2023 consultation – Australia's Critical Minerals Strategy: Discussion Paper

Consultation response from the Institution of Chemical Engineers (IChemE)

The Institution of Chemical Engineers (IChemE) is pleased to make this submission on Australia's Critical Minerals Strategy: Discussion Paper. IChemE has chosen to respond to five questions that are of specific relevance to the Institution. The responses below will also help with addressing the current and future environmental challenges as outlined in the Government's 2021 Intergenerational Report - Australia over the next 40 years[1].

Q5. What are the specific opportunities Australia should seek to realise while developing downstream processing and manufacturing capabilities?

Given Australia's wealth of critical minerals resources, there will be strong demand for expertise along the value chain and thus the overriding need for skills development such as chemical engineers and related professions. Government can leverage off existing programs, such as Advance Queensland[2], which are providing substantial support to progress this skills development. Similarly, new and emerging technologies will be required to extract and process these resources more effectively, and therefore greater promotion and incentives for research and development will be important. This could be through collaborative research and development programs funded from Federal and State Governments jointly with industry, similar to the Trailblazer Universities Program[3]. This will both drive the development of Australian deposits and generate IP for Australian Mining Equipment, Technology and Services (METS) companies. Furthermore, Australia should emphasise that its mineral supply, including critical minerals sourced for clean energy technologies, have a global standing on human rights.

Q6. For key technologies and value chains, such as batteries, magnets, alloys and other clean energy technologies, what are the key obstacles to Australia moving up the value chain?

Two key critical obstacles are the small size of the domestic market and the comparably high cost of Australian labour globally. To overcome labour costs the development of batteries, magnets, alloys and other clean energy technologies would require much higher levels of automation. The production of high value, IP protected products from Australian research and development could be sold to export markets at a premium and help alleviate the issues of having a small domestic market. To aid this development, the Government can play a crucial role in supporting promising technologies to move from Technology Readiness Level 4 (technology validated in lab) to Level 6 (technology demonstrated in relevant environment). Since the shipping of these products come with associated costs and carbon footprint, opportunities to reduce these factors would be highly beneficial.

[1] https://treasury.gov.au/publication/2021-intergenerational-report
[2] https://advance.qld.gov.au/industry
[3] https://www.education.gov.au/trailblazer-universities-program

Q7. How can governments, industry, and researchers support Australia's critical minerals industry to move further downstream and develop new sovereign capabilities?

To leverage Australia's R&D capabilities and IP, investment could be made to investigate a wider range of applications of critical minerals - for example applications for boiling nanofluids, energy storage, spacecraft thermal control where doped mixed-molten-salt is used to transport heat – which could open-up new markets for industry and researchers. Government incentives would be critical to develop these new and emerging applications. These applications should also include circular economy practices, for instance reprocessing, recycling and or reuse of mining waste rock and tailings.

The Australian Government should promote the use and the benefits of existing industry-led collaborative grant schemes such as Cooperative Research Centres (CRCs) and Cooperative Research Centres Projects (CRC-P) while simultaneously increasing funding to those that aim to improve downstream capabilities in the Critical Minerals Industry. A recent report by ACIL Allen[4] found that Australian CRCs deliver strong economic, employment, research, and commercialisation outcomes. The CRC model provides a demonstrated, measurable return on investment for both government and private stakeholders. CRCs offer a medium for collaboration between typically disparate stakeholders by aligning objectives in a collaborative manner. The Future Battery Industries Cooperative Research Centre[5] is an example of a successful CRC that supports the development of downstream processing and new sovereign capabilities.

Q14. What are the opportunities for critical minerals projects to maximise their ability to support clean energy supply chains and technologies?

An effective and streamlined development and funding processes with proven technology presents a significant opportunity for Australia to support clean energy supply chains and technologies. This could be through creating and supporting pilot scale testbeds for emerging technologies to accelerate their feasibility at commercial scale. This would then 'de-risk' critical minerals projects providing greater assurance to the markets that these projects will produce expected financial returns. These activities could be undertaken in conjunction with existing relevant organisations such as the Clean Energy Council, which is the peak body for the clean energy industry in Australia.

Q18. What role can Government play in supporting the critical minerals sector, ensure workplaces are safe and inclusive, and can attract and retain underrepresented cohorts, such as women?

IChemE strongly values safe and inclusive workplaces and believes the Government can play an important role in this area. IChemE could work with the Government through the IChemE Safety Centre (ISC), which is a not-for-profit multi-company, subscription based, industry consortium, focused on improving process safety. The ISC's annual training programme covers a wide range of areas at the

[4] https://www.industry.gov.au/sites/default/files/2023-01/cooperative-research-centres-program-impact-evaluation.pdf)
[5] https://fbicrc.com.au/

forefront of improving safety standards throughout industry. The Government could run education and skills development programs showing the mounting evidence of the business benefits of utilising diverse cohorts. This should be done in conjunction with current programs like the state-based Women in Mining (e.g., Women in Mining and Resources Queensland) and Women in Engineering (e.g., University of Queensland's Women in Engineering).

The Institution of Chemical Engineers (IChemE)

The Institution of Chemical Engineers (IChemE) is a professional association with 30,000 members. IChemE is a not-for-profit, member-led qualifying body and learned society that advances chemical engineering's contribution worldwide for the benefit of society. We support the development of chemical, biochemical and process engineering professionals and provide connections to a powerful network of over 30,000 members in more than 100 countries. The Institution of Chemical Engineers in Australia has a board and staff in Australia.

This response has been produced by IChemE members in Australia and draws on the Institution's position on climate change published in November 2020.[6] In 2020-22, IChemE also produced sectoral plans to support climate change action in multiple industries and jurisdictions, including energy transition, clean energy, water, food and pharmaceuticals. IChemE has submitted a detailed formal submission to the Low Emissions Technology Statement 2022 consultation: Department of Industry, Science, Energy and Resources, Australian Government.

We support our members in applying their expertise and experience to make an influential contribution to solving major global challenges, including achieving the UN Sustainable Development goals.

IChemE would welcome the opportunity to provide more detailed information if required.

[6] https://bit.ly/3ptN8C9