MINERALS COUNCIL OF AUSTRALIA

SUBMISSION TO AUSTRALIA'S CRITICAL MINERALS STRATEGY: DISCUSSION PAPER

17 FEBRUARY 2023

TABLE OF CONTENTS

10 decadal contributions by Australian mining

$2.4 trillion
EXPORT REVENUE
Australian resources export revenue from 2012-13 to 2021-22.
ABS, *International Trade in Goods and Services*, table 3.

104%
▲ EXPORT REVENUE
Increase in resources export revenue from 2012-13 to 2021-22.
ABS, *International Trade in Goods and Services*, table 3.

21%
▲ GDP GROWTH
Mining share of GDP growth from 2012-13 to 2021-22.
ABS, *Australian System of National Accounts*, table 5.

$143 billion
COMPANY TAXES
Company taxes paid by the mining industry from 2011-12 to 2020-21.
EY, *Royalty & Company Tax Payments*, report prepared for the MCA, 22 June 2022.

$112 billion
ROYALTIES
Royalties paid by the mining industry from 2011-12 to 2020-21.
EY, *Royalty & Company Tax Payments*, report prepared for the MCA, 22 June 2022.

$252 billion
MINING WAGES
Wages paid by the resources industry from 2012-13 to 2021-22.
ABS, *Business Indicators*, table 17.

$24 billion
EXPLORATION
Exploration expenditure from 2012-13 to 2021-22.
ABS, *Mineral and Petroleum Exploration*, table 5.

$246 billion
CAPITAL SPENDING
Mining industry capital expenditure from 2012-13 to 2021-22.
ABS, *Private New Capital Expenditure and Expected Expenditure*, table 19.

82%
▲ CAPITAL STOCK
Increase in real net capital stock from 2012-13 to 2021-22.
ABS, *Australian System of National Accounts*, table 63.

35%▲
WOMEN IN MINING
Increase in females employed in the mining industry from 2012-13 to 2021-22.
ABS, *Labour Force Australia, Detailed*, table 6.

There's more to
Australian Mining
minerals.org.au

EXECUTIVE SUMMARY

The world must undergo an extraordinary deployment of clean energy technologies to achieve global net zero emissions by 2050, along with a massive increase in global production of the material inputs required to manufacture the necessary technologies and infrastructure.

With faster and more streamlined approvals and cheaper energy, the economic opportunity critical minerals present for Australia is significant. Global mining investment is expected to increase by US$100 billion annually from current levels to produce the mineral commodities required for the world to achieve net-zero emissions by 2050.[1] This equates to about A$4 trillion of investment required between now and 2050.

Australia is fortunate to have the mineral resources, stable political system, world leading exploration geoscience and environmental management systems needed to meet the growing global demand for critical minerals, including mineral fertilisers and minerals at risk of longer-term supply disruptions. However, unless the Australian Government puts business growth and investment at the centre of its policy making these attributes are not enough to seize the opportunity before us.

Mining investment cannot be taken for granted in the face of strong and growing competition from other countries. And yet, without investment in mining and early stage processing there will be no opportunity for mid-stage and end stage manufacturing in Australia.

The Australian Government has a clear role in providing policy settings that improve investment conditions for mining in general - and critical minerals in particular - if Australia is to successfully attract the capital and technology needed to capture this opportunity and support long-term industry growth and job creation.

That will require a sophisticated and integrated approach to national and international economic policy. It will require the development of more strategic and economic partnerships that go well beyond free trade agreements and establish mutually supportive domestic policy settings between Australia and its key partners – policy settings that integrate the supply chains for the minerals and manufactures needed by our separate economies. Technology transfer from the USA to Australia is the reason we have an aluminium industry today. Policies, such as the USA's Inflation Reduction Act (IRA) should preference investment in and technology transfer to Australian mining, minerals processing and manufacturing.

The Government should, as a priority, work with its international partners (for example the USA, Japan, South Korea, India, UK and Europe) to establish preferential policy linkages supporting the investment capital, sharing of intellectual property and technology, and the reliable and secure supply of minerals and their manufacture.

However, to successfully establish our mining and manufacturing future we must also look at our domestic policy and regulatory settings. We also need to be competitive as a destination for capital. Our ability to attract the necessary capital and become the lead global supplier of processed critical minerals and metals and their manufacture means we need to find ways to remove our economic and policy friction points and infrastructure inefficiencies that drag on our economic objectives. We need to drive a domestic economic policy realignment that delivers reliable and affordable energy, skills, technology and infrastructure.

Australia is an expensive place to do business. We have a high-cost business environment relative to our competitors in the minerals sector: with a high cost energy and transport infrastructure, chemicals and other inputs, skilled labour, land, transport, tax rates and high costs associated with regulatory processes and approval delays.

[1] S&PGlobal, Metal producers will need to double capex to meet net zero by 2050: BofA. 30 November 2020, viewed 29 September 2022.

There is an opportunity for Australian federal and state governments to work together and bring a co-ordinated strategic approach to common infrastructure planning and investment. The opportunity is to significantly reduce unit costs by identifying and harnessing economies of scale and scope in energy, transport and other input industries for mining, processing and manufacture.

Precincts or hubs that deliver economies of scale and scope could significantly reduce the cost differential across the range of minerals needed for the transition to net zero. Copper, fundamental to electrification and the pathway to net zero by 2050 is not considered a critical mineral despite its predicted short supply globally.

Domestic policy settings and policy stability are also of critical importance to Australia's capacity to attract multi-billion dollar capital investments into mining, processing and manufacturing projects. Currently there are significant policy and regulatory disconnects and differences between federal, state and territory governments that create frictions and inconsistencies, driving up costs, adding delays or worse, driving onshore processing offshore.

Co-ordinated and consistent economic policy and regulation is a priority. The Australian government must work with the states and territories to undertake a strategic review and regulatory-policy map that identifies and removes inconsistencies and conflicts and develops a roadmap to policy and regulatory coordination. The current national hydrogen regulatory review coordinated across the commonwealth, state and territory governments through the Energy and Climate Change Ministers Forum provides an excellent example of how such a review should be progressed for mining, minerals processing and manufacture.

Australia's potential to develop its critical mineral industry is only limited by its ambition, which must be supported by tangible and targeted policies to attract investment.

SUMMARY OF POLICY RECOMMENDATIONS TO SUPPORT INVESTMENT IN CRITICAL MINERALS

High-quality geoscience data

- Expand and permanently fund the Geoscience's Exploring for the Future program to improve the efficiency of and potential returns on public expenditure
- Fund the integration of state geological data into a seamless national system that would improve access to precompetitive data
- Extend the Exploring for the Future program to include geoscience data on previously mined areas to enable the recovery of critical minerals from historic mine sites.

Efficient regulation

- Ensure Commonwealth project approvals are timely, efficient, and streamlined with state and territory processes by:
  - Governments collaborating on prioritising and streamlining assessments and approvals for critical minerals projects
  - Allocating adequate departmental resources and working toward clear timeframes
- Ensure that costs recovered by regulation do not deter minerals investment.

Access to a well-skilled workforce

- Work with industry to develop a skilled workforce for mineral processing with a focus on science, technology, engineering and mathematics (STEM) pathways to support the occupations needed for critical minerals.

