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Critical Minerals Facilitation Office
Department of Industry, Science and Resources
Australian Government

31st January 2023

RE: Critical Minerals Strategy Review

Dear Critical Minerals Strategy review team,

This submission focuses on three thematic areas:

1. Ensuring responsible critical mineral supply
2. Approaches for aligning Australian Critical Minerals and Circular Economy strategies
3. Considering material criticality risks for our domestic economy

This submission is informed by the knowledge and experience gained by researchers at the UTS Institute for Sustainable Futures (ISF) when conducting research to improve long-term societal outcomes associated with Australia's mining, mineral and material supply chains and their connection to other economic sectors, the environment and communities. This stems from having led major research initiatives such as the Australian Mineral Futures Collaboration Cluster (2009-2013), the Wealth from Waste Cluster (2013-2017), as well as projects focused on responsible materials sourcing and supply. We are supportive of critical minerals policy development in Australia in a way that is consistent with the principles of sustainable development and improves the resilience of the Australian economy, for example via the creation of a sovereign wealth fund to leverage lasting benefit.

ISF researchers are available to provide further follow-up on any recommendations or discussion points raised in this submission.

Regards,
Dr Stephen Northey, Chancellor's Postdoctoral Research Fellow
Assoc. Prof. Dana Cordell, Research Director
Rusty Langdon, Senior Research Consultant
Prof. Damien Giurco, Associate Director Research

Ensuring responsible critical mineral supply

Recommendation 1: Support industry in the uptake of responsible producer certifications

Rationale: Research that has been undertaken as part of the Future Battery Industries CRC indicates that downstream manufacturers in vehicle supply chains may increasingly require the adoption of responsible producer certifications to maintain market access.[1] This has significant implications for Australian producers supplying critical minerals into these supply chains, as it may necessitate standardisation. Fortunately, a number of standards and certifications exist that may be suitable. ResponsibleSteel™ and the Aluminium Stewardship Inititiative are two leading examples that are seeing widespread industry adoption. Of greater relevance to a broader set of critical minerals is the Initiative for Responsible Mining Assurance (IRMA), which was developed through a comprehensive multi-stakeholder process and addresses thematic issues such as business integrity, planning for positive legacies, social responsibility and environmental responsibility. A complementary IRMA Ready standard exists also that can be applied by mineral exploration projects. IRMA is gradually being trialled by industry and is well placed for further adoption, with 10 Australian projects at varying stages of assessment.[2] These certifications are complementary to other efforts being undertaken by industry, such as the Minerals Council of Australia requirement for member companies to adopt the Towards Sustainable Mining Initiative.[3]

Recommendation 2: Assess the boundary between voluntary industry responsibility certifications and government mandated responsibility

Rationale: Australia has well developed legislation, regulation and some enforcement processes that contribute to providing a base level of industry behavior and responsibility. However, the international reputation of miners in Australia requires strengthening, particularly following the lawful destruction by Rio Tinto of Aboriginal heritage at Juukan Gorge. Voluntary industry standards and responsible producer certifications are being developed internationally and often require corporate responsibility that exceeds the base levels defined in Australia's policy and regulation.

[1] Rutovitz, Dominish, Li, Farjana, Northey, Giurco (2020). Certification and LCA of Australian Battery Materials – Drivers and Options. Prepared for the Future Battery Industries CRC, August 2020. https://fbicrc.com.au/wp-content/uploads/2020/10/Certification-of-Au-Battery-Materials-WEB-INTERACTIVE-SEPT-2020.pdf
[2] Initiative for Responsible Mining Assurance. https://responsiblemining.net/
[3] https://www.minerals.org.au/towards-sustainable-mining

However, for some issues addressed by these voluntary certifications the adherence to Australian regulation may be sufficient to demonstrate that a critical minerals project meets the requirement for certification. Preliminary research has revealed that there are likely to be some overlaps for specific criteria of voluntary certifications, such as IRMA and government mandated emissions reporting to the National Greenhouse Gas Inventory and the National Pollutant Inventory.[4] There is still limited understanding of how the specific criteria of responsible producer certifications map to Australia's regulations, and whether the administering bodies for these certifications are willing to recognise Australian regulation in their certification and auditing processes. Further understanding of these issues is required.

