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Lauren Butler
Assistant Manager
Trade Exposed Industry Policy Section, Industrial Net Zero Policy Branch
Department of Industry, Science and Resources
Industry House, 10 Binara Street
Canberra ACT 2600

Sent via email: greenmetals@industry.gov.au

Dear Ms Butler

GREEN METALS CONSULTATION PAPER

The Chamber of Minerals and Energy of Western Australia (CME) is the peak representative body for the resources sector in Western Australia (WA). CME is funded by member companies responsible for 20 per cent of Australia's corporate income tax receipts in 2022-23,¹ 96 per cent of Australia's iron ore production and 68 per cent of Australia's alumina production in 2023.²

CME welcomes the opportunity to provide input to the Department of Industry, Science and Resources (the department) consultation on developing a green iron, steel, alumina, and aluminium ('green metals') industry in Australia. In response to the consultation paper's themes, this submission draws on iron ore and bauxite-alumina members that provide the upstream inputs to the emerging green metals global value chain and reiterates our existing recommendations on strategic value-adding industries, energy, environment and climate (see Appendix for links to past submissions). Responses to the consultation paper's specific questions of relevance to CME and our members are outlined below.

Context

As the consultation paper references, Australia could have a \$122 billion³ green metals industry by 2040.⁴ WA ranks first as a global producer of iron ore and second for alumina and bauxite.⁵ Notably, there are no commercial-scale substitutes for these raw materials used in primary iron and alumina production.⁶ With the world's energy transition to net zero by 2050, combined with Australia's high environmental, social and governance (ESG) standards,⁷ WA has a unique opportunity to increase the supply of primary raw materials and diversify into intermediate products supporting finished green metal products. Given our upstream strength in mining and primary processing and potential for midstream expansion (with the right competitive settings), we consider **Australia has a stronger and more sustainable comparative advantage in pursuing intermediate value-added goods (e.g., green iron and alumina) over semi-finished and finished products (e.g., green steel and aluminium).**

Establishing Australia's position in the midstream to downstream segments of the metal value chain will face challenges, including the high energy and emissions intensity of current metal production processes.⁸ Currently, there are virtually no price premiums established for 'green' products, alongside a lack of transparency in definition and value alignment on what 'green' is. **Coordinated, substantive and long term policy support from all levels of the government will be required to deliver on low emission, reliable (firmed) and internationally cost-competitive energy to minimise production and capital costs,**

¹ Includes company tax, fringe benefits tax, petroleum resource rent tax and excise duty. Commonwealth of Australia, [Final Budget Outcome 2022-23](#), The Treasury, 22 September 2023, Note 3: Taxation revenue by type, p 39. CME, [2022-23 Economic Contribution: Australia](#), 17 March 2024.

² Members represent 96 and 100 per cent of mining employment onsite, respectively. Government of Western Australia, [2023 Major Commodities Resource Data File](#) and [2023 Economic Indicators Resource Data File](#). Department of Energy, Mines, Industry Regulation and Safety (DEMIRS), 14 May 2024.

³ Unless otherwise expressly stated, all currency references hereafter in this submission are to Australian dollars.

⁴ Accenture, [Sunshot: Achieving global leadership in clean exports – A policy roadmap for Australia](#), final report commissioned by the ACF, ACTU, BCA and WWF, September 2023.

⁵ Government of Western Australia, [2023 Major Commodities Resource Data File](#), DEMIRS, 14 May 2024. Commonwealth of Australia, [Resources and Energy Quarterly: June 2024](#), Office of the Chief Economist, Department of Industry, Science and Resources (DISR), 1 July 2024, p 108.

⁶ Bauxite-alumina and iron ore. US Geological Survey, [Mineral Commodity Summaries 2024](#), January 2024, p 47 and 105.

⁷ Underpins the Australian Critical Minerals Strategy, National Battery Strategy and Future Made in Australia agenda.

