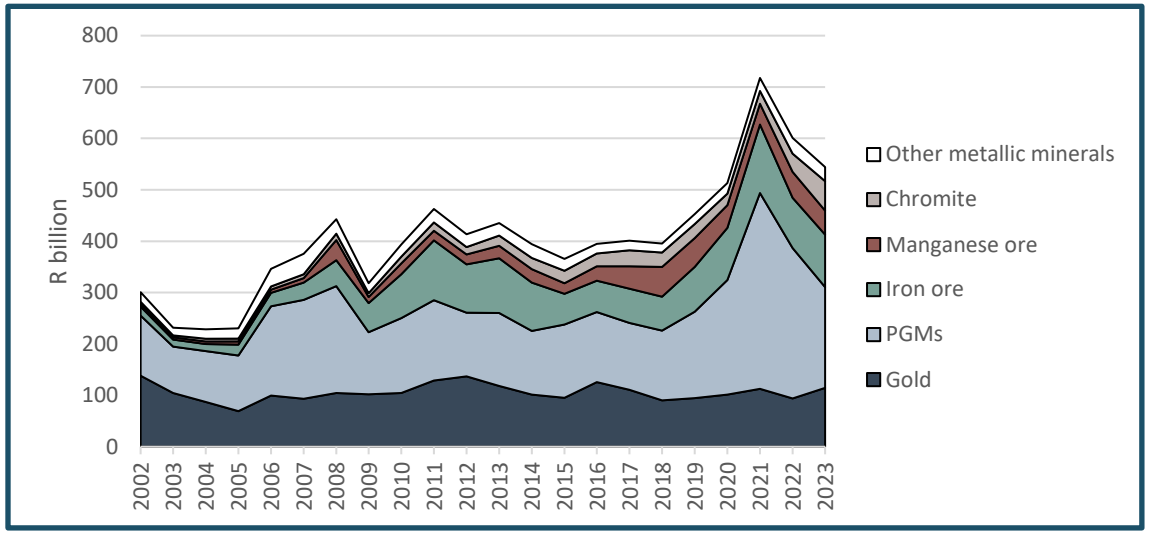
- South Africa's metals value chain (VC) is under growing pressure as the shift to a low-carbon world exposes its dependence on fossil fuel-based energy
  - The VC has historically relied on abundant, low-cost fossil fuels, with coal-fired electricity from Eskom being critical to operations across the VC. Coking coal is also critical to primary steelmaking, and opencast mining relies on petroleum-based trucks.
- This energy profile leaves the VC exposed to transition-related risks which will raise costs and limit production, leading to job losses.
- Failure to respond could devastate workers and communities reliant on the VC.
- Main sub-value chains: PGMs, gold, iron and steel, chrome, manganese, aluminium.
  - Apart from aluminium, VCs span mining, smelting/refining, and downstream manufacturing. Scrap metal also serves as an input.

Outline

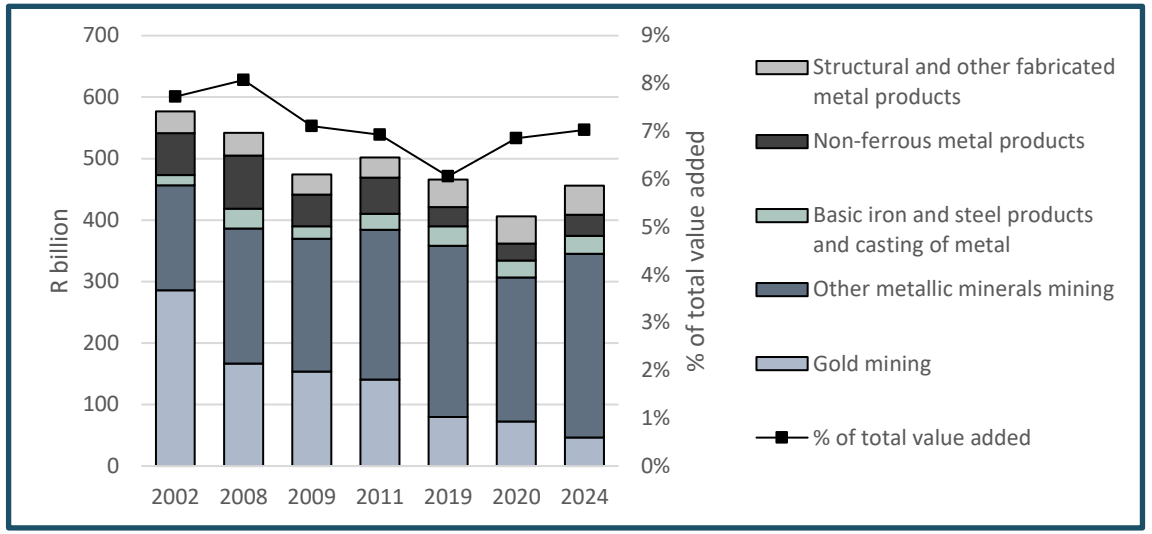
- Economic contribution and employment
- Energy dependence
- Emissions
- Risks facing the value chain
- Exposure to risks
- Vulnerable groups
- Recommendations for the Sector Jobs Resilience Plan