Enabling infrastructure and supporting communities

- Designate dedicated critical mineral processing hubs, reducing costs, approval times and improving infrastructure proximate to processing locations
- Better coordination, faster planning and approvals that deliver economies of scale and scope
- Coordinate and provide cost-sharing to reduce project costs associated with critical infrastructure and reliable, affordable energy supply
- Support investment in the development of major toll processing facilities, allowing smaller projects to co-locate and progression into processing to be facilitated through economies of scale and common infrastructure.

Stable and internationally competitive tax settings

- Ensure no new or additional tax imposts
- Retain the fuel tax credit scheme in its current form
- Improve Australia's international competitiveness and attract large-scale investment by reducing the company tax rate to the OECD average for all Australian businesses.

Improved labour productivity

- Ensure workplace relations rules enable enterprises to work with employees in each workplace to lift productivity and increase wages.

An efficient and effective transition to net zero emissions by 2050

- Ensure changes to the safeguard mechanism put the country on a course to achieving its emissions reduction targets while maintaining the international competitiveness of industry by ensuring:
  - An effective cost containment measure to give business certainty over maximum compliance costs as occurs in comparable international schemes
  - Well-resourced support for covered facilities through the transition
  - Accessible and appropriate government support to reduce the risk of facility closure and carbon leakage where emissions reducing technologies are not available and abatement through offsets is not commercially sustainable
- Ensure governments adopt a coordinated policy approach to changes in electricity generation and networks to avoid exposing industrial users to higher cost and greater risk of reduced reliability and security of supply.

Recognition of the link between Intellectual property, technology and investment

- Strengthen relationships with like-minded governments through supply security, favourable economic policy and co-operative partnerships that embed a commitment to investment and technology transfer.

Expanded opportunities for trade and investment

- Work with the minerals industry to expand opportunities for trade and investment, including promoting Australian mining's high environmental, social and governance (ESG) performance
- Facilitate closer and effective engagement between governments, industry, and research organisations to improve co-operation, co-investment and secure supply chains leading to improved investment flows and technology transfers
- Actively promote and support foreign investment into critical minerals projects and ensure regulatory processes are not onerous, complex and costly
- Work with the industry to raise awareness of Australian mining's high ESG performance through the globally recognised accountability framework **Towards Sustainable Mining** and other high standards in trade discussions
- Consult with the minerals industry on the design of funding programs such as the Value-Adding in Resources Fund to ensure support for projects is effectively targeted.

THE ECONOMIC CONTRIBUTION OF THE AUSTRALIAN MINERALS INDUSTRY

The Australian minerals industry is an integral part of the economy and firmly embedded in the nation's future. It is a global leader in providing the essential elements of modern life while growing the economy and sustaining regional communities. Australian mining supports the economic aspirations of Indigenous Australians through local commerce and employment.

Australian mining is the largest contributor to the Australian economy accounting for almost 10 per cent of GDP, the largest source of export income, and supports over 1.1 million jobs at over 200 operating mine sites and in supply chains across the country. Mining uses less than 0.1 per cent of Australia's land area and undertakes continuous rehabilitation of land disturbed during operations.

Since 2013, the industry has produced $2.4 trillion in resources export revenue, $252 billion in mining wages, $143 billion in company taxes, $112 billion in royalties, and generated 21 per cent of Australia's GDP growth.

Australia is the world's largest exporter of minerals and metals, making it an essential part of global supply chains. The country ranks as the top exporter of iron ore, metallurgical coal, alumina, lithium and mineral sands. It is a prominent exporter of uranium (second in the world), thermal coal (second), nickel (fourth) and copper (sixth). Furthermore, Australia is the second-largest producer of gold and a leading producer of critical minerals including lithium, rare earth elements and cobalt. The minerals industry produces these minerals and metals through world leading sustainability standards, including leading-practice environmental management and community engagement.

The minerals industry's substantial contribution to the economy over the last decade is the result of $246 billion of investment in exploration, mining projects and sustaining capital that was made during the expansion of mining that began in the early 2000s. This reflects the years it takes for most minerals and metals projects to go from deposit discovery, obtaining approvals, securing finance, completing construction to production.

It was this investment that took the resources sector's net capital stock to $933 billion, ensuring Australia had the mine production capacity, supporting infrastructure, services and skilled workers to enable the industry to meet growing global demand for commodities.

Analysis by the Centre for International Economics shows that Australian households were $14,800 better off in 2020 owing to the expansion of mining. Put another way, Australia's economic growth would have been 13 per cent lower in 2020 – the first year of the COVID-19 pandemic – had there not been a permanent increase in the size of the mining industry from 2005.[2]

The outlook for the Australian minerals industry is broadly positive, providing it remains competitive at both attracting investment along the entire value chain and being able to diversify to other export markets as required. The industry faces growing competition from other mining jurisdictions. Policies that deliver internationally competitive and stable investment settings are essential for positioning Australia for the next wave of mining investment, including in downstream processing, and maintaining its position as the largest exporter of minerals and metals in the world.

[2] Centre for International Economics, *Estimating the economic benefits of mining expansion and further productivity reforms*, report prepared for the Minerals Council of Australia, Canberra, 31 May 2021, pp. 1f, 10fff.

THE OPPORTUNITY

The mining sector is essential to providing the world with the minerals and metals needed to decarbonise while satisfying growing demand arising from increasing urbanisation and incomes and the digital transformation of economies.

Australia can play an important role in a world in which governments and industrial users are concerned about reliability of supply chains for minerals critical to national security and the economy.

Geopolitical uncertainty along with supply chain shocks and vulnerabilities, and the imperative to achieve global net zero emissions by 2050 have refocused efforts to expand Australia's capacity and capability along the supply chain for critical minerals.

The challenge and opportunity for Australia is to extend its comparative advantage in minerals extraction to downstream processing of critical minerals and advanced manufacturing.

Over the next three decades the world is on track to consume more minerals and metals than the total consumed over the last 70,000 years.[3] By 2050 the minerals and metals required globally each year to decarbonise the electricity sector could be double to nine times the amount produced in 2015, and three and a half to seven times for the transport sector, depending on the speed of emissions reductions.[4] By 2030, global electricity storage alone will require 50 new lithium mines, 60 new nickel mines and 17 new cobalt mines.[5]

This will require a massive uplift in investment in exploration and mining projects along with improvements in productivity from the adoption of new technologies and a more innovative workforce.

The economic opportunity this presents for Australia is significant, but not guaranteed. Global mining investment is expected to increase by US$100 billion annually from current levels to produce the mineral commodities required for the world to achieve net-zero emissions by 2050.[6] This equates to about A$4 trillion of investment required between now and 2050.

Australia is fortunate to have the mineral resources, stable political system, world leading exploration geoscience, and the processing technologies and environmental management systems needed to sustainably help meet this growing global demand.

Australia has over 100 prospective mining and processing projects totalling about $50 billion of investment and potentially providing around 30,000 construction jobs and 20,000 operating jobs.[7] Of these, 86 are critical mineral projects that are yet to achieve final investment approval.[8] Converting prospective projects into actual investment greatly depends on how policy settings affect their return on investment compared to potential projects in other mining jurisdictions.