⁸ Bruce S, Delaval B, Moisi A, Ford J, West J, Loh J and Hayward J, [Critical Energy Minerals Roadmap: The global energy transition - Opportunities for Australia's mining and manufacturing sectors](#), Commonwealth Scientific and Industrial Research Organisation (CSIRO), 20 May 2021, pp 23 and 82. Organisation for Economic Co-operation and Development (OECD), [Government support in industrial sectors: A synthesis report](#), OECD trade policy paper no 270, 7 April 2023.

ensuring feedstock produced in Australia can sustainably compete with jurisdictions with lower energy and carbon costs.

CME and its members support the Paris Agreement goals of limiting global warming to well below 2 degrees Celsius (°C), and preferably to 1.5°C, by reducing greenhouse gas emissions to net zero as soon as possible and no later than 2050.⁹ To achieve this, we acknowledge there needs to be a global transition to very low or zero carbon energy sources¹⁰ and commodities. However, international alignment on climate action,¹¹ including an effective carbon price, will be needed to avoid carbon leakage and ensure the competitiveness of Australian industries that provide feedstock inputs to global commodity value chains. As the Ai Group and Australian Aluminium Council (AAC) warns, the domestic economic effects of disparate international carbon policies on existing and future 'green' asset investments will likely be most significant post-2030.¹²

Although Australia's international competitiveness recently reached its highest ranking in over a decade,¹³ the pace of the energy transition is a cited challenge to our overall performance. Notably, the global dataset indicates that higher ranking economies score favourably for both government (i.e., corporate tax policy) and business efficiency (i.e., workforce productivity).¹⁴ The investment effects of multinational firms responding to the United States (US) Inflation Reduction Act of 2022 (IRA), the European Union (EU) Green Deal Industrial Plan and Carbon Border Adjustment Mechanism (CBAM) policy, Canada and Japan's tax breaks are also starting to be seen. It is imperative that **actions by the WA and Australian Governments are consistent with the Future Made in Australia's first pillar of national interest, with policy, regulatory and fiscal settings designed from the outset to maintain and attract investment in Australia, facilitate business productivity and ensure efficient delivery of common goals across environment and climate.**

Key recommendations

To maintain and create a sustainable comparative advantage for existing and emerging industries that provide inputs to the green metals value chain, CME recommends:

- Verification and measurement of emissions in metals is aligned (interoperable or equivalent) with widely accepted definitions and practices by investors, industry and governments worldwide.
- The WA and Australian Governments should work with international partners to support price transparency and the development of price premiums for high ESG standards in international markets.
- Achieving a net reduction in global value chain emissions should be accepted as contributing to a 'sustained comparative advantage' under the Future Made in Australia's National Interest Framework.
- Further urgent action is needed to ensure the timely delivery of a low-emission, reliable, and internationally cost-competitive energy system across WA and Australia, including –
 - In the WA Wholesale Electricity Market (WEM), this includes the timely provision of funding support under the Capacity Investment Scheme (CIS), including for demand side management facilities. At a future date, there is merit in considering extending the CIS beyond 2030.
 - For the North West Interconnected System (NWIS) in the Pilbara region, the current allocation under the Rewiring the Nation Fund should be maintained to support the development of common-user transmission infrastructure.
- The Australian Government pursues a least cost, technology-agnostic and flexible pathway to abatement and net zero by 2050.
- Australia's Carbon Leakage Review should be expanded to support export-oriented, energy-intensive and value-adding industries such as green metal feedstock inputs.
- For the Safeguard Mechanism, create separate production variables for hematite and magnetite ore to address material differences in ore.
- Streamline regulatory processes to ensure federal-state assessments are robust and efficient.

⁹ CME, [Climate change](#), policy areas, published 24 September 2021.

¹⁰ With demand-side and carbon dioxide removal measures. Intergovernmental Panel on Climate Change, [Climate Change 2023: Synthesis Report](#), contribution of Working Groups I, II and III to the Sixth Assessment Report of the IPCC, March 2023, pp 86-87 and 104.

