

To: Department of Industry, Science and Resources

Re: Updating Australia's Critical Minerals List: issues paper

17 August 2023

Introduction

AMEC welcomes the opportunity to provide a submission to the Department of Industry, Science and Resources (DISR) consultation on the update of Australia's Critical Minerals List. Whilst minor additions have been made to the list in recent years, now is optimal timing to strategically review the list to ensure it best-positions Australia to secure our domestic supplies, and grow international export capacity of our mineral offerings, up and down the value chain.

About AMEC

The Association of Mining and Exploration Companies (AMEC) is a national industry association representing over 540 member companies across Australia. Our members are mineral explorers, emerging miners, producers, and a wide range of businesses working in and for the industry. Collectively, AMEC's member companies account for over \$100 billion of the mineral exploration and mining sector's capital value.

Mineral exploration and mining make a critical contribution to Australia's economy, directly employing over 274,000 people. In 2021/22 Industry generated a record high \$413 billion in resources exports, invested \$3.86 billion in exploration expenditure to discover the mines of the future, and collectively paid over \$63 billion in royalties and taxes.

Issues paper: Updating Australia's Critical Minerals List

General Comments

AMEC has been a strong advocate for the development of strategic policy at a Commonwealth-level, in collaboration with State and Territory Governments, to ensure a holistic approach to unlocking value for Australia's emerging critical minerals sector is adopted. We have a reputation as a minerals nation, but our ability to extend that excellence beyond the extraction of ore is yet to be tested, domestically, at scale. There is now opportunity to do so, to capture a greater share of global and domestic demand for critical mineral products, and strengthen sovereign supply.

However, there is need to first define what constitutes a critical mineral. The approach taken to regularly reviewing and updating this list, will determine our ability to realise these opportunities in the timely manner that is required to be competitive, and capture a greater share of global investment. AMEC welcomes the release of the Commonwealth's 'criticality of minerals' study, to provide further market information on the availability, potential, and demand for the minerals we host.

In the below submission AMEC has outlined key recommendations the Australian Government should adopt in its review of the critical minerals list, its broader criticality of minerals review, and ongoing

work to support the implementation and delivery of the 2023 Critical Minerals Strategy. We have provided direct answers to the consultation paper questions where deemed appropriate.

Critical Minerals Strategy

The long-awaited Critical Minerals Strategy 2023-2030 set out a seven-year vision to grow Australia's critical minerals sector by becoming a globally significant producer of both raw and processed critical minerals.

Rather than the Australian Government's 'broad and enduring policy direction' this paper refers to, there is a strong need for defined policy positions and priorities from Government, to actively drive momentum to grow Australia's critical minerals sector domestically.

If critical minerals opportunities are to be seized, aligning with consistent Government rhetoric over the last few years, this messaging must be followed up with meaningful, targeted change. If the same broad and hopeful positioning is maintained, private industry will continue to drive any positive outcomes for the minerals sector, with Government a laggard. This must not be the case.

Over the last year in particular, we have seen targeted action from the United States, Canada, and the European Union, to grow their own market share of critical minerals. Australia does not have the financial capacity to compete with the US\$370B in tax credits and loan facilities offered via the transformational US Inflation Reduction Act, but reforms to existing tax policies can incentivise critical minerals project production, in a way that has never been done before, in Australia. Fast-tracking of approvals by actively reducing red-tape, and progressing strategic industrial area approvals and headworks to reduce barriers to entry for the companies who are currently looking offshore for further business opportunities, are the types of transformational change the Commonwealth and State / Territory Governments must now undertake if we are to achieve the objectives of the Strategy.

There is a keen desire for industry and Government to progress the opportunities that currently exist and expand investor interest along Australia's growing supply chain capabilities. There is welcome appetite from industry to understand the role Government, particularly the Critical Minerals Office (CMO) and DISR will play in progressing these opportunities, facilitating critical minerals pathways, and ensuring private industry is not left to continue sourcing and progressing investment and growth opportunities for Australia's benefit.

The Strategy was the first step in this Government's critical minerals agenda, but it is now time to solidify its intent with targeted policy and development action.