Recommendation 3: Invest in skills and capacity development

Rationale: Australia already has emerging skills shortages within our critical mineral supply chains, such as for mining engineers as a result of very low rates of new graduates.[5] The skills required to develop critical minerals projects and implement strategies for de-risking supply chains and demonstrating responsible supply are all highly multi-disciplinary and technical. In some areas, such as responsible producer certifications, these are still emerging skillsets and the pathways to developing expertise in these areas are not well developed. Consideration should be given to how the implementation of critical minerals strategy will require changes in the skillset and capacity of the Australian workforce. Streamlined approaches and strategic investment for bridging any identified skill gaps within meangingful timeframes should be developed. As an example, ISF recently developed workforce projections for the National Electricity Market to 2050.[6] This process uncovered emerging workforce issues (including significant skills shortages) and identified strategies required to overcome them so that Australia's clean energy transition could be successful. Workforce issues and skills gaps have been found to cross sectoral boundaries as is the case in the competition for workers between renewable energy construction projects and the broader infrastructure construction pipeline. These issues are likely cross additional sectoral boundaries, so understanding how the workforce required for critical minerals developments competes with workforce requirements of other sectors of the economy should also be considered.

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[4] Langdon, Berry, Northey, Giurco, Li, Farnjana, Cox (2022). Certification and sustainability assessment for battery materials: review of requirements and data commonalities. Prepared for the Future Battery Industries CRC. https://fbicrc.com.au/certification-commonalities-report/

[5] Minerals Council of Australia (MCA). Submission to the Australian Curriculum Assessment and Reporting Authority Review of the Australian Curriculum F-10. 8 July 2021. https://www.minerals.org.au/sites/default/files/MCA%20Submission%20to%20the%20ACARA%20F-10%20curriculum%20review%20-%208%20July%202021.pdf

[6] Rutovitz, Langdon, Mey, Briggs. The Australian Electricity Workforce for the 2022 Integrated System Plan: Projects to 2050. Prepared for the RACE for 2030 CRC, November 2022. https://www.uts.edu.au/sites/default/files/2022-11/ISP2022_Workforce_v1.pdf

Align Australian critical minerals and circular economy strategies

Recommendation 4: Incentivise integrated planning between Australia's mineral suppliers, domestic refiners, and Australia's secondary material and waste management systems

Rationale: Circular economy strategies and action plans are emerging rapidly at the state and federal level.[7,8,9,10] There is potential synergies between critical minerals and circular economy policies that should be considered.

For instance, industry specialisation is often concentrated within state jurisdictions (i.e., Victoria for batteries, etc) and so cross border coordination between regional waste management systems, mineral suppliers and refiners will be needed to integrate effective, valuable and efficient circular practices.

The circular economy also necessitates a level of interdependency of supply chains both upstream and downstream of consumers and requires appropriate coordination to achieve maximum value adding benefits. As an example, so called "black mass" from lithium-ion battery recycling processes is most commonly exported and refined in partner countries, such as South Korea, rather than being refined in Australia due to a lack of domestic refining capacity. As some of these secondary material streams continue to grow in size, there becomes potential for further domestic value add in a way that may advance our domestic circular economy strategy and also our ability to supply critical commodities to other nations.

Recommendation 5: Develop detailed quantitative understanding of material flows and stock within Australia's economy

Rationale: Accurate monitoring of Australia's material stocks and flows and relative efficiencies is lagging other jurisdictions such as the EU. Significant progress has been made in the EU to accurately monitor material flows into, out of, and within domestic economies. Industry data is collected on a regular (sometimes annual) basis to ensure accurate reflections of material flows and secondary material use rates. Recent research into best practice methods for quantifying the GHG emissions of industries in NSW found that significant data and methodology gaps

[7] https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/public-consultations/going-circular-clean-energy
[8] https://www.vic.gov.au/victorias-plan-circular-economy
[9] https://www.greenindustries.sa.gov.au/
[10] https://www.qld.gov.au/environment/climate/climate-change/transition/circular-economy

would need be resolved[11], the suggestions and findings could also be applied at a national level. Australia would benefit from developing:

- Regular collection of data with the appropriate detail and quality to represent industry practices at a highly disaggregated level.
- A common methodological framework across state and territory borders and agreed and coordinated techniques to monitor material flows.
- Alignment with international best practice to enable integration with material flow methods across international borders.

Considering material criticality risks for our domestic economy

Recommendation 6: Conduct material criticality assessments for both imported and domestically produced commodities that are essential to the domestic economy

Rationale: The current approach to designating a mineral as critical within Australia is by considering minerals that both have supply and export potential and are critical to Australia's key trading partners and allies. This differs from the approach taken by most other countries. Typically, a mineral is deemed to be critical when sectors within a country's domestic economy are dependent upon it and there are supply risks and supply-chain vulnerabilities, such as import dependence and security of supply, that may need to be managed.