Economic contribution of metals VC

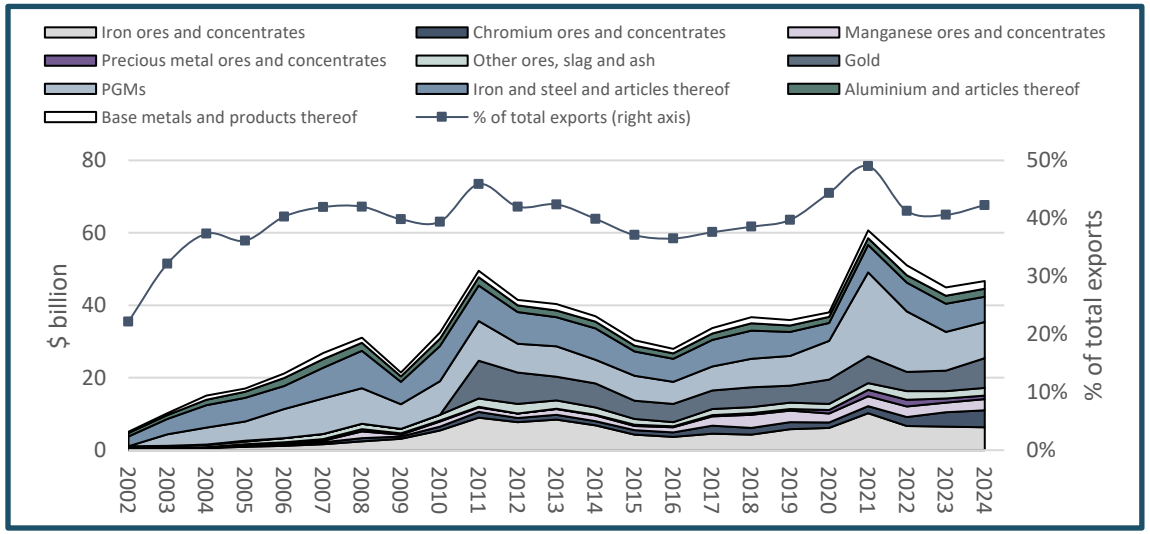
Graph 1: Sale of metal ores, 2002-2023



Graph 2: Value added from metals value chain, selected years, 2002-2024



Graph 3: Exports from metals value chain, 2002-2024

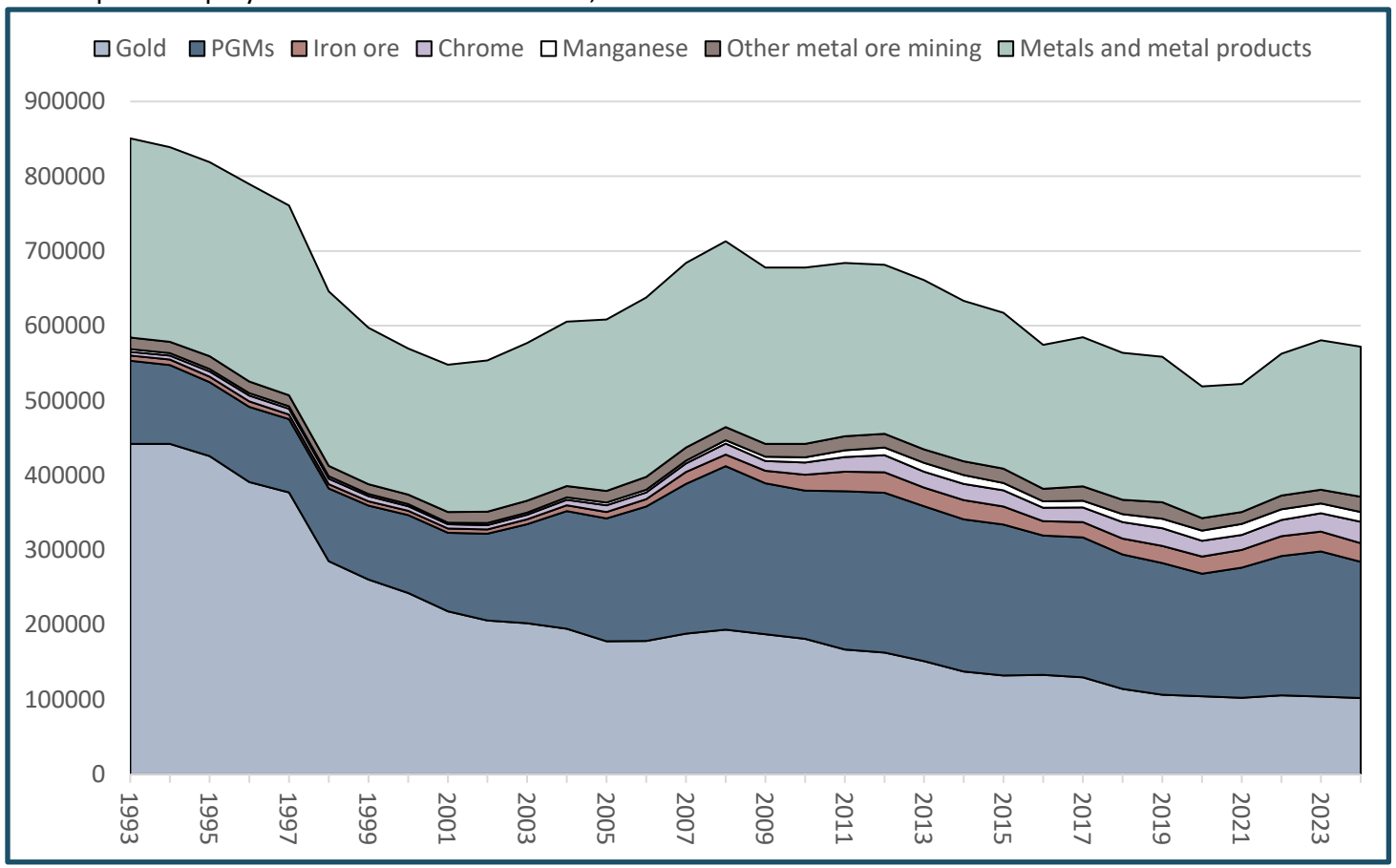


- In 2023, sales of metal ores were over R540 billion.
- In 2024, value added from VC amounted to R455 billion (7% of total industry value added).
- Exports across the VC amounted US$47 billion (42% of total exports).

Sources: Calculated from Department of Mineral Resources and Energy; Quantec EasyData; and ITC TradeMap.

Employment

Graph 4: Employment in metals value chain, 2002-2024



Source: Calculated from Quantec EasyData.

- In 2024, the metals VC employed 570 000 people.
  - Down from around 850 000 in 1993, largely, due to the decline in gold mining.
  - The mining segment accounts for around 65% of total employment, metals and metal products account for 35%.