Definition of 'Critical Mineral'

There are many differing definitions, interpretations, applications and uses. Ultimately, the Australian Government's 2023-released 'Critical Minerals Strategy 2023-30' defined a critical mineral as "metallic or non-metallic materials that are essential to our modern technologies, economies and national security, and whose supply chains are vulnerable to disruption."

The United States, through their Energy Act 2020 define a critical mineral as ‘any mineral, element, substance, or material designated as critical by the Secretary of the Interior, acting through the Director of the U.S. Geological Survey.’

Canada, with the release of their 2022 Critical Minerals Strategy released updated criteria in order for a mineral to be deemed critical. It must be “essential to Canada’s economic security and its supply is threatened; or required for our national transition to a low-carbon economy; or, a sustainable source of highly strategic critical minerals for our partners and allies.”

The European Commission, through their 2023 Critical Raw Material Act has identified critical raw materials as those “which are important for the whole European economy and face a high risk of supply disruption.”

Each definition outlines a number of different qualifying criteria to render a mineral critical. This is important to maintain the integrity of the list. However, it is also important to strategically position Australia’s growth priorities and expertise to maximise value from the emerging industry. The ability to do so will be supported by refreshing the list and creating more agility in the methodology used to underpin the currency of the critical minerals list and supporting lists.

Should Australia differentiate between criticality or importance of minerals, and the capability to process them, through categories within the list or a separate category that sits alongside the list? This differentiation could reflect the size and maturity of markets and the different challenges or barriers faced.

The growth of Australia’s critical minerals sector will benefit from categories within the list to differentiate between the various purposes the minerals can serve, to meet a defined strategic focus at a point in time. This is the methodology that has been adopted in recent reviews undertaken by all of Australia’s key trade partner nations. The ‘critical minerals list’ is the primary list defined by Geoscience Australia. If a mineral is defined as critical by the Commonwealth Government, it should qualify as critical on each State and/or Territory’s individual critical minerals list, should they have one. This list should be robust, and recognise that alignment with our strategic trade partners, namely the United States, Canada, and European Union, will enable faster and more straightforward access to bipartisan arrangements such as the US’ IR Act funding.

Each international jurisdiction has a lengthy list, and with more critical uses for minerals emerging, and expected to continue emerging, it is important Governments can respond to shifts in the market with agility. The integrity of Australia’s critical minerals list should be maintained, subject to regular reviews at frequent intervals, and on an as needed basis. This can ensure we remain competitive and can reprioritise our focus to align with the nation’s strategic objectives, with more agility than previously able.

A list of five critical minerals should be categorised and focused on for their role in driving the development of a battery industry within Australia. A category within our main list, should be created,

a 'critical transition minerals list' of minerals that are vital to a net zero economy transition, in similar fashion to the US Department of Energy's 2023 critical material assessment methodology¹.

An unofficial model of 'tiering' or 'categorisation' already exists in the Australian system, and has occurred following reviews of the criticality of minerals in the US, Canada, and the European Union. Australia's criticality of minerals study is also expected to highlight the strong demand for battery minerals as a priority, and identify a range of minerals that are critical for the green-energy transition.

Following the release of the Albanese Government's 'Australia Made Battery Plan', and the development of the National Battery Strategy, battery minerals should be the strategic focus for the Australian critical minerals sector. With battery minerals under the broader critical minerals list a key focus of Government, we welcome Government support to ensure the objectives of the national battery strategy can be delivered. Minerals that should be categorised as the five critical minerals for battery uses are Lithium, Rare Earth Elements, Graphite, Vanadium, and Nickel. These minerals should be rated as the five battery minerals, subject to broader consultation. This methodology is similar to Canada's development of a sub-category, prioritising six minerals that hold the most potential for Canadian economic growth, and will be the focus of the most federal investment².

An additional tier or category of critical minerals should be created to support the primary critical minerals list, of 'critical transition minerals'. It would be comprised of those minerals that are not yet on GA's critical minerals list, but meet some of the qualifying criteria and whose role will be critical to the net-zero transition. This list would be similar to the UK's 'watchlist'³ and European Commission's strategic raw materials⁴.

