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Accelerating opportunities in Western Australia's Critical Minerals Sector

CME Introduction

The Chamber of Minerals and Energy of Western Australia ('CME') is the peak representative body for the resources sector in Western Australia. Western Australia's resources sector accounts for two thirds of total Australian mineral and energy production. CME is funded by member companies responsible for 87 per cent of the State's mineral and energy workforce employment,[1] ranging from mining (mineral and petroleum commodities), manufacturing (alumina, basic inorganic chemicals and explosives) and support services (aviation, gas transmission pipelines and electricity supply).

The significance of Western Australian's minerals and energy industries to national and State economies cannot be overstated. In 2021-22, the industry recorded a record export value of $231 billion,[2] with iron ore generating the most value with sales of $137 billion.[3] Petroleum products (including crude oil, condensate, liquefied petroleum gas and national gas) followed at a record of $50.2 billion, with gold sales the third most valuable export at a record of $17 billion.[4]

Surging lithium prices and higher local sales volumes drove the value of spodumene concentrate sales to a record $6.8 billion (more than two and a half times the previous record), making it Western Australia's 3rd highest value mineral by sales in place of alumina. Alumina ($6.7 billion), nickel ($4.9 billion and the highest level in almost 15-years), copper (a record $2 billion), mineral sands (a record $1.3 billion), rare earths ($779 million), and cobalt (a record $522 million) sales were all higher in 2021-22, primarily on the back of increased commodity prices.[5]

The value of royalties, North West Shelf grants and lease rentals generated by Western Australian mining and resources sector operations totalled over $12.8 billion in 2021-22.[6] Accounting for 46 per cent of the State's Gross Value Added by industry,[7] the sector is a significant contributor to the local, State and Australian economies.

The resources industry, including our critical minerals sector, plays a key role in regional community and economic development. For example, based on data collected from just 56 CME member companies the sector directly supported 66,870 full time jobs, provided $11.75 billion in salaries and directly supported 14,661 Western Australian businesses across the State through supply chain purchases in 2020-21.[8] And in the Pilbara region, these members directly supported 6,325 full time jobs, $1.39 billion in wages and directly supported 659 Pilbara businesses.[9]

CME's Competitiveness policy portfolio is focused on ensuring a globally competitive and stable environment that recognises the resources sector as a strategic driver of economic development and diversification. A key tenet of this includes advocacy to support competitive policy settings that leverage existing advantages in the production of commodities such as iron ore, natural gas and gold and to facilitate diversification into the production of value-added mineral concentrates, chemicals, and other products.

Capitalising on new opportunities in strategic industries such as critical and battery minerals will play a key role in supporting the decarbonisation of the global economy. CME and its members aim to work collaboratively with stakeholders to establish Western Australia as a domestic producer, user and exporter of competitive critical minerals and value-add products.

CME represents members across the critical minerals value chain in mining, processing and value-add sectors. In arriving at the policy position and recommendations on critical minerals outlined in this document, CME and its members are guided by a series of energy and climate policy principles outlined on the CME website https://www.cmewa.com.au/policy-advocacy/policy-areas/.

[1] Government of Western Australia, *2021-22 Economic indicators resources data*, average number of individuals onsite under State legislation, Department of Mines, Industry Regulation and Safety, 8 August 2022.
[2] Unless otherwise expressly stated, all references to dollars in this report are to Australian dollars (A$).
[3] Government of Western Australia, *Latest statistics release*, Department of Mines, Industry Regulation and Safety, 5 October 2022.
[4] Ibid.
[5] Ibid.
[6] Government of Western Australia, *2021-22 Annual report on State finances*, Department of Treasury, 28 September 2022, p. 8.
[7] Government of Western Australia, *WA Economic Profile – May 2023*, Department of Jobs, Tourism, Science and Innovation, 31 May 2023, p. 1.
[8] CME, *2020-21 Economic Contribution Factsheets*, March 2022.
[9] Ibid.

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Executive summary

The focus on critical minerals has arisen from the need for global action to reduce greenhouse gas emissions. Critical minerals such as lithium, nickel, cobalt, silicon and rare earth elements are essential components in many of today's rapidly growing clean energy technologies. These minerals and others,[10] are considered 'critical' because their use as an input to products of advanced manufacture cannot be easily or cost-effectively substituted, and their supply is concentrated in or constrained by a small number of jurisdictions.

Demand for critical minerals has dramatically increased and is set to double by 2030.[11] Achieving global climate ambitions will require an estimated quadrupling of critical minerals inputs to clean energy technologies by 2040. Achieving net zero globally by 2050 will require at least six times more critical mineral inputs in 2040 compared to 2020.[12]

Western Australia hosts almost all the minerals on Australia's critical minerals list, and many of the minerals on the critical minerals lists of the world's manufacturing economies, together with other commodities that will support the energy transition. Already a globally significant supplier of critical minerals, recent capital investment has seen an iterative movement along the value chain beyond the export of minimally processed raw materials to produce value-added products. Western Australia is the world's largest supplier of lithium, a global top 5 producer of class 1 nickel, rare earths and refined cobalt, and hosts Australia's only silicon metal manufacturing operations.

The prospect of a rapid rise in demand for critical minerals poses questions about the availability and reliability of supply. From a policy perspective, critical minerals markets present a relatively unique strategic consideration – they underpin both the advanced manufacturing industries of the world's major economies as well as the military hardware that is fundamental to national security for those economies.

Policy makers in Australia have a crucial role to play in determining whether and to what extent our critical mineral assets will be vital enablers for clean energy transitions across the globe. Today's supply and investment plans for many critical minerals fall well short of what is needed to support an accelerated deployment of solar panels, wind turbines and electric vehicles ('EVs').[13] There are many vulnerabilities that may increase the possibility of market tightness and greater price volatility for critical minerals, such as the high geographical concentration of production, long project development lead times or higher exposure to climate risks.

Recent supply chain disruptions and geopolitical tensions have led to a re-evaluation of reliance on international trade for key inputs to economies worldwide and have resulted in the establishment of a plethora of bilateral and multilateral trade frameworks targeted at diversifying the sources of supply of critical minerals and associated inputs to the advanced manufacturing process.

There is enormous opportunity for Western Australia to have a world leading, sustainable, value-adding critical minerals sector. However, there is a narrow window of opportunity to capitalise on global critical minerals demand and unlock our potential as a major participant in the supply chain.

To realise shared State and Commonwealth critical minerals ambitions it will be important to focus policy effort on areas of competitive strength. Australia is one of the world's most competitive upstream producers of critical and battery minerals globally, a factor that will continue to increase in importance to Australia's trade partners.

Several challenges remain and future success is not guaranteed. Exploration, development and processing of critical minerals requires enormous capital investment at every stage of exploration and project development, and project financing can be difficult due to market, technical and commercial risk.

Western Australia is considered a high cost environment,[14] and State and Federal policy initiatives supporting the development of the sector are under-resourced relative to competitor jurisdictions. The global marketplace for investment capital is increasingly competitive, and within Australia, the increasing regulatory complexity and costs applied to project development continues to challenge prospective and existing critical mineral operators alike.

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[10] The United States Geological Survey (USGS) includes 50 minerals on their current list of critical minerals whilst the European Union includes 30 minerals on theirs.
[11] International Energy Agency (IEA), *The Role of Critical Minerals in Clean Energy Transitions* , p 8.
[12] Ibid.
[13] For example, sales of EVs and battery storage investment for power this year (US$40 billion) have almost doubled from last year. IEA, *World Energy Investments 2023,* May 2023, p 21.
[14] Australia ranked 19th out of 63 countries in overall competitiveness, however, ranked 38th in the cost structure sub-factor. International Institute for Management Development, *World Competitiveness Booklet 2022*, 15 June 2022, p 54.

The introduction of critical minerals sustainability standards in international jurisdictions, together with evolving domestic obligations under instruments such as the Australian Government's Safeguard Mechanism will require Western Australian critical minerals producers to rapidly decarbonise their mining, processing and refining activities, which will require access to clean sources of energy at an unprecedented scale and the adoption of strategies to minimise scope emissions.

There is a lack of clarity regarding the opportunities arising from the bilateral and multilateral agreements that Australia is a party to, as well as the specific market opportunities presented by the policy interventions and incentives offered in international jurisdictions.

Collaboration between all tiers of government is required to address project development bottlenecks, enhance Western Australia's attractiveness as an investment destination, and fully realise Western Australia's potential in the critical minerals supply chain.

CME has developed this work in close collaboration with its members, and with an evidence base supported by work commissioned by CME and undertaken by Australian Venture Consultants ('AVC'). This position paper incorporates key findings from the confidential AVC report, which contemplates the likely impact of geopolitical tensions on the supply chain dynamics for critical minerals.

Priority recommendations

The following list is a summary of priority recommendations for government to accelerate critical minerals development and capitalise on the opportunities in front of us. Further recommendations are captured throughout the paper with a complete list in the final section.