The opportunity for Australia to increase its contribution to the supply chain for critical minerals through the development of downstream minerals processing and advanced manufacturing remains to be captured. While Australian mining has a strong record of processing minerals and metals, competition from other countries for investment along the critical minerals value chain is strong.

The Australian Government's Critical Minerals Strategy is crucial to unlocking the maximum value embedded in the nation's resource endowment in critical minerals.

---

[3] Guillaume Pitron, 2020, *The Rare Metals War: the dark side of clean energy and digital technologies*. Scribe Publications.

[4] T. Watari et al., 2019, Total material requirement for the global energy transition to 2050: A focus on transport and electricity. Resources, Conservation & Recycling 148, pp.91-103.

[5] International Energy Agency, Global Supply Chains, July 2022, viewed 15 December 2022.

[6] S&PGlobal, Metal producers will need to double capex to meet net zero by 2050: BofA. 30 November 2020, viewed 29 September 2022.

[7] Minerals Council of Australia calculations based on Department of Industry, Science, Energy and Resources, *Resources and Energy Major Projects: 2022*, viewed 20 December 2022.

[8] Minerals Council of Australia calculations based on Department of Industry, Science, Energy and Resources, *Resources and Energy Major Projects: 2022*, viewed 20 December 2022.

SEIZING THE MOMENT

Australia's natural and economic advantages

Along with being able to address other major challenges shaping the world, the scale of the technology-led transformation to global net-zero emissions cannot occur without the minerals and raw materials provided by the mining sector.

Australia's advantages as a major minerals producer are abundant – globally-leading environmental, social and governance frameworks, secure and transparent supply chains, and a rich endowment of the minerals and metals that are in growing demand.

Australia is one of the world's major producers of several key mineral commodities (bauxite, coal, copper, lead, gold, ilmenite, iron ore, nickel, rutile, zircon, and zinc) and also has significant geological reserves of other minerals that are essential for the transformation of global energy and transportation systems to net zero emissions.

As a mining and processing location, Australia has the potential to develop into a major, secure and transparent supplier of a broad spectrum of minerals of importance to addressing global challenges.

Australia is fortunate to have:

- A rich resource endowment, including some of the world's largest resources of minerals such as tantalum, zirconium, titanium, lithium, cobalt, tungsten, vanadium, niobium, antimony and manganese ore
- An existing production capability for lithium, rare-earth elements, cobalt, manganese ore, zirconium and titanium
- A global reputation for extracting minerals safely, sustainably and with robust environmental, social and governance (ESG) standards and labour protections
- An advanced mining equipment, technology and services (METS) sector, which directly serve the mining sector, supported by world-leading general technology vendors
- A highly skilled resources workforce with the diverse and complex skills required by new technologies
- World-leading research, development and technical services through such institutions as the CSIRO alongside significant research partnerships with universities
- Strong and long standing strategic partnerships, including with the United States, United Kingdom, Japan, India, South Korea and Taiwan
- Mature relations with countries in the European Union which are a source of capital, skills and technology transfer.

The linkages between mineral extraction, early-stage processing and manufacturing are strategically important for Australia, particularly considering the recent global geopolitical events and the acknowledgement by governments and industry of the necessity in having access to reliable global supply chains. Those linkages along with its natural and economic advantages have meant that Australia is often recognised as a reliable, safe, and secure destination for capital investment and supplier of materials. This has helped offset Australia's higher cost of production compared to other mining jurisdictions.

However, that situation is no longer guaranteed. Actions by federal and state governments are resetting these perceptions in the minds of long term as well as emerging trading partners, investors and their governments.

The Critical Minerals Strategy can ensure Australia is the preferred place for investment along the critical minerals value chain.

Critical minerals must be defined for Australia's circumstances

- The Australian Government's critical mineral list should be based on a comprehensive assessment of criticality that also accounts for the risk of future market imbalances causing supply disruptions
- Copper, nickel, bauxite (aluminium ore), alumina and aluminium and manganese are essential for the transformation of global energy and transportation systems to net zero emissions and vulnerable to future supply shocks or disruptions
- Potash and phosphate are essential for Australia's agricultural producers who are vulnerable to the disruption of fertiliser supply.

Australia must define its critical minerals from the perspective of a major minerals producer and exporter that both contributes to and benefits from the associated products necessary for the functioning of economies and nations more broadly.

The Australian Government's critical mineral list should include minerals based on a comprehensive assessment of the point of criticality along the supply chain and an understanding of the risk, impact and risk mitigation measures relevant to the specific mineral/metal/manufacture across the entire supply mining, processing and manufacture supply chain. That assessment should account for the risk of market imbalances causing supply disruptions in the future. Given the various approaches to defining critical minerals, it is important that there is also a clear understanding of the underlying economic and physical factors affecting the supply of minerals and the supply risks they pose.

The 'criticality' of a mineral may change over time depending on whether it is essential to society's needs and the nature of the risk to supply disruption. For some minerals like copper, the major risk is a structural supply deficit given the large amount of capital investment and the time it takes to bring a new mine into production. While the risk of a supply disruption for copper is currently extremely low, the supply risk is medium to longer-term. If there is a supply short-fall, prices will rise rapidly and progress on decarbonising economies will slow and put at risk the world achieving net-zero emissions by 2050.

For other minerals, such as rare earth elements, the risk of supply disruption further along the supply chain (downstream processing and manufacture) is more immediate, arising from the highly concentrated geographic location of processing capacity and technical know-how.[9] Awareness of this risk has heightened the need for strategic investments and supporting policies by governments to diversify supply and de-risk supply chains to ensure access to sufficient processing capacity and end-use products.

Minerals including copper, nickel, bauxite (aluminium ore), alumina and aluminium and manganese are critical for the transformation of global energy and transportation systems to net zero emissions. They are also vulnerable to supply shocks due to the risk of insufficient future supply.

Critical minerals should also include potash and phosphate. Australia's agricultural industries are vulnerable to the disruption of fertiliser supply. There is an opportunity for Australia to develop sovereign capability in the production of fertiliser from potash and phosphate. This capability would not only strengthen Australia's national food security and exports, it would also help meet the growing global demand for low-carbon, efficient sources of plant nutrients from low-risk jurisdictions. Demand for reliable sources of fertiliser is increasing and becoming prone to supply risk. In addition to growing world population, recent sanctions and restrictions on potash supplies from Belarus and Russia, respectively, and nationalism in countries restricting and banning food and fertiliser exports, are contributing to a global shortage of fertiliser.

[9] Gielen, D. and M. Lyons (2022), *Critical materials for the energy transition: Rare earth elements*, International Renewable Energy Agency, Abu Dhabi, viewed 9 January 2023.

The strategic importance of the Australian critical minerals industry

- Australia must partner with like-minded countries in closing the critical minerals supply chain
- Providing Australia retains its comparative advantage in the upstream supply of minerals, it is positioned well as a strategic partner in de-risking the supply of critical minerals
- Cooperative partnerships with like-minded countries increases the chances of improved coordination in the design of mutually beneficial policies and the development of transparent and efficiently price markets for critical minerals.