AMEC Recommendations:

- AMEC recommends categories within Australia's critical minerals list are created to differentiate between the various purposes the minerals can serve, to meet a strategic priority.
- Name 5 battery minerals – AMEC considers these will be 'Lithium, Vanadium, Nickel, Rare Earth Elements, and Graphite' as Australia's five strategic battery minerals to meet the nation's strategic battery priorities.
- Australia's Critical Minerals list with all currently listed minerals is retained, as Australia's primary critical minerals list, and subject to a tri-annual review by Geoscience Australia.
- Create a new tier or category of 'Critical Transition Minerals' for those minerals that are critical to a net-zero transition.

¹ https://www.energy.gov/sites/default/files/2023-07/doe-critical-material-assessment_07312023.pdf

² <https://www.canada.ca/content/dam/nrcan-rncan/site/critical-minerals/Critical-minerals-strategyDec09.pdf>

³ <https://www.gov.uk/government/publications/uk-critical-mineral-strategy/resilience-for-the-future-the-uks-critical-minerals-strategy>

⁴ https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en

Is the current set of criteria still fit for purpose?

AMEC considers the list of criteria for critical minerals to be fit for purpose, but in need of tightening to align with strategic objectives set by the Commonwealth Government. The broad scope of the current list's criteria could enable many minerals to be considered critical, or critical to the energy transition. This is broadly supported, as alignment with key trade partner nation lists is required, but dilution of the importance of the minerals on the list should not occur as an unintended consequence.

Elevation of specific criteria for a set time should be adopted, to meet the Commonwealth's objectives. For example, in order to grow a domestic downstream battery industry, Government should elevate the 'essential to modern technologies' criteria, with a focus on the battery minerals Australia is well-positioned to mine and develop. This will in-turn enable policy-makers and regulators to prioritise projects that can deliver on this objective, and serve as a strong indicator to investors that the Government supports the industry.

Due consideration should also be given to minerals that will be required for the net-zero emission transition. These minerals will provide critical inputs to the transition, but may not meet all other qualifying criteria.

A holistic approach to critical minerals policy and criteria will also consider investment policy, namely Foreign Investment Review Board (FIRB) reforms, and the impact of decision-making under the 'national security' lens, which has direct and indirect impact on minerals projects. Unless a clear impact can be demonstrated that an investment would pose a threat to Australia's defence capacity, investment into minerals projects and associated infrastructure should be supported or provided a valid alternative, if they are for critical minerals.

Our geology is second to none, and mineral resources are abundant. In order to continue growing a critical minerals sector, up and downstream, a forward-looking view must be adopted by the Commonwealth. The Commonwealth's agenda should inform State and Territory Governments' and be supported by commercial, market-driven data that is subject to regular review.

Minerals that should be added to Australia's list

AMEC will outline a number of minerals below that should be added to Australia's Critical Minerals List 2023, as per issues paper question number two.

Copper:

AMEC recommends Copper is added to Australia's critical minerals list.

Copper (Cu) has been recognised across the globe as a key material required to support the transition to net zero. Known for its use as a conductor of electricity, in electrical generators and motors for electrical wiring and in electrical goods, copper is also a conductor of heat used in vehicle radiators, air conditioners, insulation systems, water pipes, and mobile phones. Copper is also being

diversified to replace aluminium in computer chips, and increasingly in battery uses. Geoscience Australia states Copper 'combines more useful properties than probably any other metal'⁵.

Australia has significant natural copper reserves, with South Australia frequently heralded the 'Copper Kingdom'. We are the world's seventh largest producer of Copper.

The US' 2023 Department of Energy Critical Material Assessment identified Copper as a 'critical material for energy', with 'near-critical' status in the medium-term due to its role in electrification⁶, whilst Canada has listed Copper in its six priority critical minerals. The US' Inflation Reduction Act and Bipartisan Infrastructure Law includes over US\$370B in tax credits and funding for critical minerals projects, which will significantly bolster copper demand through energy infrastructure investments. The USGS has identified that copper meets all of its criteria to qualify as a critical mineral, noting its supply chain is vulnerable to disruption as while the US is a large producer of mined copper, the supply of refined copper remains dominated by a few other countries⁷.