- Active facilitation is required to drive critical minerals projects that are in the national interest. A key priority of governments should be to identify areas of regulatory overlap (both within and across State and Commonwealth processes) to support ongoing streamlining and regulatory efficiency.
- Australia to maintain its open, rules-based market economy philosophy with respect to foreign trade and investment policy.
- Government to unpack incentives and legislation in other jurisdictions, and leverage bilateral and multilateral agreements to identify and communicate specific market opportunities to industry, optimise diversity of offtake markets and sources of capital investment.
- Government to adopt measures such as grants and tax incentives to improve Australia's (and Western Australia's) investment attractiveness, including for upfront capital outlays.
- Urgent direct investment is required to establish regional clean energy hubs and transmission infrastructure to supply clean energy and support decarbonisation of critical minerals mining, processing and refining activities. Approvals for clean energy projects should be accelerated.
- A sustained policy focus on comparative advantages to encourage the upstream and refining segments of these value chains at scale is critical to securing Australia's (and Western Australia's) position in the critical minerals supply chain.

Defining critical minerals

The generally accepted definition of a critical mineral is any metal or non-metal required as raw material for the manufacture of technology-oriented products such as batteries, semiconductors, circuitry and other advanced manufactured products that exhibit the following characteristics:

- Their use as an input to the manufacture of a product cannot be easily or cost-effectively substituted; and
- Their supply is concentrated in or constrained by a small number of jurisdictions from either a primary production or downstream supply chain perspective.

Partly as a result of the term's nebulous nature, but primarily reflecting the differential experiences of individual manufacturing economies there are several lists of critical minerals promulgated by multiple nation-states, multilateral bodies and industry groups.

Australia defined 26 minerals in its 2022 critical minerals list, which included grouped minerals such as Rare Earth Elements ('REE', which collectively comprise 16 light and heavy rare earth minerals) and Platinum Group Elements ('PGE', which collectively comprise 6 metals). In 2020, the European Union ('EU') defined a critical minerals list containing 30 minerals,[15] while the United States ('US'), as an advanced manufacturing economy particularly affected by critical minerals market dynamics defined its critical minerals list to include 50 specific minerals, which includes approximately half of the 16 light and heavy rare earths.[16]

Similar critical minerals lists have been defined by other jurisdictions including Japan, the Republic of Korea ('Korea'), Republic of India ('India'), Canada and the United Kingdom ('UK'). Despite the differences in the number of minerals deemed critical by each jurisdiction, substantive commonality exists between the lists, all of which include minerals in which Western Australia is richly endowed, such as the 'battery minerals' of lithium, nickel, cobalt, REEs and manganese.

Western Australia is already a critical minerals powerhouse

Western Australia hosts almost all the minerals on Australia's critical minerals list, and many of the minerals on the critical minerals lists of advanced manufacturing economies such as the US, EU, India, and Korea including high purity alumina, cobalt, lithium, graphite, magnesium, manganese, nickel, palladium, PGEs, REEs, silicon and vanadium.

The State also hosts other minerals that will support the global energy transition, such as iron ore, copper, bauxite and zinc. Recent years have seen capital investment in excess of $9 billion and an iterative movement along the value chain beyond the export of raw materials to refined products.

Western Australia currently hosts three lithium hydroxide facilities, a nickel sulphate refinery, a nickel and cobalt metals refinery, a silicon metal refinery and a rare earths processing facility, with a rare earths refinery under construction and other minerals processing facilities planned or under development.

Hosting over 99 per cent of Australia's lithium deposits,[17] Western Australia is the world's largest lithium supplier, accounting for 54 per cent of total global raw lithium production in 2022.[18] Production is expected to double by 2029-30, by which time the State will be producing enough spodumene concentrate to manufacture one million tonnes of lithium hydroxide annually.[19] Western Australia's lithium hydroxide production is forecast to reach 250,000 tonnes annually by 2025-26.[20]

Western Australia is the largest single source of alumina in the world, producing 45 per cent of Australia's alumina and accounting for 11 per cent of global supply.[21]

A global top 5 nickel producer, Western Australia currently produces around 130,000 tonnes of Class 1 nickel, the preferred feedstock for the manufacture of battery grade nickel sulphate. Total Class 1 nickel production is expected to increase to 150,000 tonnes annually by 2029-30.[22]

Western Australia is a global top three producer of rare earths, its two operating mines accounting for 69 per cent of national production, and approximately 11 per cent of global rare earth concentrate production. Rare

[15] European Commission, *Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability*, 2 September 2020.
[16] USGS, *2022 Final List of Critical Minerals*, 2 February 2022.
[17] Geoscience Australia, https://www.ga.gov.au/scientific-topics/minerals/mineral-resources-and-advice/australian-resource-reviews/lithium.
[18] S&P Global Market Intelligence (annual 2022).
[19] AVC, *Geopolitics: drivers of a shift in the competitiveness of WA domestic downstream minerals processing?,* February 2023.
[20] Australian Aluminium Council, https://aluminium.org.au/australian-alumina/.
[21] Geoscience Australia, https://www.ga.gov.au/education/classroom-resources/minerals-energy/australian-mineral-facts/aluminium.
[22] AVC, *Geopolitics: drivers of a shift in the competitiveness of WA domestic downstream minerals processing?*, February 2023.

earth concentrate production is forecast to increase from around 66,000 tonnes currently to 200,000 tonnes by 2029-30, as well as capacity to produce 30,000 tonnes of rare earth chemical concentrate and up to 23,000 tonnes of separated rare earth oxides.[23]

Western Australia produces approximately 5,900 tonnes of highly refined cobalt metal per annum,[24] the fourth largest producer of cobalt globally, behind the Democratic Republic of Congo ('DRC'), Indonesia and Russia.[25]

Australia's only high purity silicon metal manufacturing operations are also situated in Western Australia and produce approximately 52,000 tonnes of silicon metal annually.[26]

Western Australia hosts almost all of Australia's estimated PGE resources, including the largest PGE discovery globally in two decades, a strategic asset given approximately 78 per cent of global supply is concentrated in Russia and South Africa.[27]

Demand for critical minerals is underpinned by the global energy transition

The focus on critical minerals has arisen from the need for global action to reduce greenhouse gas ('GHG') emissions. At the Paris meeting of the United Nations Conference of Parties ('COP'), 196 parties agreed to limit global warming to well below 2, preferably 1.5 degrees Celsius compared to pre-industrial levels.

To achieve these objectives, parties agreed to achieve climate neutrality by mid-century and reach global peaking of GHG emissions as soon as possible. The Paris Agreement ('The Agreement') was vital for establishing National Determined Contributions ('NDCs'), whereby signatories outlined specifically how they would meet this goal every five years.[28] The Agreement provided a global structure with regular time frames to assess action transparently while allowing individual signatories to act relative to specific challenges within their jurisdiction.

However, since the Agreement, a series of studies indicated that action under current NDCs in the aggregate are insufficient to limit warming to 1.5 degrees Celsius. For example, the Intergovernmental Panel on Climate Change concluded the Agreement goals would not be met unless there was an '*immediate, rapid and large scale*' reduction in GHG emissions.[29]

The United Nations Emissions Gap Report[30] found that the world must cut emissions by at least 45 per cent by 2030 to avoid a global climate catastrophe. Countries have recently set more ambitious goals to reduce emissions in the shorter term in response to these findings. For example:

- The EU has committed to at least a 55 per cent net reduction in emissions from 1990 levels by 2030[31]
- The UK enshrined its target to cut emissions by 68 per cent by 2035 compared to 1990 levels[32]
- The G7 agreed to lower the group's emissions by 60 per cent by 2030 relative to 2010 levels[33]
- Australia has committed to a minimum reduction of 43 per cent reduction in emissions by 2030 relative to 2005 levels.[34]

Within the private sector, many energy and mining companies have established decarbonisation roadmaps to achieve net zero emissions reduction targets,[35] with executive remuneration increasingly linked to emissions key performance indicators, and accounting for climate change risk incorporated into investment (or divestment) decisions.

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[23] AVC, *Geopolitics: drivers of a shift in the competitiveness of WA domestic downstream minerals processing?,* February 2023.
[24] As a co-product of nickel production.
[25] USGS, *Mineral Commodity Summaries 2023*, 31 January 2023.
[26] AVC, *Geopolitics: drivers of a shift in the competitiveness of WA domestic downstream minerals processing?,* February 2023.
[27] Statista (2023), Supply of palladium worldwide in 2020 and 2021, with a forecast for 2022, by country, and Global platinum mine production 2021.
[28] Australia's current NDC is to achieve an economy wide emissions reduction of 43 per cent below 2005 levels by 2030.
[29] Intergovernmental Panel on Climate Change, *Sixth Assessment Report*, Working Group I report, 9 August 2021.
[30] United Nations Environment Programme, *Emissions Gap Report 2022: The Closing Window — Climate crisis calls for rapid transformation of societies*, 27 October 2022.
[31] EU, Update of the NDC of the European Union and its Member States – December 2020.
[32] Department of Business, Energy, and Industrial Strategy, UK of Great Britain and Northern Ireland's NDC, September 2022.
[33] Climate Analytics, *G7 Climate Policy: What good looks like.*
[34] Australian Government, *Australia's NDC Communication 2022*, Department of Industry, Science, Energy and Resources (formerly, now DISR).
[35] Australasian Institute of Mining and Metallurgy requires all members to meet 10 sustainable development principles, including net zero scope 1 and 2 GHG emissions by 2050 or earlier, https://www.icmm.com/en-gb/our-principles.