The importance of secure, resilient supply chains and transparent, well-functioning markets for critical minerals has never been greater. Recent geopolitical events highlight the fragilities in commodity supply chains and international trade, and the need for more resilient supply chains. In recent years, the processing of critical minerals has become an increasingly important issue regarding the de-risking of supply chains and building sovereign capability for many countries, including Australia.

The United States thorough the US$369 billion in green subsidies and tax credits to cut emissions provided in the Inflation Reduction Act, and the European Union looking to ease tax credit rules for green industries are key drivers that will re-shape supply chains for critical minerals. While it remains unclear how these initiatives will play out in delivering the clean energy transformation and the opportunities they present for other countries, Australia must partner with like-minded countries in closing the supply chain.

Providing Australia retains its comparative advantage in the upstream supply of minerals, it is positioned well as a strategic partner in de-risking the supply of critical minerals. It has the necessary resource endowment and world-leading expertise in mining and mining equipment, technology and services (METS), and opportunities to develop and extend its comparative advantage further along the supply chain.

Global investment in exploration and new mines for the commodities required to achieve net-zero emissions are not increasing fast enough to meet projected demand. On average it takes about 16 years for a mine to be developed through to the point of first production – 12 years for exploration and feasibility studies and 4-5 years for construction.[10] From discovery to production a nickel mine takes on average 12 to almost 20 years depending on whether its sulfide or laterite, respectively, and a copper mine takes about 16 years.[11]

Recycling and the move to a circular economy will ultimately play a major role in meeting final demand. However, owing to the significant growth in demand, primary extraction and processing of critical minerals will be required at a massive scale for decades.

The critical minerals supply chain can be complex, particularly for rare earth elements. For many critical minerals, the issue is not the existence of a resource in a specific country but rather where the resource is processed. For example, globally there are 84 rare earth element deposits and occurrences, and 11 producing mines.[12] Although China currently accounts for 57 per cent of the world's mined production, there are plenty of opportunities to develop new mines elsewhere. The problem for rare earth elements is in downstream processing and product related manufacture given that China produces around 84 per cent of the world's refined product.[13]

[10] IEA, *The role of critical minerals in clean energy transitions*, viewed 21 January 2023.

[11] Ibid.

[12] British Geological Survey, *Global rare earth element (REE) mines, deposits and occurrences (May 2021)*. Viewed 9 January 2023.

[13] Australian Government, Department of Industry, Science, Energy and Resources, 2021. *Outlook for Selected Critical Minerals*, Australia.

China also holds a dominant global market position in the production of many other critical minerals, especially bismuth (around 79 per cent), tungsten (around 83 per cent) and antimony (around 73 per cent) as well as major positions in the production of many others.[14] While cobalt is mostly mined in the Democratic Republic of Congo, 85 per cent of refined cobalt chemical is produced in China. Most mined vanadium originates in Brazil and South Africa, but the supply of refined vanadium (used in steel and some types of batteries) is dominated by China and Russia.

Australia working in cooperative partnerships with like-minded countries seeking to reduce supply chain risks for critical minerals increases the chances of improved coordination in the design of mutually beneficial policies. It also provides the opportunity for some commodity markets, such as those for rare earth elements to move from opaque, immature market arrangements to transparent and efficiently priced markets.

Establishing a secure supply chain for critical minerals that involves Australia playing a major role requires three interlinked components:

- Deep government to government connections that demonstrates to communities, industry and financiers the strength of the partnerships and their shared commitment to the supply chain
- Capital flows from end-use countries (for example United States, United Kingdom and European Union) into Asia for manufacturing and Australia for mining, downstream processing and some advanced manufacturing
- Material and product flows from Australia through Asian manufacturing to large end use markets in the European Union, United Kingdom, United States, and Asia.

Australia has a strong international reputation as a stable, reliable, environmentally responsible minerals producer. It also has close trading relationships with many like-minded countries including the United States, European Union, United Kingdom, Japan, South Korea, India, Taiwan and Indonesia. These countries provide the market size and scale necessary for creating a resilient supply chain for critical minerals and clean energy technologies based on the development of transparent and efficient markets.

Foreign investment to fund exploration, develop and sustain job-creating projects and gain access to new technologies, skills and capabilities has helped mining become Australia's most successful global industry. Strengthening trading relationships and foreign investment ties, and embedding Australian mining into the critical minerals supply chain, provides greater access to financial capital for upstream expansion. It also enables Australia to benefit from other countries' technology, intellectual property and research and development, which is crucial to developing its capability and capacity further up the value chain.

Greater investment in mining is essential to an effective critical minerals strategy

- Governments cannot afford to be complacent about mining sector investment and must improve conditions for capital investment in Australia
- Investment in mining is a prerequisite to attracting the investment, technology, intellectual property (IP), and specialist skills needed to develop downstream processing and advanced manufacturing
- Policies that ensure Australia is globally competitive at attracting investment in projects along the mining supply chain are necessary for developing and expanding the nation's capability and capacity in the production of critical minerals.

[14] Mudd, G. M., Werner, T. T., Weng, Z.-H., Yellishetty, M., Yuan, Y., McAlpine, S. R. B., Skirrow, R. and Czarnota K., 2018. *Critical Minerals in Australia: A Review of Opportunities and Research Needs*. Record 2018/51. Geoscience Australia.

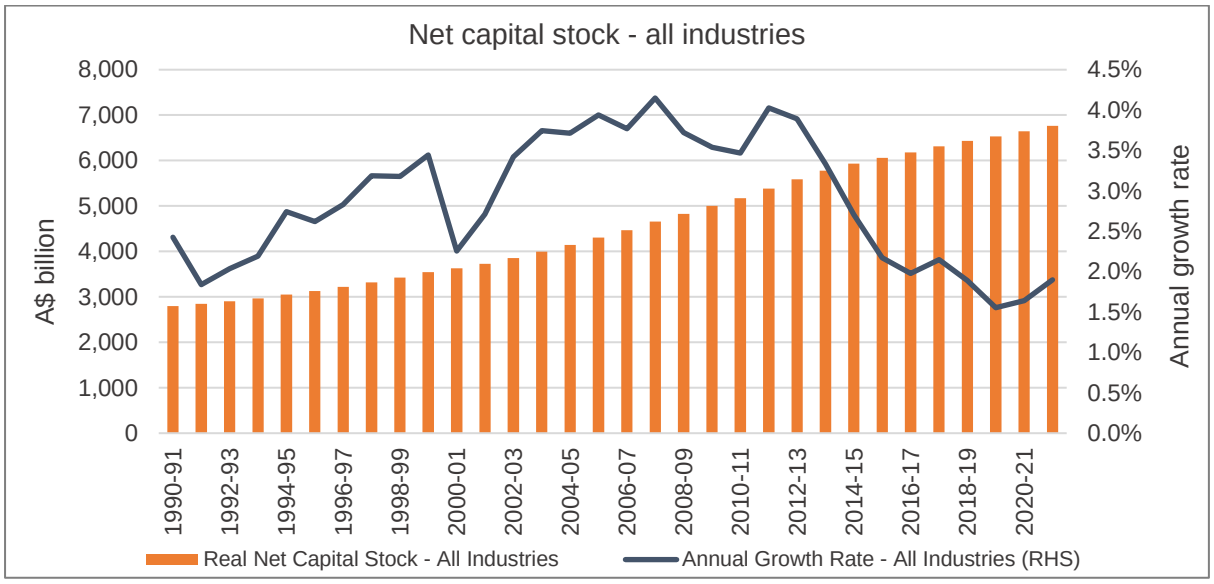
Governments cannot afford to be complacent about mining sector investment. Investment in mining must be seen as the crucial initial point in the supply of capital to Australia' critical minerals sector. Capturing opportunities along the critical minerals value chain fundamentally depends on secure upstream supply and therefore strong investment in exploration and upstream production.