The International Energy Agency identified copper as a key input to eight out of ten clean energy technologies, but this demand is much broader than clean energy. Global consumption is expected to double by 2050 or sooner⁸. Analysts predict a significant increase in demand for copper due to its role as an essential ingredient in electrifying cars and engines, noting is constrained supply due to challenges associated with extraction at depth, and undercover⁹.

Nickel:

AMEC recommends Nickel is added to Australia's critical minerals list.

Nickel (Ni) has been recognised on the US' list of critical materials for energy, and near-critical in the short and medium-term, due to its role in batteries and renewable energy technologies. In 2022, the United States Geological Survey included nickel as a critical mineral¹⁰. Canada has also recognised Nickel as one of its six priority minerals, representing the greatest opportunity to fuel domestic manufacturing. The European Commission's strategic raw materials list identified nickel, with its technologies important to Europe's green and digital ambitions, as well as defence applications, noting its supply chains were subject to potential risk in the future.

Nickel is a critical component of batteries, ensuring high energy density and chargeability. Higher nickel concentrates in electric vehicles can provide greater range and faster recharge times. As demand for electric vehicles increases across the globe, securing a domestic source of supply should be a strategic priority. With 84% of the world's Nickel projects occurring in higher risk jurisdictions

⁵ <https://www.ga.gov.au/education/classroom-resources/minerals-energy/australian-mineral-facts/copper>

⁶ https://www.energy.gov/sites/default/files/2023-07/doe-critical-material-assessment_07312023.pdf

⁷ <https://elements.visualcapitalist.com/why-copper-is-a-critical-mineral/>

⁸ <https://www.afr.com/companies/energy/the-flaws-in-australia-s-new-critical-minerals-strategy-20230613-p5dg2r>

⁹ <https://www.afr.com/companies/mining/rio-tinto-makes-800m-bet-on-us-copper-mining-20230621-p5di7a>

¹⁰ [U.S. Geological Survey Releases 2022 List of Critical Minerals | U.S. Geological Survey \(usgs.gov\)](https://www.usgs.gov/news/2022-list-of-critical-minerals)

than Australia, there is a strong need for supply chain security and ethical sources of Nickel to meet increasing demand¹¹.

Australia should include nickel as a critical mineral on the list. The Government must focus on speeding the approval of nickel mines. Nickel offers one of Australia's largest mineral opportunities.

Zinc:

AMEC recommends Zinc is added to Australia's critical minerals list, and the 'critical transition minerals' list.

Zinc (Zn) continues to be recognised as a critical material for the low-carbon economy. It plays a large role in renewable energy technologies including solar and wind power, and zinc-ion batteries have growing uses in electric vehicles. Zinc has been recognised as a critical mineral in both Canada and the US.

Whilst Zinc has traditionally been recognised for its galvanizing properties, its role in the energy transition is growing in prominence. It is a material that should be recognised for growing importance to achieve net-zero targets. Zinc is 100% recyclable, with galvanized steel requiring zinc the preferred material of choice used by electric vehicle manufacturers for car bodies¹². It also supports solar and wind technologies, which are growing in popularity as Governments across Australia strive to reach net zero emissions.

Zinc inventories have reached historically low levels with a looming supply deficit. It is estimated that four out of the ten major producers have less than a decade's worth of mine life remaining. However, Zinc demand is projected to double to approximately 25 million tonnes by 2040. This equates to a significant supply gap of 12 million tonnes, primarily driven by major mine depletions, lack of new discoveries, and regulatory constraints on approvals.

AMEC recommends that Zinc is recognised for its role in the energy transition.

Uranium:

AMEC recommends Uranium is added to Australia's critical minerals list, and the 'critical transition minerals' list.

Uranium (U) appears on Canada's list of 31 critical minerals, outlined in their 2022-released Critical Minerals Strategy. Uranium and nuclear energy sources have been recognised as an important ingredient in the race to reach net zero emissions by 2050.

Uranium was removed from the US' list of critical minerals in the 2022 update, as they reclassified it as a fuel mineral¹³. However, ranking members (Senators) of the Senate Committee on Energy and Natural Resources opposed this move, noting a decline in domestic production, with the US now

¹¹ <https://ardearesources.com.au/critical-minerals>

¹² <https://www.weforum.org/agenda/2022/04/zinc-low-carbon-economy-construction/>

¹³ <https://www.iea.org/policies/15271-final-list-of-critical-minerals-2022>

almost entirely dependent on foreign sources of uranium¹⁴. A similar outcome should be avoided in Australia. Uranium is used to power a significant number of nuclear reactors in the U, which generate one fifth of the nation's energy¹⁵.