As an example, phosphate has been on the EU's critical minerals list since 2014. Phosphate is a critical fertiliser input in any country's food system. However, there is currently limited public understanding regarding how much phosphate Australia mines, produces, imports and exports. This is partially due to a duopoly existing in this market and trade figures being commercial-in-confidence. This lack of data transparency severely weakens our ability to plan for long-term phosphorus and food security in this country. As well as the ability for industry and independent assessments to determine whether phosphorus should be considered domestically critical.

[11] Langdon, Cunningham, Giurco, Jazbec, Rifkin, Abbas, Wiedmann, Lenzen, Malik, Mahmoudi, Strezov, Huda, Baddeley, Naidu (2022). Benchmarking and monitoring the Greenhouse Gas implications of a circular economy in NSW (Issue March). https://www.nswcircular.org/wp-content/uploads/2022/03/NSW-Circular-NSW-Government-Rapid-Review-2022.pdf

Recommendation 7: Create mechanisms for industry coordination and response to domestic criticality risks

Rationale: Reducing and adapting to domestic criticality risks should be achievable for most sectors of the economy. For instance using the phosphorus example from above, ISF's prior research, including that conducted for the AgriFutures Australia, revealed that there is 15 times more phosphate in Sydney's organic waste than required by the fertiliser demand in all the agriculture within Sydney's food bowl.[12,13] So in this instance, strategies to invest in renewable fertilisers in Australia would have potential to significantly reduce any domestic criticality risks for phosphorus. Similar opportunities may be possible for the full set of critical minerals, but transparent mechanisms for industry understanding, coordination and response to domestic criticality risks needs to be created. This could be through a combination of industry forums, working groups on specific minerals and supply chains, or funding mechanisms that further support reduction in domestic criticality.

Additional Resources

The UTS Institute for Sustainable Futures has actively coordinated and contributed to research that has sought to provide foresight and improved governance of Australia's mineral resources. Outputs of these broader research efforts that we view may have relevance for the critical minerals strategy are shown below.

Vision 2040: Mining, Minerals and Innovation – A vision for Australia's mineral future
Mason, Lederwasch, Daly, Prior, Buckley, Hoath, Giurco (2011). Prepared for CSIRO Minerals Down Under Flagship by the Institute for Sustainable Futures and Curtin University.
https://opus.lib.uts.edu.au/bitstream/10453/32583/1/final_vision_final_Jan2012_WEB%20(1).pdf

Advantage Australia: resource governance and innovation for the Asian century
Mason, Mikhailovich, Mudd, Sharpe, Giurco (2013). Prepared for CSIRO Minerals Down Under Flagship by the Institute for Sustainable Futures and Monash University.
https://opus.lib.uts.edu.au/bitstream/10453/32425/1/2012001274OK.pdf

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[12] Metson, Cordell , Ridoutt, Mohr, (2018). Mapping phosphorus hotspots in Sydney's organic wastes: a spatially-explicit inventory to facilitate urban phosphorus recycling. Journal of Urban Ecology 4(1): 1-9. https://doi.org/10.1093/jue/juy009
[13] Cordell, Jackson, White (2013). Phosphorus flows through the Australia food system: Identifying intervention points as a roadmap to phosphorus security. Environmental Science & Policy 29: 87-102. http://dx.doi.org/10.1016/j.envsci.2013.01.008

Australian Opportunities in a Circular Economy for Metals: Findings of the Wealth from Waste Cluster

Dominish, Florin, Giurco, Corder, Golev, Lane, Rhamdani, Reck, Graedel, Sharpe, Edwards, Benn, Brooks (2017). Final report of the Wealth from Waste Cluster.
http://wealthfromwaste.net/wp-content/uploads/2017/11/Wealth_From_Waste_Report_WEB.pdf

Sustainability Evaluation of Energy Storage Technologies

Florin, Dominish (2017). Prepared for the Australian Council of Learned Academies (ACOLA).
https://acola.org/wp-content/uploads/2018/08/wp3-sustainability-evaluation-energy-storage-summary.pdf

Responsible minerals sourcing for renewable energy

Dominish, Florin, Teske (2019). Prepared for Earthworks.
https://www.uts.edu.au/sites/default/files/2019-04/ISFEarthworks_Responsible%20minerals%20sourcing%20for%20renewable%20energy_Executive%20summary.pdf

Reducing new mining for electric vehicle battery metals: responsible sourcing through demand reduction strategies and recycling

Dominish, Florin, Wakefield-Rann (2021). Prepared for Earthworks.
https://earthworks.org/wp-content/uploads/2021/09/UTS-EV-battery-metals-sourcing-20210419-FINAL.pdf

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End of Submission