In pursuit of these emissions reduction objectives, the world is transitioning from a fossil fuel–intensive to a minerals-intensive energy economy. Demand for critical minerals has dramatically increased and is set to double by 2030.[36] Achieving the Agreement's goal will require an estimated quadrupling of critical minerals inputs to clean energy technologies by 2040, and achieving net zero globally by 2050 will require at least six times more critical mineral inputs in 2040 compared to 2020.[37]

Meeting this primary demand will require strong growth in investment to bring forward new supply sources over the next decade. The World Bank estimates that US$1.7 trillion in global mining investment will be required to facilitate the transition to net zero emissions by 2050.[38]

Today's mineral supply and planned investment demonstrate a mismatch between global climate ambitions and the availability of the critical mineral inputs essential to realising those ambitions.[39]

Past strains on the supply-demand balance for minerals have prompted additional investment and measures to moderate or substitute demand, which have been accompanied with time lags and considerable price volatility. For example, in 2010 the People's Republic of China ('China') intervened to limit exports of REEs which caused prices to escalate by a factor of ten.

This extreme price movement triggered many countries to consider options to reduce material intensity, find substitutes and diversify sources of production. Japan introduced a comprehensive policy package to reduce consumption, secure diversified supply sources and promote recycling. As part of the package, Japan offered a US$250 million loan to Lynas Corporation, which was the only major non-Chinese source of REE production at the time, to secure diversified supply.

Particularly given the low substitution potential of many minerals that are considered critical minerals, similar circumstances in the future could delay clean energy transitions and result in cost escalation.

Critical minerals supply risk and the impact of geopolitics on trade patterns

The 21st century digital economy, energy transition, energy security and defence applications and implications of critical minerals have not been lost on industry, world governments and multilateral entities.

> *Risks to critical mineral supply chains can come about when mineral production or processing is dominated by individual countries or companies that could limit availability. Other risks include market immaturity, political decisions, social unrest, natural disasters, mine accidents, geological scarcity, pandemics, and war.*
>
> Geoscience Australia

Broadly, supply risk is the probability that a problem with the inbound supply of raw materials or precursors will disrupt business operations. In the classical sense, this may include shortages or unavailability of materials, increased prices of materials, unfavourable terms offered compared to other purchasers, late or failed delivery, erratic or extended turnaround times, exchange risk, procurement risk (fraud, shrinkage), or reputational risk (e.g. child labour). These risks may be multifactorial and compound across supply chains, particularly as the complexity and length of those supply chains increases (which is frequently the case with respect to supply chains that include critical minerals).

At the other end of the spectrum, risk may also be heightened where market power becomes overly concentrated in the hands of one supplier, particularly where that supplier is also vertically integrated with or deeply embedded in a rival enterprise competing to serve the same downstream customers. This holds true in both business dealings and nation-state geopolitics.

The current supply of many critical minerals is geographically concentrated. China, for example, produces approximately 85 per cent of refined rare earths and cobalt chemical, 75 per cent of the lithium-ion battery value chain,[40] and approximately 80 per cent of the manufacturing stages of the solar photovoltaic value chain (polysilicon, ingots, wafers, cells and modules) – a share that is predicted to reach almost 95 per cent by 2025.[41] Similarly, approximately 85 per cent of the supply of PGEs is concentrated between South Africa and Russia.[42]

[36] IEA, *The Role of Critical Minerals in Clean Energy Transitions* , p 8.
[37] Ibid.
[38] The World Bank, *Mineral-Rich Developing Countries Can Drive a Net-Zero Future*, 6 June 2022.
[39] IEA, *The Role of Critical Minerals in Clean Energy Transitions* , p 11.
[40] AVC, *Geopolitics: drivers of a shift in the competitiveness of WA domestic downstream minerals processing?,* February 2023.
[41] IEA, *Special Report on Solar PV Global Supply Chains*, July 2022.
[42] IEA, *The Role of Critical Minerals in Clean Energy Transitions*, p 30.

Recent supply chain disruptions and geopolitical tensions have led to a re-evaluation of reliance on international trade for critical inputs to economies worldwide, and have resulted in the establishment of a proliferation of bilateral and multilateral trade frameworks targeted at diversifying the sources of supply of critical minerals and associated inputs to the advanced manufacturing process.

Processing has become an increasingly important issue, particularly in the context of Australian sovereign capability. Australia has entered into a number of bilateral agreements with various jurisdictions to encourage cross-jurisdictional participation and investment flows with respect to critical minerals, including the Australia-United States Climate, Critical Minerals and Clean Energy Transformation Compact, a Critical Minerals Partnership with Japan, a Memorandum of Understanding on Cooperation in Critical Minerals Supply Chain with Korea and the Australia-India Economic Cooperation and Trade Agreement.

In addition to the above bilateral country-to-country links, Australia is also a partner or participant in a number of critical minerals-focused multilateral agreements, including the Minerals Security Partnership, Five Eyes Critical Minerals Alliance, Supply Chain Resilience Initiative, Energy Resource Governance Initiative and Critical Minerals Mapping Initiative.

Australian Critical Minerals Strategy

The Commonwealth Government first released an Australian Critical Minerals Strategy in 2019, which was subsequently updated in March 2022, with a vision for Australia to become a *'critical minerals powerhouse'* which is *'integral to international critical minerals supply chains'* by 2030.

The strategy is currently undergoing a further review and while the 2023 critical minerals strategy has, at time of writing, yet to be published, the 2023 Australian Critical Minerals Strategy discussion paper[43] identified that the new strategy will 'help Australia add value to our resources, grow our domestic downstream processing and manufacturing industries and support decarbonisation', and would reflect:

- The important role Australia's critical minerals can play in helping Australia and international partners achieve their emissions reduction targets.
- The imperative to bring Australian projects online quickly to support diversified critical minerals supply chains and markets.
- The growth of Australia's domestic manufacturing and industrial sectors.
- Australia's ongoing commitment to the highest environmental, social and governance ('ESG') standards.

As noted in CME's submission to the discussion paper,[44] the proposed objective of the Strategy to capture Australia's opportunity *'to cement itself as a global supplier of choice for processed critical minerals'* is strongly supported.

CME also specifically welcomed the discussion paper's acknowledgement of *'the imperative to bring Australian projects online quickly to support diversified critical mineral supply chains and markets'*. While Australia is already a globally renowned supplier of critical minerals to global markets, analysis undertaken in consultation with CME members indicates that the majority of existing and planned production is already committed to offtake partners.

It cannot be overstated that for Australia to decarbonise and to support international partners in meeting their decarbonisation targets, the **expansion of existing mines, development of new mines, further value-add processing and continued exploration to support new discoveries and establish the future project pipeline will be required**.

Implementing the Strategy

CME notes, in addition to articulating the strategic importance of critical minerals development within Australia, the Government has also committed funding to support these objectives, including:

[43] DISR, *Australia's Critical Minerals Strategy: Discussion Paper*, December 2022.
[44] CME, *Australian Critical Minerals Strategy 2023: Discussion Paper*, submission to DISR, 13 February 2023.

- $29 million[45] in Tranche 2 grant funding issued to Western Australian critical minerals projects by the Commonwealth Government Critical Minerals Development Program to accelerate the development of projects which is intended to support Australia's soon to be released Critical Minerals Strategy.
- Committing $57.1 million over four years to further develop the Critical Minerals International Partnerships program, to secure strategic and commercial partnerships. This investment builds on the $2 billion Critical Minerals Facility and $1 billion targeted to value adding in resources, under the $15 billion National Reconstruction Fund.
- Committing $21.2 million to ensure the ongoing operations of the Critical Minerals Office, responsible for policies, programs and international engagement, as well as $2.2 million to the Treasury, to establish data analysis capabilities to track foreign investment patterns and compliance in the critical minerals sector.

To date, funding commitments focused specifically on critical minerals industry development or attracting new investment capital have been relatively modest. Funding initiatives have consisted primarily of concessional finance, typically allocated to feasibility studies, engineering design work, and building pilot or demonstration facilities. Grant funding or Government expenditure on research, development and extension has predominantly been short-term in nature and focused on 'known' technical challenges or barriers to entry. Government support of the necessary quantum to facilitate critical mineral production at scale has historically been limited.