Energy dependence

- As noted, South Africa's metals sector has historically relied on cheap, fossil fuel-based energy, with coal-fired electricity, coal, and petroleum being critical to operations.
- Energy intensity:
  - In mining, energy-related costs range between 7% and 13% of costs
  - For some electricity dependent smelting operations, utility costs reach 43% of production costs. In ferroalloy production, these costs can reach as high as 60% of production costs (according to reports).
  - Dependency is less pronounced in coal-based smelting where energy costs are between 13% to 15% of total costs.
  - At the refining stage, utilities accounted for 13% of production costs.

Emissions

- The metals industry accounts for the largest share of South Africa's industrial process and product use GHG emissions, at 51% in 2022.
  - Iron and steel production, and ferroalloys production are the largest contributors to the metals category.

- Although there has been renewable energy uptake in the value chain, with plans for further expansion, energy and emissions intensity among entities within the value chain remains largely unchanged from 2021.

Risks

Climate Change Act – Carbon Budgets

- Raise costs in short-term and limit production
- Starting in 2026.
- Impacts to be felt for iron and steel, but also ferroalloys, and aluminium.

Carbon tax

- Already material with costs set to mount progressively.
- Adverse impacts currently for steelmaking.
- Could affect electricity dependent process should scope 2 emissions be penalised as the carbon tax evolves.

Rising electricity prices

- Already material due to factors outside of the transition.
- Could be fuelled by the transition as proposals to ensure price neutrality of electricity under carbon tax runs until 2030.
- Particularly problematic for EAF steel, ferroalloys and aluminium.

Risks

Rising fuel costs

- Already material, could rise as carbon tax evolves, among other things.
- Problematic for opencast mines.

Carbon border measures

- EU CBAM already material, penalties to be imposed from 2026.
- Particularly problematic for iron and steel considering current scope of EU CBAM.
- Potential to increase in scope for products and type of emissions.
- Other countries considering implementation of similar measures

Phase-out of internal combustion engine vehicles

- The PGMs value chain faces risk due to the phase-out of new ICE vehicles in the EU and UK.
  - ➢ Long term > 10 years

Exposure to risks

Key factors influencing exposure

- Pace of renewable energy uptake on the national grid and by firms in the sector.
- Advancement of renewable energy, green hydrogen, fuel cells, and battery storage technologies.

Segment-level exposure

- Electricity- and carbon-intensive activities such as smelting, refining, and steelmaking are highly exposed.
- Mining is generally less vulnerable due to lower electricity/emissions intensity.

Exposure to risks

Commodity-level exposure

- **Highly exposed:** iron and steel, ferroalloys, aluminium due to high carbon intensity and electricity dependence.
- **PGMs:** potential demand loss from EV adoption.
- **Gold:** effect of climate related pressures is unclear; long-term decline due to resource depletion.

Vulnerable groups

Workers

- Workers in primary steel, ferroalloy, and aluminium production face high-risk in the short-term.
  - ➢ Operations are energy- and emissions-intensive, thus, exposed to transition-related pressures.
  - ➢ Workers often have lower financial, human, and social capital, compared to mining.
  - ➢ However, they are relatively better off than the rest of the economy. Located in more economically diversified areas.
- Mining workers are relatively less vulnerable short-term due to lower electricity and emissions intensity of operations.
- Generally better financial, human, and social capital.

Community-level vulnerabilities

- Mining-dependent regions tend to not be economically diverse.
  - ➢ Displaced workers might have a harder time finding a new job.
- Local businesses often rely on nearby mines, so potential mine closures could adversely affect broader communities.
- Worst effects to be felt in regions where mining and smelting are co-located.

Workers and communities

- In the long term, those dependent on the mining, smelting and refining of PGMs are at risk due to a decline in demand for the finished product (catalytic converters) associated with their sub-value chain.
- Particularly problematic for Rustenburg, Moses Kotane, and Thabazimbi
  - ➢ More than 40% of value added is from metals mining, and more than 40% of total employment is in the metals VC.
  - ➢ Limited opportunities outside the metals VC, and reduced demand for businesses/employers operating in these areas.

Recommendations

In light of the risks and impacts facing workers and communities in the metals VC, three SJRP priorities emerge:

- A deliberate shift to renewable energy.
- Economic diversification in mining dependent regions.
- Strengthening of protections for workers, including UIF, and TERS.

Thank you

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