MINERALS COUNCIL
SOUTH AFRICA

11 February 2026

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Topic: South Africa's Critical Minerals and Beneficiation

The **Critical Minerals and Metals Strategy** has a list of 21 minerals and metals in its list. The list, as you are aware has three categories of criticality. In the high criticality minerals list, there are five minerals - **platinum, manganese, iron ore, coal, and chrome**.

The "moderate to high criticality list" has another five minerals: gold, vanadium, palladium, rhodium and rare earth elements. The third category is the list of "minerals with moderate criticality" which has 11 minerals. These minerals are not only abundant in our geology; they are central to industrialisation, energy security, and global competitiveness.
But the real question is: how do we move beyond extraction into beneficiation, creating jobs, industries, and domestic demand?

Let's take the minerals in the high criticality list **platinum, manganese, iron ore, coal, and chrome.** What does the data tell us about the domestic use of these minerals? Using local sales volumes as a proxy of the proportion we beneficiate locally between 2020 and 2024:

- Platinum 3% or 4 t of total production
- Iron ore = 11% or 6.9 million tonnes of total production
- Manganese = 14% or 2.7 million tonnes of total production
- Coal = 69% or 163 million tonnes of total production
- The chrome data is quite shaky

From this list it is clear that we have done well in coal beneficiation which we use for power generation, chemicals and synthetic fuels.

Just to remind ourselves the applications or commercial uses of these minerals:

- **Platinum**: Used in catalytic converters, jewellery, medical devices, and increasingly in hydrogen fuel cells—positioning South Africa in the clean energy transition.
- **Manganese**: Essential for steelmaking and battery technologies, particularly in electric vehicles.
- **Iron Ore**: The backbone of steel production, feeding construction, infrastructure, and manufacturing.
- **Coal**: Still dominant in electricity generation but also used in chemicals and synthetic fuels.
- **Chrome**: Critical for stainless steel production and alloys, supporting manufacturing and export industries.

The fundamental question of why we beneficiate is usually half answered. Typically, you would hear policymakers talk about we cannot export our minerals raw and that's where they end. You also hear that we should beneficiate to create jobs.

One answer that gets closer to the reason for beneficiation is "so that we can industrialise". However, the reason we beneficiate minerals is so that we solve our problems as a country. For example, we have been struggling with issues of energy, infrastructure (road, bridges, dams) we should use or beneficiate to solve those problems.

Some of the challenges we have to directly deal with so that we move up the beneficiation frontier are the following:

- **Capital inadequacy**: Beneficiation plants require billions in upfront investment, often beyond local financing capacity.
- **High energy costs**: Beneficiation is energy-intensive, and South Africa's electricity tariffs undermine competitiveness.
- **Infrastructure bottlenecks**: Rail, ports, and logistics constraints raise costs and reduce reliability.
- **Skills development**: Training engineers, metallurgists, and technicians to sustain beneficiation industries.
- **Policy uncertainty**: Frequent regulatory changes discourage long-term investment.
- **Global competition**: Countries like China dominate mineral processing, making entry into markets difficult.

One of the countries we can learn from when it comes to beneficiation is Finland. Finland has pursued a deliberate strategy of mineral value addition, anchored in its **National Mineral**

Strategy. The country recognised that simply exporting raw ores would not maximise economic or technological benefits, so it invested heavily in downstream processing, research, and innovation. Finland's approach emphasises aligning mineral development with the **EU's critical raw materials agenda**, while also building domestic industrial capacity. This has meant fostering strong linkages between mining companies, technology developers, and universities, ensuring that minerals are not only extracted but also transformed into advanced products for batteries, clean energy systems, and high-tech manufacturing.

The strategy also integrates sustainability, circular economy principles, and environmental safeguards, positioning Finland as a responsible supplier in global mineral chains.
The Finnish list of priority minerals reflects both domestic geology and global demand trends. It includes **nickel, cobalt, lithium, graphite, and rare earth elements**, alongside traditional strengths in copper, zinc, and platinum group metals. These minerals were chosen because of their importance in **battery technologies, renewable energy systems, and digital industries**.

For example, Finland has become a European hub for **battery precursor production**, leveraging its nickel and cobalt resources, while also investing in refining lithium and developing recycling systems for critical materials. By focusing on value addition, Finland has moved beyond being a raw material supplier to becoming a strategic player in the clean energy and technology value chains.

What instruments has Finland used to promote the link between its priority minerals and industrialisation and what can we learn as South Africa? Finland has used a mix of **policy, institutional, and financial instruments** to link its priority minerals with industrialisation.

- **Policy instruments**: At the core is the **National Mineral Strategy**, coordinated by the Ministry of Economic Affairs and Employment, which sets clear objectives for value addition and integration into the EU's clean energy and digital transition. As South Africa we have the Critical Minerals and Metals Strategy. That's good start.
- **Institutionally**, the government of Finland has invested in **research and innovation ecosystems**, particularly through the Geological Survey of Finland (GTK) and partnerships with universities, to ensure that mineral extraction is tied to advanced processing and technology development. As South Africa, we already have institutional capacity, the question is, to what extend will there be a deliberate resource injection to advance the aspirations of the Critical Minerals and Metals Strategy. In fact, this take me to an important aspect that I need to mention. Except for a few aspects including …electricity tariff funding of between R23.8 bn to R44.2 bn and the R400 million in

exploration funding made by the IDC, generally the Strategy is not costed. President Trump's economic programme has a cost attached - **$3.4 trillion!**

- **Financially**, Finland has used three broad instruments: i) **public-private investment vehicles**, ii) innovation funding, and iii) EU-backed financing to de-risk large capital projects. It has also embedded **circular economy principles**, encouraging recycling and secondary use of critical minerals to sustain industrial supply. Together, these instruments have allowed Finland to move beyond raw mineral exports, positioning itself as a European hub for **battery materials, clean energy technologies, and advanced manufacturing inputs**. Countries that have generally experienced sustainable economic growth, on average spend between 3% and 5% of GDP on research, development and innovation. In 2024 South Africa spent R56 bn which is the equivalent of 0.8% of GDP.

South Africa's mineral wealth is undeniable. But wealth in the ground is not prosperity in society. By focusing on beneficiation - turning platinum into hydrogen fuel cells, manganese into battery materials, iron ore into steel, coal into chemicals, and chrome into stainless steel - we can transform our economy. All to solve our problems, then we will be beneficiating for the right reasons.

The choice before us is clear: remain a supplier of raw commodities or become a global leader in mineral-based industries. Beneficiation is not just an economic strategy - it is a national imperative.

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