It remains unclear how the recently budgeted funds will be expended and what impact they might have, particularly noting the significant competition with, and investments being made in other jurisdictions. In this context, and as outlined further below, CME encourages the Commonwealth Government to focus the critical minerals strategy effort on initiatives targeting where Australia can be economically competitive, and leveraging our existing strengths to ensure maximum return on these investments.

Western Australian Critical Minerals Strategy and Initiatives

In 2019, in recognition of the rapidly evolving landscape and in anticipation of the market opportunity, the Western Australian Government established its inaugural Future Battery Industry Strategy[46] with a vision that, by 2025 Western Australia '*has a world leading, sustainable, value-adding future battery industry that provides local jobs, contributes to skill development and economic diversification, and benefits regional communities*'.

The strategy was renamed the Future Battery and Critical Minerals Industries Strategy in November 2020, with revised priorities following the impact of COVID-19 on market trends, broadening the focus from battery minerals to incorporate critical minerals. The following priority areas are articulated in the recently developed 2023-24 work plan:[47]

Priority 1 – Becoming a destination of choice for advanced critical mineral processing

Activities focus on creating a more favourable investment environment for midstream proponents by prioritising and addressing investment barriers at a whole-of-sector level, and developing a practical plan as to where and how the Government intends to curate industry development.

Priority 2 – Accelerate battery manufacturing and recycling opportunities

Activities focus on collaborating with industry to develop and actionable business case for battery manufacturing in Western Australia, and eliciting support from the Commonwealth Government to help bring this aspiration to fruition.

Priority 3 – Promoting our investment opportunities

Promoting investment will continue to play an integral role for Government under the strategy. In addition to bolstering the Government's engagement with key overseas markets, the 2022 update to the strategy included an action for the Department of Jobs, Tourism, Science and Innovation (JTSI) to investigate opportunities to host an international battery and critical minerals summit.

[45] https://business.gov.au/grants-and-programs/critical-minerals-development-program/grant-recipients.
[46] Government of Western Australia, Future Battery Industry Strategy – 2019.
[47] Government of Western Australia, Future Battery and Critical Minerals Industries, Ministerial Taskforce, 2023-24 Battery and Critical Minerals Work Plan.

The 2022 updated work plan also articulated additional activities to inform policy, facilitate investment, support research, grow workforce capability and remain dynamic to emerging industry needs and opportunities.[48]

A Ministerial Taskforce was established in 2020 to drive The Future Battery Industry Strategy,[49] however in November 2022,[50] JTSI proposed to reshape industry engagement forums by replacing the Taskforce and working group model with an Annual Roundtable and Targeted Industry Focus Groups. CME will continue to engage closely in these forums and recommends the Government continues to progress this work in consultation with industry.

Given the strategic importance of the development of the critical minerals sector, the continued focus at the most senior levels of Government will be important to the delivery of the strategy, and in conjunction with policy settings and initiatives to enhance the investment attractiveness of Western Australia, would send a strong signal to the market regarding the opportunities here.

Implementing the Strategy

In addition to articulating the strategic importance of critical minerals development within Western Australia, the State Government has also committed funding to support these objectives, including the following measures announced in the 2023-24 State Budget:

- $40 million for the Sustainable Geoscience investment package to accelerate critical minerals resource discoveries in Western Australia.
- $1.7 million allocation from the Investment Attraction Fund to implement priority activities relating to the Future Batteries and Critical Minerals Industries Strategy.

While not specifically targeted to critical minerals, CME was also pleased to see:

- $2.8 billion in budgeted investment to decarbonise the South West Interconnected System (SWIS), which includes $2.7 billion to build battery storage capacity at Collie, $126 million for Western Power to scope, plan and commence work to unlock existing renewable generation capacity on the Western Power transmission network, and $1.25 million for Energy Policy WA to investigate renewable energy hubs.
- $31.6 million to accelerate environmental approvals for green energy projects.
- An additional $35 million in the 2023-24 budget to support business case development, Native Title and environmental de-constraining of industrial land.

However, in the context of potential midstream and downstream critical minerals-exposed manufacturing, the overall quantum of government support is low. For example, the largest grant source available to industry is the potential $13.2 million set aside to incentivise domestic cathode material manufacture. By way of comparison, the New South Wales State Government has allocated $30 million under its own Future Industries Investment Programme. For more defined programmes, the largest Western Australian Government grant source available is the geographically restricted Collie Future Industry Development Fund, offering up to $2 million in matched funding. These examples stand in stark contrast to incentives offered by other regional governments, such as South Korea's recently announced US$15 billion in funding to develop advanced battery technologies.[51]

Further, much of the Western Australian Government's focus to date has been on start-up, small-scale and niche enterprises. While such enterprises are a valuable sector of an overall State economy, and, if successful, are likely to grow over time and enable an ecosystem of supporting service providers, delivering significant multipliers and co-benefits, they are unlikely to dramatically shift the dial on the overall structure of the Western Australian economy. The quantum of support offered, together with the time and phase-limited nature of its restriction to early-stage enterprises, may restrict the ability of any resulting enterprise to achieve a scale beyond what the Western Australian economy could naturally support.

In the context of the above, and as explored in more detail below, CME encourages the Western Australian Government to focus the critical minerals strategy and policy effort on initiatives targeting where Western Australia can be economically competitive, and leveraging our existing strengths to ensure maximum return

[48] Ibid.
[49] Government of Western Australia, Future Battery Industry Strategy – 2019.
[50] Government of Western Australia, Future Battery and Critical Minerals Industries, Ministerial Taskforce, 2023-24 Battery and Critical Minerals Work Plan.
[51] Reuters, *South Korea announces $15 billion investment in advanced battery technologies*, 20 April 2023.

on these investments. CME further encourages the Western Australian Government to work with the Australian Government to ensure that Commonwealth incentives and grants are designed to be accessible by Western Australian Government.

Seizing the economic opportunity

There is enormous opportunity for Western Australia to have a world leading, sustainable, value-adding critical minerals sector. However, as recognised in the State and Commonwealth critical minerals strategies, there is a narrow window of opportunity to capitalise on global critical minerals demand and unlock its potential as a major participant in the global critical minerals supply chain.

A number of challenges exist that warrant increased focus by governments in order to secure Western Australia's position in the critical minerals industry:

The exploration, development and sustainability of critical minerals mining, processing and chemical conversion operations typically face complex technical and logistical challenges in addition to substantive regulatory and environmental complexity and significant capital intensity at every stage of project development. The technical processes associated with conversion of critical minerals into value-added chemical products are energy, water and reagent intensive, and revolve around technology and know-how that produces products of very high purity within tight specifications.

To justify the investment associated with constructing processing infrastructure, critical minerals operators require certainty of a sufficiently long mine life, ability to ramp production in response to market demand, economically competitive access to the required capacity of energy, reagents and water, robust enabling infrastructure, and the ability to accommodate staff.

As well as the physical infrastructure needed to support the growth of new projects, access to services continues to be a significant challenge. Addressing regional access to services such as primary healthcare, regional childcare and law and order are important steps that would not only support the development of critical minerals resources, but the wider sector.

The increasing global focus on ESG matters has resulted in several international jurisdictions mandating ESG provenance requirements for critical mineral inputs to advanced manufacture products. For example, the EU has revised the EU Battery Directive to introduce new sustainability measures, including limiting the carbon footprint of all raw material inputs to batteries, with gradually increasing obligations scheduled to apply from 2024.[52]

Such measures will require critical minerals producers to accelerate decarbonisation of operations, sourcing energy from renewable and other low carbon sources and adopting electrification (or alternative low or no emission technologies) across vehicle and machinery fleets, and are likely to influence investment decisions with respect to the location of value-add processing infrastructure.

While Australia has low risk ESG credentials relative to many other critical minerals rich regions, and is ranked 7th globally based on the World Bank's Worldwide Governance Indicators,[53] the rigour of its underlying governance structure results in significantly higher regulatory complexity and cost burdens relative to competitors, inhibiting investment attractiveness.

A persistent skills shortage exists across the mining sector, with enrolments in mining engineering declining by 63 per cent since 2014.[54] Training and research in key disciplines currently underserved in the Australian University sector, such as geometallurgy, metallurgy and mineral process engineering will be required if Australia is to build the skills base to capitalise on the global decarbonisation opportunity.

Challenges and recommendations of most relevant to the sector in Western Australia are discussed in the subsequent sections of this position paper.

Active facilitation by government to drive these projects that are in the National interest, together with application of prudent policy levers to address these challenges will be integral to securing Western Australia's position as a strategic critical minerals trade partner.

[52] European Parliament Legislative Train Schedule, *New Batteries Regulation: A European Green Deal*. The European Commission has recently proposed The Critical Raw Materials Act which will set clearer actions such as shorter permitting timeframes. Proposal for a regulation, 16 March 2023. *Critical raw materials: Ensuring secure and sustainable supply chains for EU's green and digital future*, press release, 16 March 2023.
[53] Austrade, *Strong Foundations: Worldwide Governance Indicators 2020*, 2021.
[54] Minerals Council of Australia, *Minerals Tertiary Education Council Key Performance Measures Report*, 2018.