Analysis from the International Energy Agency (IEA) found that the amount of energy supplied by nuclear power will increase by 40% by 2030 and double by 2050¹⁶. It is an essential component of the global net-zero emissions energy transition, and nuclear reactors are found to be one of the most cost-effective sources of low-carbon electricity.

AMEC recommends that Uranium is recognised for the role it can play, in the right policy settings, in providing cost-effective, emissions-reduced power for Australian communities.

Tin

AMEC recommends Tin is added to Australia's critical minerals list, and the 'critical transition minerals' list.

Tin features on the Canadian and American critical minerals list as the global supply chain for tin is facing a critical shortage, with demand rapidly increasing with renewable technology and computer chip uptake. Currently, 97% of the world's tin supply comes from developing economies, and approximately 40% of it comes from artisanal and small-scale miners, making the industry highly unsustainable. Moreover, most of the world's tin is obtained through alluvial mining, which is detrimental to the environment. Since 1985, only four new tin mines have been put into production. China is the world's largest tin producer and consumer, accounting for approximately 30% of the global tin supply and 47% of the global tin consumption in 2022. However, over the past 15 years, China's tin production has steadily declined along with the global tin reserves. According to US Geological Survey forecasts, this decline is expected to continue, with the world facing a worsening supply deficit beyond 2030.

AMEC recommends that Tin is recognised as a critical mineral used for computer chips, super conductors and in renewable technologies.

Phosphate

AMEC recommends Phosphate is added to Australia's critical minerals list.

Phosphate (Ph) is the 'p' in the lithium-iron-phosphate (LFP) batteries that make up almost half the world's batteries for electric vehicles (EVs). These batteries have proven to be more stable than traditional lithium batteries and hence safer.

Phosphate is a critical fertiliser mineral used globally by the agricultural industry in fertiliser and animal feed. There are significant phosphate rock deposits being developed in the north-west

¹⁴ <https://www.energy.senate.gov/2022/2/energy-committee-leaders-to-secretary-haaland-helium-uranium-are-critical-minerals>

¹⁵ <https://www.theassay.com/articles/feature-story/how-critical-is-uranium-to-decarbonization/>

¹⁶ <https://www.iea.org/reports/net-zero-by-2050>

minerals province of Queensland. Securing and developing a domestic supply of phosphate will mitigate the emerging risks of securing fertilisers necessary to maintain agricultural production.

Some of the top jurisdictions—China and North Africa—from which phosphate is currently sourced from are suffering supply chain disruption as a result of geopolitical instability. AMEC sees it as an opportunity for Australia to use its supply reliability as an investment attraction mechanism and consequently facilitate the development of phosphate domestically. The inclusion of phosphate will deliver further economic benefits in the form of reduced risk of access to fertilisers for the nation's agricultural industry and improved food security domestically as well as internationally.

Further there are research trials underway in Queensland analysing the environmental benefits of Queensland's phosphate, namely its slow-release nature and improved conditioning powers, and how these properties help reduce the levels of nutrient entering running off into waterways and entering sensitive catchments, such as the Great Barrier Reef.

Phosphate rock is listed as a critical mineral in India, a critical raw mineral in the EU and an increasing mineral of importance in the UK.

Silica and Silicon:

AMEC recommends that the current critical minerals list's reference to Silicon as a critical mineral is corrected to be Silica.

The source defined by Geoscience Australia when referencing silicon is Cape Flattery and the mineral sands in production and being explored in that area, is a significant Silica deposit.

Silica Sands is quartz that over time, through the work of water and wind, has been broken down into tiny particles. The purity of Silica Sands varies from location to location due to environmental factors and as a result high purity sand is much sort after by end users. The use of Silica Sands varies greatly but is used in production of Glass products; Architectural, Smartphones, Tablets, Automotive, Fiberglass, Solar Panels—which is where immense opportunity is identified for offtake agreements for the Cape Flattery silica. Solar panel manufacturers' feed stock requires more than 99% purity silica with less than 120ppm iron oxide levels. An estimated 70% of each typical commercial solar panel comprises glass sheeting made from low iron, high purity silica.

