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Critical Minerals Office
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By email: CMOconsultation@industry.gov.au

RE: Critical Minerals Strategy 2023

The Australian Industry Group (Ai Group) welcomes the opportunity to provide feedback on the development of a new Critical Minerals Strategy 2023.

Ai Group is a peak national employer association representing and connecting thousands of businesses in a variety of industries and sectors across Australia. Our membership and affiliates include private sector employers large and small from more than 60,000 businesses employing over 1 million staff.

Ai Group welcomes the Australian Government's development of a new Critical Minerals Strategy. Australia was one of the first countries to develop a specific critical minerals strategy in 2019. This was updated in 2022 to reflect a growing suite of policies designed to support the industry's development.

These strategies have proven highly successful, providing a framework for the rapid growth of critical minerals production over the last four years. The expansion of Australia's lithium mining has been extraordinary; while we have consolidated our international market presence in the highly-strategic rare earths sector.

However, the rapid pace of change in global markets and technology for critical minerals warrants taking a fresh look at national strategy in 2023.

There is a strong consensus that further developing the critical minerals industries would benefit Australia's economic, strategic, technological and climate interests:

- Critical minerals are essential for the clean energy transition, and global demand is forecast to grow by large multiples in coming decades.
- Australia has rich geological endowments in most critical minerals, and the knowledge and skills base to successfully develop higher value-add downstream technologies.
- They can enable Australia to 'climate proof' our resource sector, by progressively transitioning our export profile from hydrocarbons to critical minerals
- They are a foundation for closer economic ties with key strategic partners – including Europe, the UK, the US and Japan – who are seeking new supply from reliable partners
- A domestic critical minerals industry could also insulate Australia against the effects of potential supply chain shortages or disruptions for these commodities.

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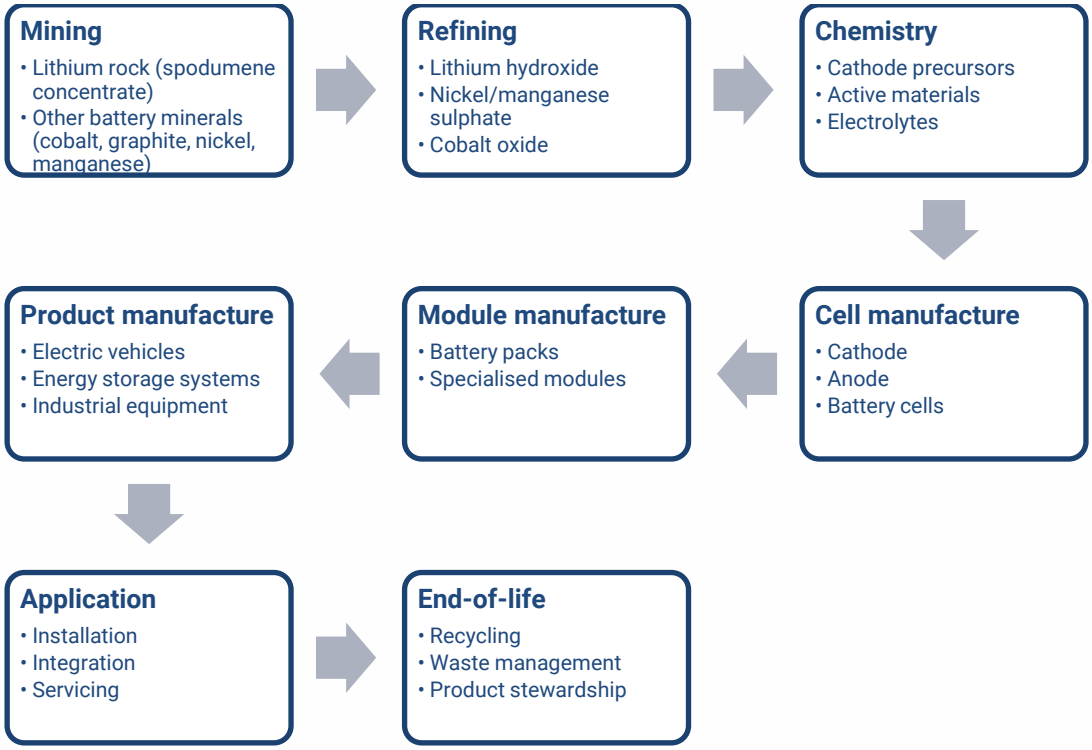
However, there are multiple paths the development of critical minerals in Australia might take.

Critical minerals are not strictly an 'sector', but an integrated value chain that spans several distinct industries: mining, chemical processing, advanced manufacturing, energy production and distribution, and end-of-life services. The chart below provides a simplified illustration of the technical value chain lithium-ion batteries, used widely across the clean energy ecosystem. Similarly complex value chains exist for alternate battery technologies (e.g., vanadium redox flow) and permanent magnets (used in the renewables, EV and defence sectors).

Simplified technical value chain for lithium-ion batteries



While functionally linked, each industry within a critical minerals value chain has distinct features and needs. Some stages offer opportunities which are better suited to Australia's resource endowments and technological capabilities than others.