¹¹ Maier R, Gerres T, Tuerk A and Mey F, [Finding tipping points in the global steel sector: A comparison of companies in Australia, Austria, South Korea and the USA](#), Global Environmental Change, vol 86, May 2024.

¹² Ai Group, [Response to the Carbon Leakage Review Consultation Paper](#), submission to Department of Climate Change, Energy, Environment and Water (DCCEEW), 12 December 2023. AAC, [Re: Economic modelling of Australia's potential emissions reduction pathways](#), submission to DCCEEW, 12 December 2023.

¹³ International Institute for Management Development (IMD), [Competitiveness Profile: Australia](#), IMD World Competitiveness Yearbook 2024, June 2024.

¹⁴ IMD, [Singapore creating best long-term value, says latest IMD research on competitiveness](#), news article, June 2024.

Future markets for green metals

Q1. What insights do you have on green metals markets?

The drivers of growth for aluminium and steel are fundamentally different. However, both are widely used metals in modern economies and are structural elements of the world's digital transformation¹⁵ and clean energy transition.¹⁶ For both finished metals, the decarbonisation of the automotive sector, particularly in the EU, is leading to initial demand for green products.¹⁷ There will also be substitutions between steel and aluminium for certain vehicle components.

Underlying the global demand for steel is population growth and higher living standards in most developing economies (i.e., building construction, infrastructure and mechanical equipment), with steel demand expected to increase by more than a third by 2050, with demand for primary steel contributing 60 per cent and scrap doubling.¹⁸ Please see our comments below on the role of scrap.

Wood Mackenzie projects iron ore with low impurities and high iron content will be in short supply in the early 2030s, with consumption of high-grade direct reduced iron (DRI) pellets increasing five-fold.¹⁹ Thus, there is a growing interest in high-grade magnetite, smelting low-grade hematite-goethite ores (hereafter hematite) and electric refinement.²⁰ Countries such as Brazil, Saudi Arabia, the United Arab Emirates and Oman²¹ are likely to compete with Australia as green iron-producing destinations because of their low cost clean energy. Brazil, Sweden and Bahrain currently dominate the pellet supply landscape.²²

Global aluminium demand is driven by the automotive and electrical sectors, with demand for primary aluminium increasing to 40 to 50 per cent and scrap tripling by 2050.²³ We note that the demand for primary aluminium may dampen if there is continued growth in scrap recycling.²⁴ However, industry consensus is that demand will outstrip supply and increased production of primary aluminium will require comparable increases in bauxite mining and alumina refining rates.

Without government support, a 'green' premium of between 40 and 70 per cent is estimated to be required for the green aluminium and steel value chains by the Mission Possible Partnership.²⁵ Where premiums exist to cover the significant cost parity in business-to-business transactions, they are relatively small at an extra \$10 to \$15 per tonne for green aluminium.²⁶ Please see our discussion below on government policy and supply side options without price premiums for green metals and their feedstocks.

Q2. How does metal recycling contribute to Australia's green metals industry in Australia?

Like critical minerals, global investment in scrap metal for both steel and aluminium recycling typically occurs closer to vertically integrated operations, i.e., China, Japan, the EU and North America.²⁷ Integrated steel mills use 15 per cent ferrous scrap as inputs to the electric arc furnace (EAF).²⁸ However, irrespective of the quantity and quality of scrap steel, the automotive sector will likely still rely on iron ore.²⁹

¹⁵ UN Trade and Development, [Digital economy growth and mineral resources: Implications for developing countries](#), technical notes on ICT for development, no 16, December 2020.

¹⁶ International Energy Agency, [The role of critical minerals in clean energy transitions](#), May 21, p 21.

¹⁷ Ibid, p 10. Association for Iron and Steel Technology, [Who needs green steel? Depends on what you're making](#), annual AISTech Town Hall Forum, 8 May 2024. Oxford Institute for Energy Studies, [Steeling the race: Green steel as the new clean material in the automotive sector](#), March 2022. Australian Financial Review, [European automakers demand South32's higher-cost 'green aluminium'](#), 27 April 2023. Alcoa, [Alcoa to supply sustainable, low-carbon aluminium for wheels on the e-tron GT, Audi's first electric sports car](#), 23 March 2021. Centre for European Policy Studies, [A policy framework for boosting the demand for green steel in the automotive industry](#), 25 January 2024.