Conditions for capital investment in Australia must be improved.

Global commodity markets are highly competitive and there is strong international competition for investment in exploration, mine development and downstream processing facilities. Traditional mining regions in both North and South America and emerging regions in Africa that offer high-grade deposits or lower construction costs, energy costs and taxes on projects are providing superior capital returns for investors. Analysis comparing effective tax and royalty rates on mining investment shows that Australia faces strong competition from many of these mining jurisdictions.[15]

Over the last decade, Australia has gone from one of the best performing OECD countries for private sector capital investment to one of the poorest performing.[16] Annual growth in Australia's net capital stock slowed substantially, falling by almost two and a half percentage points, and is now growing at almost its lowest rate in 60 years (chart 1).

Chart 1: Australia is experiencing weak private sector investment



Source: Australian Bureau of Statistics, Australian System of National Accounts, released 28 October 2022.

The low rate of growth partly reflects the weak growth that has occurred in the mining sector's capital stock. In the absence of any changes to policy settings to make Australia a more attractive investment destination, capital investment is likely to remain weak.

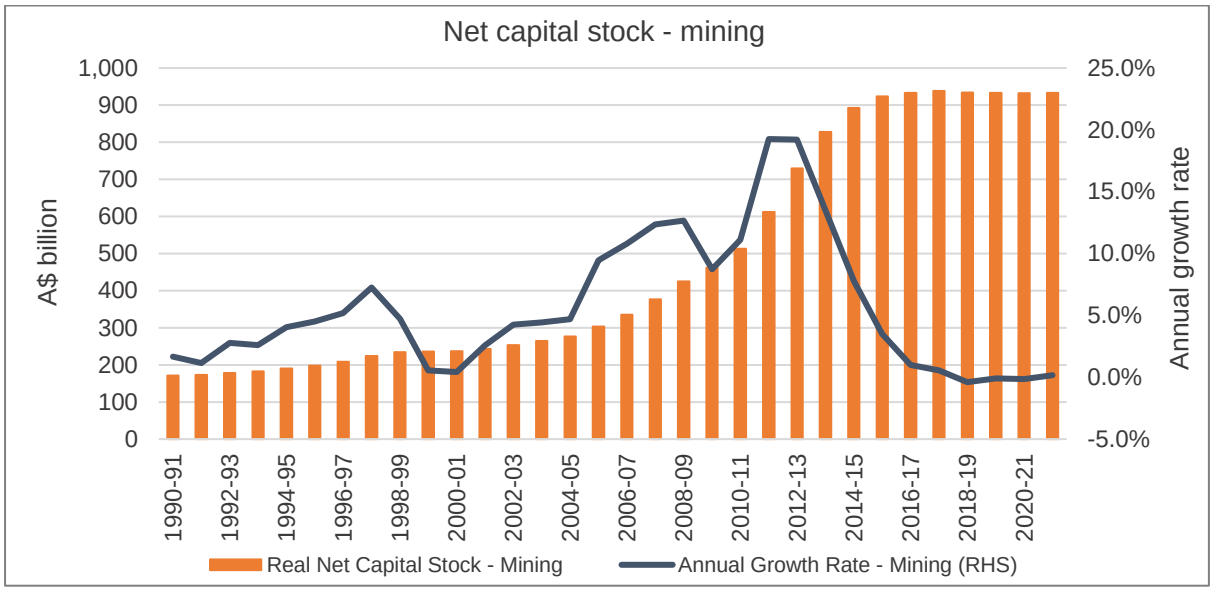
Government has a clear role in providing policy settings that improve investment conditions for mining in general and critical minerals in particular.

Investment in mining is the key prerequisite for Australia to attract the investment, technology and intellectual property (IP) and specialist skills needed to develop downstream processing and advanced manufacturing. The investment hurdles of being a relatively high-cost jurisdiction for downstream activities and Australia's geographic location would be too onerous to support developing processing and manufacturing industries without the advantages of our minerals endowment and world leading mining capability.

[15] P. Bazel and Mintz, J., Corporate tax reform to help address Australia's weak investment performance, Research report prepared for the Minerals Council of Australia, School of Public Policy, University of Calgary, 2022
[16] Ibid., p.5.

In the last decade there has been almost $250 billion of investment in new mines, equipment, and infrastructure. However, the sector's capital stock has plateaued since about 2015-16 (chart 2) indicating that over recent years a large share of capital expenditure was on plant and machinery to sustain operations rather than on new projects.[17]

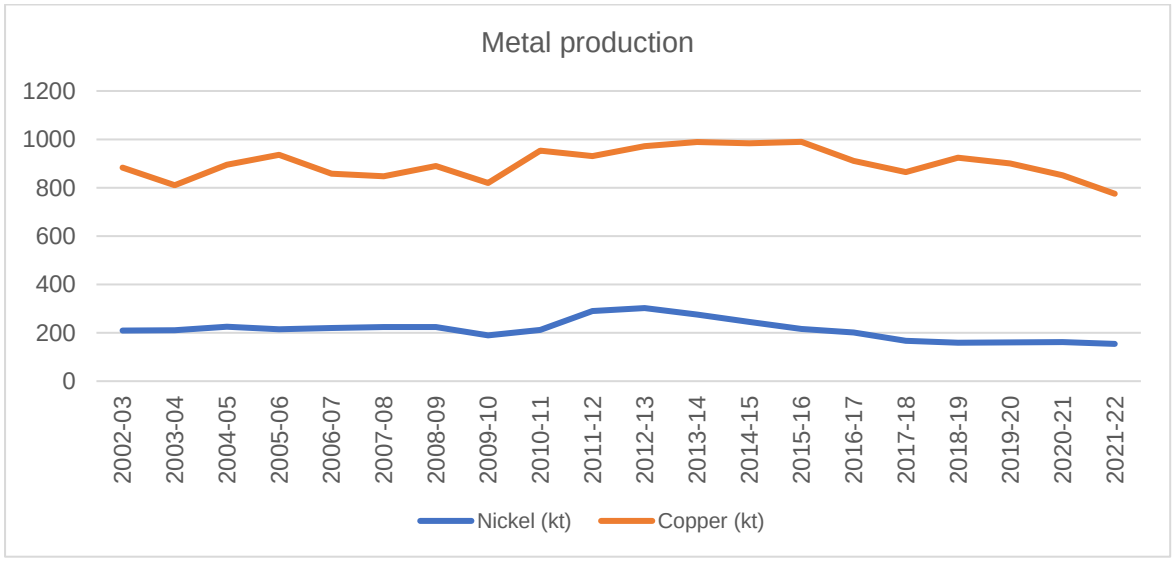
Chart 2: Mining's capital stock has plateaued



Source: Australian Bureau of Statistics, Australian System of National Accounts, released 28 October 2022.