While the recent growth of critical minerals mining has been rapid, Australia is yet to see strong capability development in the mid- and down-stream stages of the value chain. This is arguably a natural path for an emerging industry to take. Australia has initially focused on developing the stage of production – mining – in which we have the strongest existing industrial capabilities.

As the critical minerals mining sector quickly matures, it is imperative for government policy to pivot towards supporting the next phase of industry development. This involves seizing sequential opportunities that emerge further along the value chain. With mining capabilities now in place, critical minerals processing is the next opportunity that Australia should target.

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1. Mid-stream processing is the next step for critical minerals industry development

Increasing value-add for Australia's resource production is a key focus for critical minerals policy. Critical minerals are unique insofar as the bulk of value-adding occurs in the mid- and down-stream stages of the value chain, rather than upstream mining. A 2018 Austrade study estimated that only 0.53% of value in the global battery industry was captured in Australia at the time, despite Australia producing around half the world's primary lithium[i].

There is clearly room for Australia to capture a greater share of value from our critical minerals by developing value-add industries.

These value-add industries need to be developed in a sequential way, with each step being built upon success in the last. Our proven mining capabilities provide a foundation for the next steps in the value chain – refining and chemicals processing – to be competitive in Australia. Processing 'near the mine' greatly reduces transport and trade costs, and allows economies of scale to be achieved that ensure global competitiveness.

In batteries, the next stage for Australia is lithium hydroxide, then cathode precursor production. For permanent magnets, it is rare earth oxide separation, then metallisation.

Australia can and should harbour ambitions to advance further along the value chain to downstream manufacturing. However, this will rely on our successful establishment of mid-stream processing capabilities first. An Australian battery industry will not be competitive if our lithium must be exported for processing in Asia, then imported back for cell manufacturing. Capability gaps at mid-stream will block developments further downstream.

There is ample scope for expanding Australia's mid-stream processing capabilities. At present, there are two lithium hydroxide processors in Australia, with a third in development. These only have scale to process a small fraction of total lithium (spodumene concentrate) production. Australia has one company which can process separated rare earths and a second refinery in development, but the former relies on offshore processing for final separation stages. More local mid-stream capability is essential before downstream manufacturing will be competitive.

A focus on mid-stream processing will unlock additional mining opportunities. Many Australian rare earth projects cannot establish a "direct route to customer," as they market a product (mixed rare earth oxides) which is one step short of customer needs (separated oxides). Without local processing, these projects cannot compete against foreign suppliers with a 'full stack' supply chain. Nickel, cobalt, and manganese all face similar challenges. Additional processing capability will help bring more critical minerals mining projects to market.

Mid-stream processing in Australia is aligned to the needs of our strategic partners. Many critical mineral value chains have heavy concentration at the mid-stream, with China often dominating global production. Japan, the US, UK, and EU all have critical mineral strategies that aim to introduce greater competition at the mid-stream, by bringing new and more trusted suppliers into the value chain. Australia is ideally positioned to attract the investment and technology needed for mid-stream processing from these partners.

Mid-stream processing should be the focus for the next iteration of Australia's critical minerals

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development. Previous critical minerals strategies have established the required foundations in mining, and we can now mature policy effort to processing industries. When these efforts succeed, future critical minerals strategies can then iterate to make manufacturing the central focus.

2. **End-of-life capabilities provide Australia important critical minerals opportunities**

Critical minerals have received considerable attention for their role in supporting the clean energy transition – whether for EVs, renewable energy, or energy storage systems. But far less commercial or policy attention has been paid to the end-of-life implications of the clean energy transition.

In coming years, clean energy sectors will generate large quantities of end-of-life waste, in the form of decommissioned products containing batteries and/or permanent magnets. Managing these new waste streams will prove a significant environmental challenge for countries around the world.

Australia's strength in critical minerals offers advantages in developing end-of-life capabilities in the clean energy sector. The products of the sector – recyclates from batteries and permanent magnets – are themselves a feedstock for critical minerals processing industries. Recycling capabilities in Australia will be 'close to market' for their final products, and provide an additional resource stream for the processing industry. Australia's strong ESG credentials make it an attractive investment location for critical minerals recycling.

In the short term, the rapid growth in demand for clean energy technologies means that primary minerals will dominate the value chain. But as the sector matures, recyclates will become an increasingly important source of critical minerals. Australia will be competitively placed if we can offer both primary (mineral) and secondary (recyclate) resource streams.

End-of-life capabilities are therefore complementary to Australia's critical mineral efforts. Investment in basic research and early-stage commercialisation projects now will ensure Australia has a globally competitive knowledge base when this industry moves to scale and maturity in the late 2020s.

Should you wish to discuss the matters raised in this submission, please contact our Director of Research and Economics Dr Jeffrey Wilson at jeffrey.wilson@aigroup.com.au

Sincerely yours,

Louise McGrath
Head of Industry Development and Policy

[i] Australian Trade and Investment Commission, *The Lithium-ion Battery Value Chain: New Economy Opportunities for Australia*, Fig 31, 2018.