¹⁸ International Energy Agency, [Iron and Steel Technology Roadmap](#), October 2020, p 57. [Energy Technology Perspectives 2023](#), January 2023. World Steel Association, [World steel in figures 2024](#), 27 May 2024.

¹⁹ Wood Mackenzie estimates 8 per cent of current iron ore production is ideal for DRI in steel mills, another 15-20 per cent can be used with minimal beneficiation and processing and another 10 per cent with significant beneficiation, processing and grinding required. [Pedal to the metal: iron and steel's US\\$1.4 trillion shot at decarbonisation](#), September 2022.

²⁰ Wood Mackenzie, [Metalmorphosis: How decarbonisation is transforming the iron and steel industry](#), October 2023.

²¹ Institute for Energy Economics and Financial Analysis, [Australia faces growing green iron competition from overseas](#), September 2023.

²² Wood Mackenzie, [The steel industry's decarbonisation quest](#), Worldsteel Open Forum, 5 October 2022.

²³ CRU International, [Opportunities for aluminium in a post-COVID economy](#), prepared for the International Aluminium Institute (IAI), 28 January 2022. IAI, [Aluminium sector greenhouse gas pathways to 2050](#), September 2021. European Aluminium, [Vision 2050: European aluminium's contribution to the EU's mid-century low-carbon roadmap](#), October 2022.

²⁴ Bruce S, Delaval B, Moisi A, Ford J, West J, Loh J and Hayward J, [Critical Energy Minerals Roadmap: The global energy transition - Opportunities for Australia's mining and manufacturing sectors](#), CSIRO, 20 May 2021, p 82.

²⁵ World Economic Forum, [Net-Zero Industry Tracker: 2023 Edition](#), insight report, 28 November 2023, p 55 and 76.

²⁶ Australian Financial Review, [European automakers demand South32's higher-cost 'green aluminium'](#), 27 April 2023. Reuters, [Green steel is possible and even affordable, but still unlikely](#), 28 March 2024.

²⁷ IAI, [Aluminium recycling factsheet](#), October 2020. Bureau of International Recycling, [World Steel Recycling in Figures: January-December 2023 update](#), Ferrous Quarterly Report 2024-05.

²⁸ International Council of Academies of Engineering and Technological Sciences, [Toward low-GHG emissions from energy use in selected sectors](#), Chapter 6: Iron and steel industry, January 2023.

²⁹ Centre for European Policy Studies, [A policy framework for boosting the demand for green steel in the automotive industry](#), 25 January 2024.

We caution the department on focusing on the role of scrap alone as it could incentivise the locking in of incumbent steelmaking routes in Australia. Recently, modelling by the Heavy Industry Low-carbon Transition Cooperative Research Centre (HILT CRC) found that the success of the electric smelter-basic oxygen furnace (melter-BOF) pathway would rely on incorporating more scrap and mitigating the technological risks of smelting.³⁰ However, this study does not consider commercial viability in the Australian context, with CME members believing our focus should not be limited to scrap. As described below, under decarbonisation, members are investigating electric smelting and reduction by electrolysis to produce green iron. Different countries will pursue scrap according to their market advantage, extent of industrial development and government policies.

Innovation in the collection and treatment of aluminium scrap, both pre- and post-consumer, is also highly competitive with tight margins internationally, i.e., it will need effective industry partnerships and government support.³¹ With high transport, labour and energy costs for Australia, these margins will be tighter. Alongside increased visibility of Scope 3 emissions accounting, decarbonisation of the transport sector will also need to occur to make any metal scrap recycling a sustainable comparative advantage for Australia.

Q3. What practices are used to verify and measure green metals?