Ensuring the security of supply of critical raw materials

Since the forecast price for critical and battery minerals is expected to peak around 2030[55] and energy demand per capita in Asian developing economies will continue to increase through to 2030, it is crucial that the Western Australian Government work alongside the Commonwealth Government to ensure that project development and productivity are not undermined by inefficient regulation and unnecessarily burdensome administrative compliance.

While Western Australia continues to be one of the world's most attractive jurisdictions for mining investment, and Australia's highest ranked jurisdiction, the State's policy perception index ranking[56] declined in 2022 due to increased concerns over its taxation regime, uncertainty regarding environmental regulation and regulatory duplication and inconsistencies.

Efficiency in project approvals

Inefficient, costly and duplicative assessment and approvals requirements continue to contribute significant delays and excessive cost burdens for critical minerals projects, acting as a disincentive to investment and impeding economic productivity. These issues are consistently cited by industry as the most prohibitive barriers to progressing projects to greenfield production or brownfield expansion – the latter frequently underpinning decisions to invest in additional value-add refining capacity.

The end-to-end approvals process can take 10 to 15 years[57] from exploration to mining stage, during which the State and Commonwealth environmental approvals process alone typically consumes 2 to 5 years. Current proposals for cost recovery through these processes are estimated to involve upfront costs in excess of $3 to $5 million, excluding the extensive costs associated with developing the studies and work required to submit these approvals.

These inefficiencies render it difficult for proponents to capitalise on escalating market demand relative to competitors, and reduce Western Australia's attractiveness as an investment destination.

In contrast, these approvals in some international jurisdictions can generally be achieved in a matter of months. For example, in 2022, 67 percent of mining projects in the United States received all required approvals and permits to conduct exploration activities in less than 6 months, compared to 40 percent in Western Australia.[58] International jurisdictions are increasingly adopting streamlined 'one agency' approvals processes for qualified mine development and critical infrastructure projects. The introduction of the Fixing America's Surface Transportation Act (FAST-41)[59] and the associated Permitting Council in the United States has seen qualified project approvals in less than a year from permitting dashboard project posting date.[60]

Proposed reforms across climate, heritage and environment policy at state and national levels exacerbate uncertainty, and if poorly designed, significantly increase the risk of introducing further duplication to the regulatory environment.

CME welcomed the establishment of the Streamline WA initiative in 2018, which was intended as a whole-of-government initiative aimed at improving regulation and regulatory practice across all tiers and agencies of government. However, in the experience of CME members, this executive-led government reform agenda has to date not delivered material improvements in the approval process. In part this is due to a reluctance to pursue legislative reform to remove the need for double-handling as well as inconsistencies in the adoption of Streamline WA initiatives between agencies, diluting cumulative efficiency benefits. Concurrently, industry has experienced a continued deterioration in processing and application of the multi-agency approvals framework, which is where the most urgent attention is required.

CME welcomed the recent funding allocation of $31.6 million to accelerate environmental approvals for green energy projects as part of the recent State Budget and look forward to working with the 'green approvals' teams as they are established and fully resourced across JTSI and the Department of Water and Environmental Regulation.

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[55] Driven by steep demand from front-loading of net zero commitments, inducing supply reactions and reducing market tightness after 2030. Boer.L, Pescatori A and Stuermer M, *Energy transition metals*, International Monetary Fund Working Paper WP/21/243, October 2021, pp. 26.
[56] Fraser Institute, *Annual Survey of Mining Companies 2022*.
[57] IEA, *The Role of Critical Minerals in Clean Energy Transitions* , p 122.
[58] Fraser Institute, *Annual Survey of Mining Companies 2022*, p 51
[59] United States Environmental Protection Agency, *FAST-41 Coordination*.
[60] Derived from: United States Permitting Dashboard, Federal Infrastructure Projects, https://www.permits.performance.gov/.

A key priority of government should be to identify areas of regulatory overlap (both within and across State and Commonwealth processes) to support ongoing streamlining and regulatory efficiency.

Through initiatives like Streamline WA and 'green approvals' the Government has demonstrated that it understands that ineffective regulation increases the costs and difficulties of doing business, and is committed to modernising and streamlining administrative processes and regulation and timeframes through a whole of government approach.

CME remains supportive of these initiatives and encourages Government to continue to collaborate with industry to ensure they deliver on objectives, including ongoing prioritisation of regulatory efficiency mapping and removal of duplication.

It is noted both the Australian and Western Australian governments are increasingly looking to cost recovery models to support the delivery of regulatory services. CME considers it is critical that fee-for-service models are based on an efficient unit cost, not historical actual costs, and should be aligned to customer service performance indicators and drive ongoing efficiency improvements. **CME's position remains that business must not bear the cost of inter-and intra-agency inefficiencies due to regulatory duplication and internal constraints.**

CME appreciates the ongoing skills constraints impacting both regulators and industry alike. In addition to directed programs to address skills shortages, CME recommends available resourcing be continuously reviewed to ensure allocation to highest and best use.

Where resourcing constraints exist, the use of private sector expert environmental and heritage consultants, for example, should be expanded to augment capacity within the public sector and support efficient processing of applications, enabling greater throughput of approvals, enhanced productivity, and greater investment in projects.[61]

While approval agency resourcing needs to be sufficient to meet demand for services, CME recommends process improvements be prioritised alongside targeted capacity building to ensure highest and best use of limited resources.

The investment landscape has become increasingly challenging

Access to capital can be a major barrier, particularly for junior and mid-tier proponents

The exploration, development and processing of critical minerals deposits requires enormous capital investment at every stage of project development. Critical minerals assets are frequently developed by junior or mid-tier mining companies with a market capitalisation of less than $5 billion.

Access to external capital is typically required, however, financing can be difficult due to risk, particularly since the exploration and project development cycle is long, critical minerals markets are relatively volatile and lack pricing transparency.

Challenges associated with very high up front capital costs, accessing project financing and risk underwriting domestically have historically prompted early-stage explorers and developers of critical minerals deposits to negotiate raw material off-take arrangements with offshore processors in exchange for project funding. In the absence of more competitive fiscal settings, this trend risks perpetuating a cycle of offshore processing, inhibiting Australia's ability to value-add domestically.

If early-stage projects were able to be supported or financed within Australia without the need to sell off-take to offshore processors, more raw material would be available for processing domestically.

The availability of targeted incentives or other financing options in Australia could provide alternative financing pathways and increase opportunities to capture more of the value chain domestically.

Access to turn-key ready serviced land is limited

Critical minerals processing requires access to a substantial quantum of reliable energy supply and vast quantities of high-purity water, and conversion of mineral concentrates into value-added chemical products

[61] Many examples exist across jurisdictions of prequalified experts assisting in the documentary and assessment work to improve efficiency.

generates large volumes of waste that must be disposed of responsibly. In the context of accelerated emissions-reduction targets, it is increasingly important for processing and refining infrastructure to be situated within reasonable proximity to critical minerals mine assets.

Unlike competitor jurisdictions, it can be difficult to access suitable 'turn-key' ready land with available access to adequate services such as water and energy supply, chemical inputs, transport logistics and port throughput capacity, further increasing the time and cost burden on project proponents, and redirecting capital investment into processing infrastructure to more competitive jurisdictions.

Australia is considered a high-cost environment relative to its competitors[62] and faces higher costs[63] associated with labour, land, transport, tax rates,[64] perceived high foreign investment fees and cost of regulatory complexity.[65] Western Australia's approach to developing strategic industrial land has traditionally required the first proponent to fund the cost of the enabling infrastructure and services to enable the development of industrial activities. In some cases, strategic industrial areas that have been earmarked by government to accommodate mineral processing activities remain unserviced by power and water, which is a major impediment to attracting capital investment in processing infrastructure to these sites, due to the magnitude of the additional cost and time burden to render the sites development ready.

While the Western Australian Government has allocated an additional $35 million in the 2023-24 budget to support business case development, Native Title and environmental de-constraining of industrial land, CME considers additional investment is likely to be required to establish Western Australia as a competitive investment destination for value-add processing infrastructure.

Investing upfront in the required approvals to unlock regional strategic industrial estates, together with investment in enabling infrastructure and services such as power and water will improve Western Australia's competitiveness as an investment destination.

CME encourages the Western Australian Government to de-bottleneck industrial land and develop strategic, turn-key ready industrial hubs to improve Western Australia's investment attractiveness.

The quantum of investment and government intervention to support downstream industries in competitor jurisdictions is unprecedented

Western Australia has progressed along the value chain in the refinement and production of battery grade chemical products, and is well positioned to capitalise on market opportunities to grow its market share in these products, particularly given the quantum of critical minerals reserves, location of existing projects and refining infrastructure. However, these are complex projects which are highly capital (upwards from $2 billion), energy and resource intensive and which are, in the Australian context, likely to be captured as Safeguard-liable emitters.