Although capital investment has increased production for some commodities over recent years, others have not fared as well. For example, over the last 10 years, Australia's bauxite mining increased 40 per cent, iron ore production increased 85 per cent and lithium output more than tripled.[18] In contrast, over this period Australia's copper production declined by 25 per cent and nickel production declined by 36 per cent (see chart 3), while global copper production increased by 30 per cent and nickel production by 58 per cent.

Chart 3: Australia's copper and nickel production are declining



Source: Department of Industry, Science and Resources, Canberra, Resources and Energy Quarterly December 2022

[17] See, Department of Industry, Science and Resources, *Resources and Energy Quarterly, June 2022*, p.11.

[18] USGS Mineral Commodity Summaries, 2012-2022, https://www.usgs.gov/centers/national-minerals-information-center/mineral-commodity-summaries. Viewed 2 February 2023.

Over the last twenty years both Australia's copper and nickel mine production as shares of global production have declined by just over one percentage point and four percentage points, respectively. This occurred despite Australia ranking 2nd in the world for copper resources and has 22 per cent of the world's nickel resources.[19]

Much attention is given to minerals like lithium, cobalt and rare earth elements regarding the need to increase supply given the large relative size of increase compared to current production. Compared to these, increases in demand for other strategically important metals such as copper and nickel look small, but even a doubling of their demand requires a substantial increase in new mines.

Policies that ensure Australia is globally competitive at attracting investment in projects along the mining supply chain are necessary for developing and expanding the nation's capability and capacity in the production of critical minerals.

Policy settings must support investment along the entire mining value chain

- Policy settings that improve investment conditions for mining in general – and critical minerals in particular – are critical to Australia's ability to attract the capital and technology needed to capture the critical minerals opportunity and support long-term industry growth and job creation.
- The government should, as a priority, work with its international partners to establish preferential policy linkages supporting commercial co-operation, sharing of capital, intellectual property and technology and a secure, reliable supply of minerals and their manufactures.

Australia needs a clear plan to ensure it has a competitive advantage in mining, downstream processing, and advanced manufacturing, if it is to grow its critical minerals resources and industries. The Critical Minerals Strategy provides this opportunity.

Policy settings that improve investment conditions must be at the centre of such a plan for capital to be allocated to the strongest projects and provide the surest path to long-term industry growth and job creation.

Internationally competitive and stable policy settings are essential to Australia attracting the investment that will maximise the potential value to the economy from the critical minerals supply chain. Policies that support investment flowing to where value can be captured along the supply chain are essential for Australia fully capitalising on growing global demand for critical minerals.

International competition applies both between and within companies. When an Australian division of a global company makes the case for progressing a local mining project to its board, predicable and competitive policy settings are crucial to assessing the risk profile of that project favourably against other investment opportunities in the company's international portfolio.

Although several factors influence the allocation of the industry's scarce capital, policy settings are instrumental in the decisions of mining companies to commit to complex projects with high upfront costs, but multigenerational benefits.

[19] Ibid.

High-quality geoscience data

- The critical minerals sector's long-term success will depend on exploration and, in particular, the discovery of large deposits of global significance.

Recommendation:

- Expand and permanently fund the Geoscience's Exploring for the Future program to improve the efficiency of and potential returns on public expenditure
- Fund the integration of state geological data into a seamless national system that would improve access to precompetitive data
- Extend the Exploring for the Future program to include geoscience data on previously mined areas to enable the recovery of critical minerals from historic mine sites.

The critical minerals sector's long-term success will depend on exploration and, in particular, the discovery of large deposits of global significance.

Exploration is risky and therefore high-quality, accessible pre-competitive geoscience data is critical to maximising the economic returns to Australia from exploration. Government programs that generate precompetitive data play a key role in narrowing the search space for commercial exploration programs. More funding for these programs is needed to speed up the rate of discovery and attract greater greenfield exploration investment.

The Australian Government should expand and permanently fund the *Exploring for the Future* program and fund the integration of state geological data into a seamless national system that would improve access to precompetitive data and assist in identifying potential mineral systems. This includes the provision of geoscience data on previously mined areas to enable the recovery of critical minerals from historic mine sites. The recovery of these materials will become increasingly important as demand for critical minerals grows.

The returns on such programs can be significant. Modelling shows the benefit-cost ratio of the exploration of the East Tennant area undertaken as part of phase one of Geoscience Australia's Exploring for the Future program could be as high as $51 in benefits for every dollar invested.[20]

Providing Geoscience Australia with permanent funding for these activities enables longer-term and better planning, which will improve the efficiency of and potential returns on public expenditure.

Stable and internationally competitive tax settings

- Stable and internationally competitive tax settings are essential to Australia attracting investment in innovative, long-lasting, and large-scale projects in mining and minerals processing.

Recommendation:

- Ensure no new or additional tax imposts
- Retain the fuel tax credit scheme in its current form
- Improve Australia's international competitiveness and attract large-scale investment by reducing the company tax rate to the OECD average for all Australian businesses.

Stable and internationally competitive tax settings are essential to Australia attracting investment in innovative, long-lasting, and large-scale projects in mining and minerals processing. High profits at one part of the cycle must be balanced against large and irreversible amounts of expenditure at other

[20] ACIL Allen, Exploring for the Future Program: Return on Investment Analysis, a report commissioned by Geoscience Australia.

parts of the cycle, including exploration, mine development and expansion, replacement investment, introduction of new technologies, and rehabilitation.

For Australia to improve its international competitiveness in attracting investment into critical minerals there must be no new or additional tax imposts on the industry. The fuel tax credit scheme must be retained in its current form. Fuel tax credits are not a subsidy and are based on the fundamental tax policy principle that business inputs should not be taxed.

The company tax rate must be reduced to the OECD average for all businesses. Corporate tax rates have a significant impact on project investment decisions and are used by many countries to attract foreign investment. There is significant variation in corporate tax rates across Australia's major international minerals processing competitors, including the use by some jurisdictions of tax holidays or grants and subsidies, such as in the provision of common user infrastructure.

A comparison of marginal effective tax and royalty rates with major mining jurisdictions in other countries shows that Australia's mining companies typically pay more tax and mining levies on their gross profit compared to Canadian companies and, in the case of copper, gold and iron ore, the United States.[21] Leaving aside Brazil, China, India and Russia, Australia's fiscal system is less competitive than most countries for copper, gold and iron ore.

Australian mining is particularly exposed to not realising the full potential for new investment if the marginal effective tax and royalty rates on the commodities it produces increase relative to other mining jurisdictions.

Improved labour productivity

- Unlocking value along the entire critical minerals supply chain requires a modern workplace system.

Recommendation:

- Ensure workplace relations rules enable enterprises to work with employees in each workplace to lift productivity and increase wages.