Currently, **no commonly agreed definition or approach exists for verifying or measuring 'green' in metals**, especially a tonne of CO₂ equivalent per metric tonne (tCO₂e/t) benchmark for crude steel. There are various standards and criteria proposed by investors, industry and governments worldwide for 'green steel' – whether it be green, clean, sustainable, low carbon, low, net or near zero emission – including the Global Steel Climate Council's The Steel Climate Standard, ResponsibleSteel's International Production Standard Version 2.1, the Net-Zero Steel Initiative, Climate Group's SteelZero initiative and Climate Bonds' Standard V4.2 Steel Criteria. These have different emission boundaries, accounting methods, financing objectives and signatories.

As an example of this lack of agreement, the World Steel Association loosely defined low carbon steel as steel manufactured with significantly less emissions than conventional fossil fuel-based routes (i.e., blast furnace-basic oxygen furnace, BF-BOF), acknowledging this will change.³² Locally, the Australasian Centre for Corporate Responsibility (ACCR) labels (a) renewable-powered EAF, (b) DRI and hot briquetted iron (HBI) processes that use green hydrogen as a reductant and (c) molten oxide electrolysis as green steel production pathways.³³ Iron ore electrolysis currently has the lowest technology readiness level (TRL). Still, it will likely play a role in the long term because it uses 15 to 30 per cent less electricity than current DRI processes.³⁴ The ACCR also recognises the low-carbon steel pathway as (a) gas-based DRI, (b) biomass and (c) direct hydrogen (H₂) injection into BF's. Substituting 50 per cent of fossil fuels used in steel for sustainable charcoal could alone reduce global emissions by 3 per cent,³⁵ but seeking supply will be challenging.

Acknowledging this lack of progress on international collaboration, it was agreed at COP27 and COP28 through the International Energy Agency's (IEA) Breakthrough Agenda that there would be consensus on the methodology for verifying 'near zero emission' steel claims by the end of 2024.³⁶ ResponsibleSteel was named one of the primary platforms to carry forward this work, with its latest standard revised to include certification transition periods and separation of raw and processed mined materials to reflect supply chain complexity.³⁷ Reflecting the promising commitment of 57 governments to the IEA's Breakthrough Agenda, we provide **in-principle support to the verification and measurement of 'near zero emission' in steel or an equivalent widely accepted definition. This assumes widespread interoperability or equivalency of disparate initiatives and sustainable taxonomies will follow alongside the IEA's consensus on near zero emission**,³⁸ while allowing compatibility with upstream and midstream segments of the steel value chain and alignment with the IEA's normative modelled Net Zero Emissions by 2050 Scenario.

³⁰ Sabah S, Shahabuddin M, Rahbari A, Brooks G, Pye J and Rhamdhani MA, [Effect of gangue on CO2 emission for different decarbonisation pathways](#), Ironmaking & Steelmaking, vol 51, iss 4, 3 April 2024.

³¹ European Aluminium, [Vision 2050: European aluminium's contribution to the EU's mid-century low-carbon roadmap](#), October 2022.

³² World Steel Association, [What we mean when we talk about low carbon steel](#), blog, 12 April 2021.

³³ ACCR, [Forging pathways: insights for the green steel transformation](#), March 2024, table 1, p 12.

³⁴ IEA, [Iron and Steel Technology Roadmap](#), Energy Technology Perspectives series, October 2020, table 2.1.

³⁵ CSIRO, [Charcoal for green metal production](#), 31 October 2022.

³⁶ IEA, [Breakthrough Agenda Report 2023: Accelerating sector transitions through stronger international collaboration](#), 14 September 2023, p 96.

³⁷ ResponsibleSteel, [International Production Standard Version 2.1](#), 21 May 2024.

³⁸ The ResponsibleSteel standard requires implementation of the Task Force on Climate-Related Financial Disclosures recommendations. This should imply alignment with the IFRS/ISSB S1 Sustainability-related Financial Information, S2 Climate-related Disclosures and the Global Reporting Initiative. The Climate Bonds Initiative's Steel Criteria for issuance recognises ResponsibleSteel as an alternative demonstration of compliance.