Investment choices are made in a global context, with some jurisdictions providing significant incentives and concessions to underpin the establishment of critical and battery minerals processing and downstream value chains domestically, such as in the US with the introduction of the *Inflation Reduction Act of 2022* ('Inflation Reduction Act').

The Inflation Reduction Act forms part of the Biden Administration's 'Build Better Back' framework and builds on earlier US initiatives targeted at capturing investment and generating employment associated with emissions reduction, decarbonisation and national security, including the Infrastructure Investment and Jobs Act of 2021, the CHIPS and Science Act of 2022[66] and the America COMPETES Act of 2022.[67]

Government initiatives to support the development of Australia's critical minerals sector, including downstream capability total between $3.6 and $18.0 billion.[68] To place this in an APAC regional perspective, initiatives that are designed to enhance the US critical minerals supply chain capabilities, supply security and downstream industry total approximately US$700 billion.[69]

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[62] Australia ranked 19th out of 63 countries in overall competitiveness, however, ranked 38th in the cost structure sub-factor. International Institute for Management Development, *World Competitiveness Booklet 2022*, 15 June 2022, p 54.
[63] Australian Manugacturing Growth Centre,*Manufacturing Competitiveness Plan 2022,* p 42.
[64] Price Waterhouse Coopers (2023), Quick Charts, Corporate Income Tax Rates, https://taxsummaries.pwc.com/quick-charts/corporate-income-tax-cit-rates.
[65] The World Bank, Databank.
[66] Creating Helpful Incentives to Produce Semiconductors.
[67] Creating Opportunities for Manufacturing, Pre-Eminence in Technology, and Economic Strength.
[68] Depending on how broadly you define the sector.
[69] AVC, *Geopolitics: drivers of a shift in the competitiveness of WA domestic downstream minerals processing?,* February 2023.

The introduction of these incentives, the magnitude of which cannot be matched in an Australian context, has intensified competition for global investment capital, particularly in downstream industries, presenting significant challenges to realising domestic downstream ambitions, such as cell and pack manufacturing. For example, eligibility criteria associated with the US Electric Vehicle (EV) tax credit requires all battery components to be manufactured or assembled in North America by 2029.[70]

Further, the 30 per cent investment tax credit for refining or processing of critical minerals in the US is likely to render Western Australia a less attractive investment destination for downstream processing of critical minerals. There is evidence that the extraordinary policy incentives offered in the US are attracting capital from other advanced manufacturing jurisdictions.[71] A case in point, in the six months following the passage of the Inflation Reduction Act, over US$45 billion in investments were announced across the critical minerals and battery supply chain.[72]

Other international jurisdictions have responded to the Inflation Reduction Act with their own significant policy incentives to attract capital investment, including the EU's comprehensive Green Deal Industrial Plan,[73] and the Canadian Government has launched the Canada Growth Fund[74] together with the Made in Canada Plan, which includes generous investment tax credits for investments in clean technologies and critical minerals projects.[75] The Republic of Korea offers a range of tax incentives for qualifying investments in critical mineral and battery industries, including tax credits of up to 40 percent, and tax exemptions including the acquisition and property tax on property acquired for up to 15 years, exemptions from customs duties, Value Added Tax (VAT) and individual consumption tax on imported capital goods.[76]

CME recommends the Commonwealth Government consider measures such as **direct grants and tax incentives to improve Australia's (and Western Australia's) competitiveness as an investment destination, including for upfront capital outlays**.

Western Australian projects need cost certainty and incentives which play to our comparative advantage

While policy incentives observed in international jurisdictions present an opportunity for Western Australian critical minerals producers, it cannot be overstated that the ability to capitalise on the market opportunity relies upon economically competitive production.

Greater certainty around the costs associated with project exploration, development and operation (e.g., regulatory, energy, employment costs, tax, and other fees and charges) are crucial to attracting the quantum of investment required to capitalise on the market opportunity - particularly in an inflationary environment where Australia is competing with international jurisdictions with more favourable cost structures and a lower regulatory complexity.

With respect to strategic cost reduction to incentivise investment into value-add processing, CME considers a targeted incentive (such as a 'value-add' rebate scheme on royalties paid) to apply to strategic second-tier intermediary products be explored by the Western Australian Government. Such a scheme would appropriately recognise the higher capital investment intensity and processing complexity of secondary or tertiary treatments, or increased operating costs associated with producing highly processed and high value saleable products in today's environment, including mineral-derived chemicals, concentrates and pellets.[77]

In conjunction with targeted strategies and incentives at a Commonwealth level, CME considers a targeted value-add incentive to apply to strategic second-tier intermediary products be explored by the Western Australian Government, to support value-adding to existing resource development as well as the domestic development of critical and battery-grade mineral projects.

[70] US Internal Revenue Service, *Internal Revenue Bulletin 2022-52*.
[71] Reuters, *Tesla scales back German battery plans, won over by US incentives*, 22 February 2023.
[72] The White House, *Treasury releases guidance to drive investment in critical minerals and battery supply chains in America,* 31 March 2023.
[73] European Commission, *Green Deal Industrial Plan*.
[74] Canada Development Investment Corporation, *Innovative funding to help accelerate Canada's decarbonization strategy*.
[75] Government of Canada, A made in Canada Plan: Affordable energy, good jobs and a growing clean economy, Federal Budget 2023.
[76] Price Waterhouse Coopers (2023), Worldwide Tax Summaries, https://taxsummaries.pwc.com/republic-of-korea/corporate/tax-credits-and-incentives.
[77] CME, *Mining Amendment Regulations (No. 5) 2019 – Consultation draft*, submission to the Department of Mines, Industry Regulation and Safety, 24 January 2020; AVC, *A case for building resilience into WA's lithium industry*, commissioned by CME and AMEC, June 2020.

It could prove transformational in bringing Western Australian projects to fruition as well as support the viability of existing investments, at a time when global competition to secure stronger footholds across the critical minerals value chain is intensifying.

Supply chain resilience and diversification

The APAC region is comprised of several large end-product markets, and very competitive intra-regional supply chains that service those and other markets around the world. By virtue of a sustained policy direction over the past three decades, China has established itself as the world's most competitive manufacturing economy and the dominant midstream and downstream producer of critical minerals products globally.

While many international critical minerals markets are responding to recent geopolitical tensions and supply disruptions by seeking to diversify supply options, supply chains remain heavily embedded in China. Efforts by non-Chinese APAC economies to grow their critical minerals dependent downstream and manufacturing industries, provide a unique opportunity for Australia as a key supplier of economically competitive inputs. As midstream and downstream processors and advanced manufacturers in APAC and other regions of the world seek to diversify their sources of critical mineral inputs, Western Australian producers of upstream and early mid-stream critical minerals will be presented with new opportunities to secure offtake and source project capital investment.

For example, Australia is one of the few nations with significant endowments of critical and battery minerals that also has a free trade agreement with the US, and hence is expected to be able to satisfy the requirements placed on US EV manufacturers by the Inflation Reduction Act.

The establishment of the Australia-United States Climate, Critical Minerals and Clean Energy Transformation Compact and Australia-United States Taskforce on Critical Minerals is welcomed. It presents an opportunity to not only increase the size of both product and capital markets for the Western Australian critical minerals industry, but also to mitigate capital exposure risk, bolster Australia's supply chain resilience and support the diversification of global supply chains.

Relationships with business partners in China and other APAC nations will remain important for Australia to realise the opportunities and establish the nation as a major supplier of critical minerals products to these markets.

Government engagement with the resources and critical minerals industry to expand opportunities for trade and investment, including promoting Australian and Western Australian industry's world class ESG performance are imperative. Continued international engagement will play a key role in Australia being recognised as an attractive destination for investment in critical minerals and facilitating effective engagement between governments, industry, and research organisations.

Collaboration with the Commonwealth that utilises the various critical minerals bilateral and multilateral agreements to which Australia is party to achieve this outcome will greatly assist Western Australia in growing its critical minerals industry.

The Western Australian Government and the Australian Government should work together to to unpack incentives and legislation in other jurisdictions, and leverage bilateral and multilateral agreements to identify and communicate specific market opportunities to industry, optimise diversity of offtake markets and 'crowd in' project capital investment.

Focus the policy effort in areas of competitive strength

Prior to the introduction of the abovementioned incentives, the US was already ranked as one of the world's most competitive manufacturing jurisdictions, second only to China.[78]

Recent investments in mining and early-stage processing have achieved an iterative movement along the value chain in Western Australia, from producing minimally processed mineral concentrates to producing chemical products such as lithium hydroxide, nickel sulphate, nickel, silicon and cobalt metal, and rare earth chemical concentrate. By 2025, Western Australia will also be producing separated rare earth oxides. However, after approximately a decade of development of critical minerals markets, Western Australia's

[78] Derived World Bank (2022), Data Bank - Manufacturing, value added (% GDP), data series ISIC rev 4; Deloitte, *Global Manufacturing Competitiveness Index*, April 2016; World Economic Forum, *Global Competitiveness Report*, 2020.

competitive participation beyond upstream and early midstream aspects of critical minerals supply chains remains aspirational.