Unlocking value along the entire critical minerals supply chain requires a modern workplace system that allows for businesses to increase productivity and continue to provide the most competitive terms and conditions to attract and maintain workers.

Modernising workplaces is vital to the competitiveness of Australia's mining industry, which is increasingly focused on integrating new technology and ideas into its operations. Owing to the greater capital intensity of Australian mineral processing operations, workplace relations rules must enable enterprises to work with employees in each workplace to lift productivity and increase wages.

An efficient and effective transition to net zero emissions by 2050

[21] P. Bazel and Mintz, J.*, Corporate tax reform to help address Australia's weak investment performance*, Research report prepared for the Minerals Council of Australia, School of Public Policy, University of Calgary, 2022

- The scale of the technology-led transformation required cannot occur without the minerals and raw materials provided by the mining sector
- Internationally competitive mining and minerals processing requires a stable policy framework for achieving net zero emissions by 2050 and technology-neutral policies to deliver affordable and reliable energy with zero emissions.

Recommendation:

- Enable least-cost abatement of CO_2 emissions by promoting all low and zero-emissions technologies, including carbon capture, utilisation and storage and currently prohibited advanced nuclear technologies
- Ensure changes to the safeguard mechanism put the country on a course to achieving its emissions reduction targets while maintaining the international competitiveness of industry by ensuring:
  - An effective cost containment measure to give business certainty over maximum compliance costs as occurs in comparable international schemes
  - Well-resourced support for covered facilities through the transition
  - Accessible and appropriate government support to reduce the risk of facility closure and carbon leakage where emissions reducing technologies are not available and abatement through offsets is not commercially sustainable
- Ensure governments adopt a coordinated policy approach to changes in electricity generation and networks to avoid exposing industrial users to higher cost and greater risk of reduced reliability and security of supply.

Internationally competitive mining and minerals processing – which will make decarbonisation possible – requires technology-neutral policies to deliver affordable and reliable energy with zero emissions.

All fuels and technologies can play a part in maximising opportunities for Australia, and Australian mining and minerals processing, by facilitating an effective transformation to reliable, competitive, zero emissions energy. Australia has substantial energy resources including coal, gas, renewables, and uranium, as well as the minerals and metals needed for energy storage, hydrogen and ammonia production.

The Australian Government must enable least-cost abatement of CO_2 emissions by promoting all low and zero-emissions technologies, including carbon capture, utilisation and storage and currently prohibited advanced nuclear technologies.

For the remainder of this decade there are very limited options for the mining sector to reduce emissions. Changes to the safeguard mechanism to reduce the industrial sector's emissions must put the country on a course to achieving its emissions reduction targets while maintaining the international competitiveness of industry. Australian businesses must not be put at a competitive disadvantage to businesses in other countries that are not subject to similar emissions constraints.

The safeguard mechanism must appropriately treat export industries competing in global markets and facilities linked to parent company emissions reduction plans. This includes ensuring there is an effective cost containment measure to give business certainty over maximum compliance costs as occurs in comparable international schemes, and that declining baselines are accompanied by well-resourced industry policy to support covered facilities through the transition. Where emissions reducing technologies are not available and alternative abatement through offsets is not commercially sustainable, accessible and appropriate interim government support must be available to reduce the risk of facility closure and carbon leakage.

Energy cost is a major factor in the viability of mineral processing projects given the significant energy intensity of operations. Australian mining companies are investing in renewable energy projects, collaborating with equipment providers to develop zero emissions technologies, and developing carbon capture and storage projects in prospective areas such as in the Surat Basin.

Changes to the supply of electricity from greater penatration of renewable energy must not expose industrial users to higher cost and greater risk of reduced reliability and security of supply. This requires a coordinated policy approach by federal and state governments to changes in electricity generation and networks that accounts for total system costs and reliability of supply in the transition away from existing fossil fuel technologies.

Efficient regulation

- Efficient and effective outcome focused regulation is crucial for the mining and downstream processing of minerals.

Recommendation:

- Ensure Commonwealth project approvals are timely, efficient, and streamlined with state and territory processes by:
  - Governments collaborating on prioritising and streamlining assessments and approvals for critical minerals projects
  - Allocating adequate departmental resources and working toward clear timeframes
- Ensure that costs recovered by regulation do not deter minerals investment.
- The government should work with the states and territories to undertake a strategic review and regulatory-policy map that identifies and removes inconsistencies and conflicts and develops a roadmap to consistent policy and regulatory coordination.

Efficient and effective outcome focused regulation is crucial for the mining and downstream processing of minerals, it is also important to the high-tech manufacturing and engineering that support the industry, as well as other advanced manufacturing activities.

Regulations across all tiers of government must be more outcome focussed by ensuring that processes are flexible enough to adapt to ongoing industry innovation, and are not unnecessarily complex, duplicative and high cost for critical mineral projects. Prescriptive regulation can stifle innovation. Given the relatively high rate of innovation in Australian mining, high regulatory costs including onerous processes risk undermining the feasibility of project investment.

Commonwealth project approvals that are timely, efficient, and streamlined with state and territory processes are necessary to incentivise investment along the critical minerals supply chain while upholding high environmental standards. Although high environmental, social and governance (ESG) standards are a competitive advantage for Australian minerals processing, especially for inputs into consumer goods, inefficient and duplicative approval systems create uncertainty and increase delays costs for projects putting at risk investment in Australia.

Reducing approval times through better processes is an important factor in shortening the time it takes for projects to reach first production. It is critical for the Commonwealth and States to collaborate on prioritising and streamlining assessments and approvals for critical minerals projects, which includes allocating adequate departmental resources and working toward clear timeframes.

Regulatory duplication, inefficiency, and uncertainty discourage investment, impede job creation and increase costs to business across the value chain.

Furthermore, costs recovered by regulation must not deter minerals investment. Prohibitively expensive state, territory and Commonwealth processes must be avoided to attract company interest in prospecting for critical minerals in Australia.

Access to a well-skilled workforce

- Workforce planning is central to ensuring a pipeline of skilled workers needed to develop Australia's capability and capacity in critical minerals
- The mining, equipment, technology and services (METS) sector has an important role in unlocking growth in critical minerals.

Recommendation:

- Work with industry to develop a skilled workforce for mineral processing with a focus on science, technology, engineering, and mathematics (STEM) pathways to support the occupations needed for critical minerals.

Australia needs the specialist skills to support a critical minerals industry.

The Australian Government should work with industry to develop a skilled workforce for mineral processing with a focus on science, technology, engineering and mathematics (STEM) pathways to support critical occupations such as laboratory technician, metallurgists, process engineers and manufacturing engineer.

Skills shortages are a risk for the industry. Workforce planning is central to ensuring a pipeline of skilled workers needed to develop Australia's capability and capacity in critical minerals. Minerals processing facilities require access to a skilled workforce during the construction, commissioning, operating and maintenance stages of processing projects.

Major critical mineral processing countries are well advanced in developing their scientific, technical, and industrial capability. Government working with the industry to better target skills and deliver quality education and training is necessary to ensure the workforce have the skills and capabilities required.