Due to inherent differences in trading markets, contributions to global carbon emissions³⁹ and its strong positive nexus to enabling the energy transition, there is significantly less debate on what constitutes green alumina or aluminium. We draw the department's attention to the following member initiatives:

- Aluminium Stewardship Initiative (ASI), which administers an independent third-party certification program for the aluminium value chain. The ASI Performance Standard Version 3.1 defines 62 ESG principles and criteria, with a mine-to-metal emissions intensity benchmark for aluminium smelting of 11 tCO₂e/t of cast aluminium.⁴⁰ Alcoa, Rio Tinto and South32 are members.
- Rocky Mountain Institute's Sustainable Aluminium Finance Framework focuses on aligning primary aluminium production to the 1.5°C pathway.⁴¹ Alcoa and Rio Tinto participated in its development.

Factors influencing investment decisions in Australia and globally

We have sought to address the consultation paper's questions 6 and 7 on the scale and costs of facility and infrastructure investment needed throughout the remainder of this submission. Our discussion of investment attractiveness is thus spread across the following sections which correspond to the consultation paper's subheading themes. For reference, we have provided a short overview here.

- Q12 to 14: Decarbonisation and the associated constraints – The primary enabling infrastructure for producing feedstock inputs for green metals is low emission, reliable and cost-competitive energy. The HILT CRC's submission to the Joint Standing Committee on Trade and Investment Growth's inquiry into Australia's opportunities in a global green economy highlights greening alumina production would require additional demand comparable to the size of the Victorian electricity grid,⁴² while the Minerals Research Institute of Western Australia (MRIWA) estimates that producing 50 million tonnes per annum (Mtpa) of green iron would require around double the current total installed generation capacity in the WA WEM.⁴³ The relative priority of addressing these key barriers to decarbonisation investment are as follows, noting the abatement pathway for iron and alumina industrial processes will be unique to the operation's assets:
 - (1) Access to low emission, reliable and internationally cost-competitive energy supply
 - (2) Accelerated development of decarbonisation technologies
 - (3) Coordinated government policy action on all aspects of energy.
- Q22: Government policy – Lack of whole-of-government support for brownfield and greenfield projects and the uneven international landscape on climate regulation, financing taxonomies, and price premiums can reduce investment attractiveness and influence decisions.
- Q23 to 30: Supply side options – Levels of government financial and policy support, including infrastructure provision to lower input costs, can influence investment decisions in the global metals value chain. Alumina manufacturing in WA is a low margin business, particularly as energy accounts for 40 per cent of costs.⁴⁴ Industrial subsidies in steel have also partly contributed to worldwide excess and inefficient market capacity.⁴⁵

Principles for community benefit sharing and how this might apply to green metals

Q8. What are the benefits to the local region or community when developing a green metals project?

A surveyed sample of CME's members spent \$132 billion locally and directly employed 98,482 Australians on a full-time equivalent (FTE) basis in 2022-23. This spending supported an additional \$103 billion in indirect economic activity and the employment of another 646,332 FTEs Australians – equivalent to 5 per cent of the nation's employment.⁴⁶ This supply chain spending included payments to:

- 18,712 local businesses. Our members support fairer, faster payment terms, times and practices for small, local and Indigenous-owned or Indigenous-run businesses. Recently, CME supported the passing of the

³⁹ 10 per cent for steel versus 2 per cent for aluminium production. Steel contributes 7 per cent in direct emissions and another 3 per cent in indirect emissions from electricity generation and the combustion of steel off-gases. IEA, [Iron and Steel Technology Roadmap](#), October 2020.

⁴⁰ ASI, [ASI Performance Standard V3.1](#), April 2023.

⁴¹ Marchan E, White T and Kooijmans S, [Sustainable Aluminium Finance Framework](#), RMI, November 2023.