Silica is the feed source for silicon, which is listed as a critical mineral by the European Union, Japan and India. Although silica sand is plentiful on Earth, high-grade silica sand is rare and in demand due to the requirement for very low impurities and sourced sand which meets environmental and socially responsible benchmarks. As such, AMEC views the opportunity to correct the reference from silicon to silica, as a key opportunity for Australia.

What lessons could be learned from other countries' approaches or the ways in which they consider their criteria for listing critical minerals?

Australia's criteria for listing critical minerals needs to align with the US' methodology for our minerals to align with trade agreements and the objectives of the IR Act.

Similar to the approach adopted by the US and Canada in recent reviews, the criteria should align with the nation's strategic priority. If Australia's priority is to be a battery industry, the criteria should align with this intent.

Other countries identified by DISR in this Issues Paper, namely the US and Canada, have invested substantial amounts of money into developing a critical minerals industry, that to date, Australia has shown little appetite to compete with. The Australia and US Critical Minerals 'Compact' presents a significant opportunity for the Australian Government to strengthen ties with the US, a key trade partner, and enable Australian minerals companies to access tax incentives and funding offered under the US' IR Act.

The lesson learnt from the US and Canada's approaches has been recognition of the significant role tax policy and incentives play in attracting investment and development to an industry. In suboptimal conditions, Australian companies and potential investors will look for jurisdictions that are more attractive to operate in. Australian approvals processes, regulatory frameworks, and tax policies must be genuinely reviewed and updated, in order to develop the critical minerals industry the Commonwealth, State and Territory Governments consistently spruik.

In the US, it is not only the Federal Government that has offered substantial tax breaks and incentives across the supply chain, but each state is also offering significant incentives to attract business in a highly competitive environment.

With the majority of critical minerals projects explored for and discovered by junior mineral explorers, access to investment, the ability to capital raise via the ASX, and timely approvals processes, are all considerations and operational hurdles junior companies contend with on a daily basis. Access to financing and various ESG assurance ratings is becoming increasingly contingent on having a project that has critical minerals potential. The Australian Government must give due consideration to the current, future, and emerging potential uses of minerals in their extracted and processed states, when reviewing policy, such as the list methodology and criticality of minerals and their end uses.

A holistic understanding of the minerals sector, from greenfield exploration through to end use manufacture and waste recycling is planned for from the earliest stages, by industry. Forward-looking Government policy, supported by commercial understanding of the key investment and approval decision points, can provide a more streamlined path to development for critical minerals.

With constant developments and end uses for critical minerals, their mines, tailings and associated by-products, it is important that alignment with our key trade partners strategically positions Australian companies to benefit from trade agreements and emerging alliances, to grow our sector domestically, and continue supporting strong exports of Australian goods.

What should trigger an update to the list?

A review and/or update to the list should be triggered by the passage of time, namely, tri-annual reviews.

With constant developments in this sector, and global events such as COVID-19 highlighting the fragility of supply chains, it is important a standing review of the lists and their methodology is maintained to measure effectiveness and make adjustments where necessary.

As strategic priorities change or are subject to disruption, via financial, global, policy or strategic means, a review of the list(s) and/or criticality can be considered on an as needed basis.

Regardless of the timing or reason for a review or update, best practice consultation and collaboration should always be upheld. Each State and Territory Government, as well as robust industry consultation and engagement, must occur.

AMEC welcomes regular feedback on the outcomes of the Strategy and its performance against objectives. Measures should be introduced when a document is to be reviewed, to provide a baseline for measuring success.

Final Comment

AMEC welcomes continued engagement as Australia's critical minerals list is updated, and the results of the criticality study are finalised. Industry is keen to realise the many opportunities to be a global leader in critical minerals, to support wide-ranging and long-term benefits for Australian communities and the economy, as these projects develop into production and processing. In the right policy and investment settings, Australia will be well-positioned to seize these opportunities and enable our critical minerals to lead the path to net-zero.

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