The Australian mining industry is rapidly undergoing a digital transformation that is enhancing existing occupations and creating new ones, as digitalisation and new and emerging technologies and innovations drive improvements across the mining lifecycle from exploration, development and operations to closure and rehabilitation, through to supply chains.[22] Critically, this transformation is making mining safer, more productive and more sustainable. The mining, equipment, technology and services (METS) sector has an important role in unlocking growth in critical minerals through delivering innovative drilling, extractive and processing technologies to improve performance across the industry.

Recognition of the link between Intellectual property, technology and investment

- Australia's downstream minerals processing industry is mostly based on foreign investment that has transferred IP and knowledge to Australia.

Recommendation:

- Strengthen relationships with like-minded governments through supply security, favourable economic policy and co-operative partnerships that embed a commitment to investment and technology transfer.

[22] op. cit. Minerals Council of Australia, September 2022, p. 7.

The importance of investment attraction is fundamental to Australia's future as a mining jurisdiction and as future processing and manufacturing jurisdiction. Most (if not all) of Australia's downstream minerals processing industry is based on foreign investment that has transferred IP and knowledge to Australia together with large inbound capital flows required to establish, adapt and use technology and associated infrastructure.

The development of Australia's bauxite mining processing and aluminium smelting industry provides a sharp and critical lesson on the importance of having the economic settings to attract investment, and the policies that encourage investors and governments to facilitate the transfer of technology and IP. An integrated aluminium industry could not have been established in Australia were it not for the massive amount of capital and technology support from the United States by the then Aluminium Company of America.[23] Other examples where foreign investment in downstream minerals processing has supported the transfer of technology and IP to Australia include:

- The development of new lithium hydroxide processing facilities
- The establishment of Australia's first rare earth elements mine and concentrator.

Geopolitical conditions are prioritising security and economic partnerships between like-minded governments. Australia must strengthen these relationships through supply security, favourable economic policy and co-operative partnership that embed a commitment to investment and technology transfer.

Expanded opportunities for trade and investment

The Australian Government can work with the minerals industry to expand opportunities for trade and investment, including promoting Australian mining's high environmental, social and governance (ESG) performance.

Recommendation:

- Work with the minerals industry to expand opportunities for trade and investment, including promoting Australian mining's high environmental, social and governance (ESG) performance
- Facilitate closer and effective engagement between governments, industry, and research organisations to improve co-operation leading to improved investment flows and technology transfers
- Actively promote and support foreign investment into critical minerals projects and ensure regulatory processes are not onerous, complex and costly
- Work with the industry to raise awareness of Australian mining's high ESG performance through the globally recognised accountability framework **Towards Sustainable Mining** and other high standards in trade discussions
- Consult with the minerals industry on the design of funding programs such as the Value-Adding in Resources Fund to ensure support for projects is effectively targeted.

The Australian Government can work with the minerals industry to expand opportunities for trade and investment, including promoting Australian mining's high environmental, social and governance (ESG) performance.

The Australian Government's strong support for critical minerals through its international engagement is necessary for Australia being recognised as an attractive destination for investment in critical minerals. It has a major role in facilitating closer and effective engagement between governments,

[23] Alcoa Australia - History, viewed 28 January 2023.

industry, and research organisations to improve co-operation leading to improved investment flows and technology transfers that are needed to build more resilient and sustainable supply chains.

Australia's foreign investment regime must manage national security risks while maintaining a strong economy with globally competitive industries. The Australian Government has an important role in supporting foreign investment into critical minerals projects by actively promoting opportunities and ensuring regulatory processes are not onerous, complex and costly.

Greater economic value from the Australian minerals industry can be captured by differentiating its competitive advantage from other mining jurisdictions. High ESG standards are a competitive advantage for Australian critical minerals. The Australian Government and industry should raise awareness of Australian mining's high ESG performance and other high standards in trade discussions to differentiate Australia's competitive advantages. This can be achieved through accountability frameworks, notably the Australian mining industry's globally recognised **Towards Sustainable Mining**, while ensuring there is no increase in the cost and regulatory burden to industry from duplication or overlapping of global standards with Australian or industry standards.

Effective consultation between the government and the minerals industry on the design of funding programs such as the Value-Adding in Resources Fund as part of the National Reconstruction fund is essential to ensuring the benefits from expanding the minerals industry are maximised, including accelerating the growth of Australia's critical minerals sector.

Enabling infrastructure and supporting communities

- Government facilitating the delivery of productive infrastructure can complement and remove impediments to investment in critical minerals and promote regional development.

Recommendation:

- Designate dedicated critical mineral processing hubs, reducing costs, approval times and improving social infrastructure proximate to processing locations
- Coordinate and provide cost-sharing of critical infrastructure to reduce project costs
- Support investment in the development of major toll processing facilities, allowing smaller projects to co-locate.
- As part of that review governments should implement a co-ordinated strategic approach to infrastructure planning and investment. The identification of opportunities to identify and harness economies of scale and scope across infrastructure for mining processing and manufacturing. Precincts or hubs that deliver economies of scale and scope could significantly reduce the cost differential across the range of minerals needed for the transition to net zero.

Government facilitating the delivery of productive infrastructure can complement and remove impediments to investment in critical minerals. Where there is a clear benefit from public investment, federal and state government support for critical infrastructure may promote the growth of mining, other industries and communities in line with broader regional development.

Copper precincts exist in SA and Qld, are emerging in NSW (Orange to Dubbo region) and WA, and have good prospects with significant exploration in the NT. A copper smelter achieves economies of scale at about 220ktpa throughput. Newcrest's Cadia mine produces about 88kt per year. It would be uneconomic to build a smelter for this throughput alone. However, collective production from mines in the area could deliver the scale economies for a smelter, support thousands of skilled jobs, chemicals and other associated industries in an area (Orange-Dubbo) which already has many of the other infrastructure components needed (rail, power and a skilled workforce).

Critical minerals are located in many remote regions across Australia. Sparse populations and limited transport options in these locations will require building communities and developing and improving transport infrastructure.

To maximise the regional opportunity that critical mineral presents, the Australian Government should designate dedicated critical mineral processing hubs, reducing costs, approval times and improving social infrastructure proximate to processing locations. In addition to locational benefits, enabling projects to capture economies of scale and scope from shared infrastructure reduces project costs.

Government coordination and cost-sharing reduces costs associated with transport, water and energy infrastructure improving project economics and increasing investment in minerals processing. It also enables government to make strategic and catalytic investments in common-user infrastructure.

Co-locating mineral processing facilities enables more efficient provision of social infrastructure such as childcare, schools and healthcare for residential workforces. Having high quality, affordable and accessible public infrastructure that is already in place makes regional communities more attractive to a residential workforce and reduces dependency on fly-in, fly-out, and drive-in, drive-out workforces.

In conjunction, approval times for minerals processing facilities in mineral processing areas should be reduced with appropriate government investment in environmental baseline studies and the completion of strategic assessments. Declared mineral processing areas may not just be confined to designated greenfield sites but could also be integrated into existing manufacturing areas so that industrial and social infrastructure is productively utilised.

Government investment in shared infrastructure also supports the development of major toll processing facilities, allowing smaller projects to co-locate. Major toll processing facilities could be located in pre-planned, pre-serviced industrial estates effectively allowing mineral processors to more easily establish their facility.