⁴² Parliament of Australia, [Australia's trade and investment opportunities in a global green economy](#), October 2023, para 6.30, p 136.

⁴³ MRIWA, [WA's Green steel opportunity](#), project M10471, May 2023. AEMO, [About the WEM](#), accessed 15 July 2024.

⁴⁴ OECD, [Government support in industrial sectors: A synthesis report](#), OECD trade policy paper no 270, 7 April 2023, p 20.

⁴⁵ OECD, [Subsidies to the steel industry: Insights from the OECD data collection](#), policy paper no 147, 26 April 2023.

⁴⁶ CME, [2022-23 Economic Contribution: Australia](#), March 2024.

'fast small business payer' insertion to the *Payment Times Reporting Amendment Bill 2024* (Cth), which will recognise members that pay small businesses within 20 days.

- 1,396 community organisations;
- 78 local governments;
- 33 per cent to the WA Government's general revenue, supporting the provision of essential public goods and services like roads, hospitals, schools and police; and
- 20 per cent of Australia's corporate income tax receipts.

By export value, the majority of WA's iron ore comes from the Pilbara region (97 per cent).⁴⁷ Of the above spending by members in 2022-23, \$2.5 billion was directly spent in the Pilbara, consisting of:⁴⁸

- 6,804 direct FTEs and another 14,282 indirect FTEs – equivalent to 1 in 2 jobs locally;
- 685 local businesses – close to 1 in 3 local businesses;
- 377 community organisations;
- 4 local governments; and
- Supporting \$2.8 billion in indirect economic activity – equivalent to 11 per cent of local economic activity.

For WA's alumina by export value, it comes solely from the Peel region with gold and copper also contributing to the region. Of the above spending by members, \$1.9 billion was directly spent in the Peel region:⁴⁹

- 10,246 direct FTEs and another 10,008 indirect FTEs – equivalent to 3 in 10 jobs locally;
- 419 local businesses;
- 50 community organisations;
- 5 local governments; and
- Supporting \$1.3 billion in indirect economic activity – equivalent to 25 per cent of local economic activity.

As demonstrated above by the key regions where iron ore and alumina are located, the WA resources sector creates economic opportunities and flow-on benefits for all Australians. In line with the Productivity Commission's findings, we note, however, **that the WA and Australian Governments can better coordinate the sector's community-focused investments and maximise the effectiveness of benefit-sharing.**⁵⁰

As described in the sections below on government policy and supply side eligibility criteria, **we recommend that a net reduction in global value chain emissions be accepted as contributing to a 'sustained comparative advantage' under the Future Made in Australia's National Interest Framework.** The onshoring of increased Scope 1 emissions should be commensurately weighed with the community benefit principles of secure jobs, skilled workforces, strengthened local supply chains and increased domestic taxes.

Unlike hematite ore which naturally occurs in saleable grades of roughly 58-62% Fe, magnetite ore undergoes a more capital, energy and labour-intensive process to produce a high grade 65-69% Fe saleable product. Its thermodynamic properties also make it more suitable as a pellet feedstock in steelmaking.⁵¹ Work commissioned by CME found magnetite requires 40 to 70 per cent more technical and management skills in the value adding beneficiation process than hematite,⁵² supporting local employment and diversity in skills and training development.

The MRIWA green steel report also found that a 4.8 Mtpa HBI green iron plant would generate \$85 billion in gross domestic product (GDP) by 2050 (at \$3 billion per annum), \$66.5 billion in real income, an average 1,540 FTEs in jobs and \$31.7 billion in government taxation revenues.⁵³ We note, however, that this report did not discuss WA's comparative advantage in attracting and maintaining this scale of required capital and energy-intensive investment.

⁴⁷ Unchanged from the 2022-23 data file. Within the Pilbara, iron ore makes 97 per cent of export value, with the balance to lithium, gold and salt. Government of Western Australia, [2023 Spatial and Regional Resource Data File](#), DEMIRS, 14 May 2024.

⁴⁸ CME, [2022-23 Economic Contribution: Pilbara region](#), March 2024.