The economics of manufacturing, packaging and other mid-and downstream stages of the value chain differ significantly from those of upstream extraction and refining. Different policy settings regarding taxation, labour conditions and remuneration, capital, environmental impact, as well as prevailing business and investment climate, availability of skilled labour, input and energy pricing, and proximity to logistics routes will influence whether critical minerals businesses will be economically feasible or competitive in a particular jurisdiction, and where along the supply chain businesses in that jurisdiction will be able to effectively compete.

Apart from aspects of natural advantage such as location and population density, the dominance of China has come about as a function of many decades of regulatory settings, facilitative business climate, and the intentional development of an economic structure conducive to such enterprise. Further, for many products of advanced manufacture and enablers of energy transitions reliant upon critical minerals, China as a jurisdiction is both the largest supplier and the largest customer, enabling within-jurisdiction vertical integration and levels of supply chain efficiency and enterprise scaling not attainable in other jurisdictions.

For effective, economic and sustainable critical minerals downstream industries to develop in jurisdictions outside China, the precursor conditions supporting economically competitive large-scale production would need to be at least equalised, if not exceeded.

In the case of lithium-ion batteries, technology learning and economies of scale have seen overall costs decline by 90 per cent over the past decade.[79] This means that raw material costs now loom larger in the overall cost structure, accounting for between 50 and 70 per cent of total battery costs, up from 40 to 50 per cent five years ago.[80]

Australia is one of the world's most competitive upstream producers of critical and battery minerals globally, a factor that will continue to increase in importance to Australia's trade partners.

The ability to capitalise on the opportunities presented through trade partner incentives and optimise the share of economic value captured domestically relies on a continued commitment to maintaining Western Australia's position as a producer of sustainable and competitive upstream raw materials.

Policy settings should encourage the upstream and refining segments of these value chains as well as advancing aspirations to capture further segments of the value chain, where Western Australia can be competitive.

Advocate for maximum trade openness

Western Australia has everything to gain as a supplier of early-stage critical minerals products to increasingly diverse and competitive supply chains that service the global advanced manufacturing industry. At the upstream level, due to its market dominance China accounts for globally significant quantities of all purchase agreements and locked-in supply via offtake agreements, vertical integration of enterprises, and foreign investment in mines and processing plants around the world – including many Western Australian enterprises.

Attracting international investment from strategic partners with technical capability will be critical to acquiring and building capacity if Australia is to secure its role in the supply of critical minerals inputs, and potentially competitively move further along the critical minerals value chain.[81]

CME recommends that the Commonwealth Government maintain Australia's open, rules-based market economy philosophy[82] with respect to foreign trade and investment policy, and optimise opportunities for Western Australian critical minerals producers to secure capital investment from companies operating downstream in other jurisdictions.

[79] IEA, *The Role of Critical Minerals in Clean Energy Transitions*, p 11.
[80] IEA, *The Role of Critical Minerals in Clean Energy Transitions*, p 11.
[81] With the potential exclusion of a few specific Australian national security initiatives.
[82] Noting that there may be exceptions in the national interest.

Accelerating environmental, social and governance obligations present both opportunities and challenges

The need for focused near-term effort on decarbonisation has been accelerated by recent changes to Australia's NDC under the Agreement and proposed reforms to the Safeguard Mechanism requiring 43 per cent reduction in emissions from the heavy industry sector by 2030.[83]

Western Australia's Climate Policy[84] articulates a vision to "*harness Western Australia's innovation and wealth of natural and mineral resources to achieve net zero emissions and ensure a prosperous, resilient future for Western Australia*'. The Western Australian Government recently announced the introduction of legislation to formalise emissions reduction targets, including ambitions to reduce Government emissions by 80 per cent by 2030.[85]

CME members are also implementing plans to reduce emissions[86] to achieve net zero emission targets by 2050 or earlier. The alignment of interests between government and industry to achieve climate targets provides opportunities for mutually beneficial collaboration to establish Australia as an evidence-based, sustainable, and ethical critical minerals producer.

While Australia has lower reported risks to ESG credentials relative to many other critical minerals rich regions, and is ranked 7th globally based on the World Bank's Worldwide Governance Indicators,[87] the complexity of its underlying governance structures results in significantly higher regulatory and cost burdens relative to competitors.

Critical minerals projects are particularly vulnerable to climate risk, in particular risks associated with water and energy. Ensuring sustainable access to clean water supplies will be fundamental to ensuring the sustainability of water-intensive critical minerals processing activities in Western Australia.

A critical challenge to establishing Western Australia as a significant and well-credentialled producer of critical minerals and support decarbonisation is the availability of the sufficient quantum of economically competitive, low-carbon energy generation, storage and transmission capacity.

Decarbonisation and the development of emerging energy industries

Recent international regulatory reform introducing ESG obligations on critical mineral inputs to advanced manufacture products as early as 2024[88] are further escalating the imperative for critical minerals producers to source energy from renewable and low carbon sources and adopt electrification (or alternative decarbonisation technologies) across vehicle and machinery fleets.

However, accessing the required quantum of reliable and economically competitive clean energy supply remains a major barrier to the adoption of clean energy and decarbonisation technologies.

Many Western Australian critical minerals projects cannot access the State's primary electricity network (SWIS) or the North-West Interconnected System (NWIS) due to their geographical location, and have historically relied upon gas or distillate self-generation. For operators that are grid-connected, the existing commercial-scale renewable generation capacity on the SWIS and NWIS cannot accommodate the quantum or reliability of clean energy capacity that will be required to facilitate the transition to low carbon critical minerals products in time to meet targets committed in the interim (i.e. 2030, before net zero by 2050).

The advancement of the technical capability to provide a future-state electricity generation and transmission network which can deliver the required capacity to support decarbonisation will be a critical component in the success of the energy transition and the future of the critical minerals industry in Australia and Western Australia in particular. A critical component to that challenge is the requirement for investment in ongoing research and development for flexible clean energy generation and storage, and process decarbonisation technologies.

[83] Australian Government, *Australia's NDC Communication 2022*.
[84] Department of Water and Environmental Regulation, *Western Australian Climate Policy*, 2020.
[85] Government of Western Australia, *McGowan Government to introduce climate change legislation*, 24 January 2023.
[86] Emissions for the purpose of this report are greenhouse gases as defined in s7A of the *National Greenhouse and Energy Reporting Act 2007* (Cth), which include carbon dioxide, methane, nitrous oxide, sulphur hexafluoride and specified hydrofluorocarbons and perfluocarbons.
[87] Austrade, *Strong Foundations: Worldwide Governance Indicators 2020*.
[88] European Parliament Legislative Train Schedule, *New Batteries Regulation: A European Green Deal*.

Investment in clean energy generation, storage and transmission capacity is required at scale

To reclaim Western Australia's position as a competitive jurisdiction to attract and retain investment, the continued investment by Government to ensure reliable and economically competitive clean energy supply is vital. This includes investing in ongoing research and development for flexible clean energy generation and storage, and process decarbonisation technologies.

Investment in the South West Interconnected System

CME recently consulted with members with current or planned operations located in the region serviced by the SWIS, to forecast aggregate industry electricity demand in the context of company decarbonisation targets. From these discussions, CME estimate the sector's decarbonisation plans will lead to a significant step-change in low emission electricity demand on the SWIS (approximately 2.5 times current demand). Indeed, SWIS transformation to supply low emission, affordable and reliable electricity underpins industries ability to remain internationally competitive.

This step-change in demand is aligned with the State Government's own forecasts, with the SWIS Demand Assessment (SWIS DA)[89] completed in May 2023, forecasting that low emission electricity demand will almost triple under the 'Future Ready' scenario.

While the SWIS can supply incremental renewable energy capacity (to existing grid-connected members), the current generation and storage mix and transmission network capacity cannot provide the required capacity and reliability to support the forecast step-change in demand associated with industry decarbonisation plans.

Industry (existing and future) will require the SWIS to provide a significant portion of this increased electricity demand. While industry will invest in 'behind-the-meter' electricity generation and storage solutions to supplement SWIS supplied electricity, land access and environmental considerations (biodiversity, water supply etc) will restrict the ability of behind-the-meter options to meet the scale of the forecast demand increase. A co-ordinated and strategic supply solution through the SWIS is required to meet forecast demand and ensure that existing and new industry can remain internationally competitive and continue to attract investment funding.

The 2022 Electricity Statement of Opportunities[90] (ESOO) is out of step with domestic decarbonisation commitments[91] and significantly underestimates the rate of electrification that will be required to support decarbonisation objectives forecasting total electricity consumption to be 15,680 GWh by 2029-30 which is roughly half of the demand forecast by the SWIS DA.

CME supports the $2.8 billion budgeted expenditure to decarbonise the SWIS, which includes $2.7 billion to build battery storage capacity at Collie, $126 million for Western Power to scope, plan and commence work to unlock existing renewable generation capacity on the Western Power transmission network, and $1.25 million for Energy Policy WA to investigate renewable energy hubs.

Given the scale of the SWIS transformation required to support existing industry, these planned investments are considered a starting point. There continues to be insufficient actual or planned investment in renewable energy generation and storage in the SWIS to support the development of new critical minerals refining operations and the shared emissions reduction ambitions of critical minerals operators, the Western Australian and Australian Governments. Significantly more investment in low emission generation with matched investment and development of firming technology and storage is required to ensure that electricity supply is reliable.

Beyond the $126 million for Western Power to commence planning for the estimated 4,000 km of new transmission infrastructure associated with the Future Ready SWIS demand scenario, the plan for funding of network augmentation associated with SWIS transformation remains unclear. The Australian Government has established the 'Rewiring the Nation' fund in recognition of the significant investment that is required to support Australia's decarbonisation objectives. It remains unclear if the Western Australian Government intends to access this funding.

[89] Government of Western Australia, *SWIS Demand Assessment 2023 to 2042 A future ready grid*, May 2023.
[90] Australian Electricity Market Operator, *Electricity Statement of Opportunities*, June 2022.
[91] Australian Government, *Australia's NDC Communication 2022*.

Consistent with the SWIS DA, CME member demand is not likely to be distributed evenly rather will be geographically clustered. This provides opportunity for SWIS transformation to occur in stages, targeting strategic zones or hubs. A staged approach to the SWIS transformation may be beneficial to smooth investment and resource requirements which are likely to be constrained in the short to medium term.

Further near-term direct government investment and facilitation to develop clean energy hubs in geographical proximity to large industrial users together with a streamlined project approvals process is likely to be required to achieve shared decarbonisation objectives within the required time horizon. For example, the UK Government recently relaxed planning requirements for utility scale battery storage projects that are co-located with renewable generation, enabling significant additional storage capacity to be brought on line rapidly, through a combination of direct and private investment.[92]

We note progress on decarbonising the SWIS will heavily rely on the recently established Green Energy Directorate to coordinate implementation of their Green Energy Approvals initiative with other government initiatives such as the Future Battery and Critical Minerals Industries, Global Advanced Industries Hub, Sectoral Emissions Reduction Strategy, LNG Jobs Taskforce and WA Renewable Hydrogen Strategy.

Government should consider immediate direct investment, public-private partnerships, or incentivising independent private power producers to establish regional clean energy hubs and transmission infrastructure to supply clean energy to support decarbonisation of critical minerals mining, processing and refining activities.

CME recommends the Western Australian Government access the Commonwealth National Reconstruction, Powering the Regions and Rewiring the Nation funds to assist in funding these investments.

Investment in the North West Interconnected System

Our members operating in the area serviced by the NWIS have similar decarbonisation needs to those serviced by the SWIS. The electrification of industrial and transport processes within their operations to meet 2030 decarbonisation objectives will increase demand for low emissions electricity in the near-term. Government has an opportunity to provide, support or incentivise infrastructure projects which maximise energy transmission efficiency and achieve emissions reductions.

CME notes the Western Australian Government is currently working with industry to examine effective investment by the Commonwealth and State in common user transmission infrastructure in the NWIS, having established the Pilbara Roundtable and supporting Industry Liaison Committee for these discussions. The most recent State Budget outlined upgrades to the Burrup transmission line to be fully recovered by the sole proponent. However, this type of upfront capital arrangement by a single industrial user may not be possible on the SWIS.

Government investment to upgrade and improve energy infrastructure, including connecting industry operations to existing State electricity networks, will have significant impact in moving towards the decarbonisation objective, while at the same time providing industry with access to, and security of, energy supply in the area serviced by the NWIS.

CME recommends the Western Australian Government advocate to the Australian Government for industry and Government access to funding for investment into NWIS and energy infrastructure for regional industry sites.

Water is a finite resource in growing demand

Mining and processing of critical minerals, and in particular, refinement of mineral concentrates to produce higher value products requires access to large volumes of high purity water.

Water scarcity is a major barrier to the development of critical mineral resources,[93] with the majority of Western Australia's critical mineral deposits concentrated in areas of high water stress, and where ground water quality ranges from sea water quality to hypersaline water, which is up to five times saltier than sea water.

While Western Australia already hosts desalination plants, these are typically established to deliver estimated volumes associated with population growth, and do not have the capacity to serve large industrial users. In

[92] UK Government, *Battery storage boost to power greener electricity grid,* 14 July 2020
[93] IEA, *The Role of Critical Minerals in Clean Energy Transitions* , p. 12.

some areas, existing clean water resources are insufficient to serve current demand,[94] and will not be adequate to enable the development of the critical minerals projects that are in the pipeline.

Access to an affordable and reliable supply of clean water will be essential to realising the objectives of Commonwealth and State critical minerals strategies. **CME recommends that Government consider additional direct investment in multi-user infrastructure to support the security of water supply.**

Recommendations

CME and its members aim to work collaboratively with stakeholders to establish Western Australia as a world leading domestic producer, and exporter of competitive critical minerals products.

To address challenges and support Western Australia taking advantage of the critical minerals opportunities, a series of priority recommendations have been identified. These are outlined below:

Ensuring the security of supply of critical minerals and supply chain resilience
Active facilitation by government to drive critical minerals projects that are in the national interest, together with application of prudent policy levers to address these challenges will be integral to securing Western Australia's position as a strategic critical minerals trade partner.
A key priority of governments should be to identify areas of regulatory overlap (both within and across State and Commonwealth processes) to support ongoing streamlining and regulatory efficiency.
Government to unpack incentives and legislation in other jurisdictions, and leverage bilateral and multilateral agreements to identify and communicate specific market opportunities to industry, optimise diversity of offtake markets and sources of capital investment.
Policy settings should encourage the upstream and refining segments of these value chains as well as advancing aspirations to capture further segments of the value chain, where Western Australia can be competitive.
Investment attractiveness
Attracting international investment from strategic partners with technical capability will be critical to acquiring and building capacity if Australia is to competitively move further along the critical minerals value chain.
Australia to maintain an open rules-based market economy philosophy with respect to foreign trade and investment policy, and optimise opportunities for Western Australian critical minerals producers to secure capital investment from companies operating downstream in other jurisdictions.
The Australian Government consider measures such as grants and tax incentives to improve Australia's (and Western Australia's) competitiveness as an investment destination, including for upfront capital outlays.
Accelerate efforts to de-bottleneck industrial land and develop strategic, turn-key ready industrial hubs to improve Western Australia's investment attractiveness.
The Western Australian Government to consider introducing a targeted value-add incentive (such as a rebate scheme) to apply to strategic second-tier intermediary products.
Western Australian projects need cost certainty and incentives which play to our comparative advantages.
Continued international engagement by governments to ensure Australia is recognised as an attractive destination for investment in critical minerals, and facilitating effective engagement between governments, industry, and research organisations

[94] Australian Broadcasting Association, *Piccadilly Street Dam in Kalgoorlie runs dry, prompting call for urgent support*, 1 February 2023.

Given the strategic importance of the development of the critical minerals sector, the continued focus at the most senior levels of government will be important to the delivery of the strategy, and in conjunction with policy settings and initiatives to enhance the investment attractiveness of Western Australia, would send a strong signal to the market regarding the opportunities here.
Facilitating decarbonisation requirements, and ensuring access to clean energy and water
Government should consider immediate direct investment, public-private partnerships, or incentivising independent private power producers to establish regional clean energy hubs to provide clean energy to support decarbonisation of critical minerals mining, processing and refining activities. Given the magnitude and urgency of the requirement for clean energy to establish Australia's (and Western Australia's) ESG credentials and contribute towards State and Commonwealth decarbonisation commitments, approvals should be streamlined for these projects.
CME recommends the Government consider direct investment in multi-user infrastructure to support supplies of critical inputs such as water.
CME recommends the Western Australian Government access the Commonwealth National Reconstruction, Powering the Regions and Rewiring the Nation Funds to assist in funding these investments.
Efficiency in project approvals
CME encourages the Government to continue to collaborate with industry to ensure they deliver on objectives, including ongoing prioritisation of regulatory efficiency mapping and removal of duplication.
It is essential that fee-for-service models are based on an efficient unit cost, not historical actual costs, and are aligned to customer service performance indicators. CME's position remains that business must not bear the cost of inter-and intra-agency inefficiencies due to regulatory duplication and internal constraints.
In addition to directed programs to address skills shortages across regulators, available resourcing and experience should be continuously reviewed to ensure allocation to highest and best use.
Where resourcing constraints exist, the use of private sector expert environmental and heritage consultants should be expanded to augment capacity within the public sector and support efficient processing of applications, enabling greater throughput of approvals, enhanced productivity, and greater investment in projects
While approval agency resourcing needs to be sufficient to meet demand for services, CME recommends process improvements be prioritised alongside targeted capacity building to ensure highest and best use of limited resources.