⁴⁹ CME, [2022-23 Economic Contribution: Peel region](#), March 2024.

⁵⁰ Commonwealth of Australia, Resources sector regulation, Productivity Commission, study report, November 2020, ch 10.

⁵¹ Alongside less emission of harmful dust and gases. Elahidoost H, Sheibani S, Raygan S, Hosseini L and Esmaeili N, [Mechanism of magnetite iron ore concentrate morphology affecting the pellet induration process](#), Advanced Powder Technology, vol 33, iss 12, December 2022.

⁵² Australian Venture Consultants, A case for a fair and reflective royalty regime for the WA magnetite industry, not-for-publication, December 2020.

⁵³ MRIWA, [WA's Green steel opportunity](#), project M10471, May 2023.

Pace and feasibility of achieving ‘green milestones’ as we move towards zero emissions production

Q12. What are the key barriers to investing in new green metals facilities or decarbonising existing facilities?

CME’s members are each on their own unique, technology-led decarbonisation trajectory towards net zero while maintaining continuity of operations. To establish a green metals value chain in Australia though, the **single largest barrier is timely access to a large-scale firmed supply of low-emission, reliable and internationally cost-competitive energy**. This is a more complex challenge for vertically integrated producers that plan investments on a long term basis. In enabling this transition in energy use and emissions intensity, members will invest in a broad range of abatement, efficiency and removal technologies.

For energy-intensive industries such as alumina connected to the South West Interconnected System (SWIS) or other electricity grids, energy as a key barrier to decarbonisation is well documented.⁵⁴ The timing of the energy transition and the required network build-out for grids owned by government trading enterprises before 2030 is unknown, leaving a tight timeline for the industry to plan the capital investment and obtain the approvals needed to convert existing facilities or establish new ones to meet their own 2030 milestones. As outlined in our 2024-25 pre-Budget submission to the WA Government,⁵⁵ we need **a holistic draft master transmission plan for the SWIS as soon as possible**. Turning to the NWIS in the Pilbara region, it is expected that electricity demand will increase by two to five times by 2050.⁵⁶ Like the SWIS, a master transmission plan will also need to be considered for the NWIS to enable decarbonisation to meet 2030 milestones ahead of net zero by 2050. Please also see our recent submission on electrification barriers.⁵⁷

In the SWIS, gas-fired generation has increased during the past year to provide critical energy security during periods of high demand.⁵⁸ More broadly, natural gas has an established role in facilitating the world’s energy transition in this decade.⁵⁹ As an established fuel source, gas can provide operational resilience. For some hard-to-abate sectors with high-temperature heat requirements such as steelmaking and alumina refining, the Australian Industry Energy Transitions Initiative (ETI) indicates gas may be an interim transition fuel for reducing emissions in the medium term.⁶⁰ **We recommend all levels of government support a least cost, technology-agnostic and flexible pathway to abatement and net zero by 2050 for both iron ore and alumina**. For different members and operations at different points in time in their pathway to net zero, this may include natural gas and different sources of hydrogen production. A focus on improving the TRL of a range of technologies and access to a range of low carbon energy sources will support least-cost abatement across a wide range of industrial processes.

Another key barrier is commercialising green metal feedstock technologies (e.g., green iron and alumina) into viable, large-scale production. Demonstrating that lower to mid-grade Pilbara hematite iron ores can be used commercially to produce near zero green iron will be important to overcome this barrier. Based on the world’s investment in assets to date, the IEA considers DRI made with natural gas as the leading commercially operable TRL pathway for iron plants which can later be converted to renewable hydrogen (i.e., H₂-DRI-EAF), noting evolutionary improvements may be needed to stay competitive.⁶¹ Modelling by the HILT CRC also suggests blending synthesis gas with hydrogen may perform better as a reductant and reduce overall energy consumption in the existing DRI shaft furnace process.⁶²

The DRI product can also be further processed in electric smelting furnaces (ESF) to remove the gangue as slag (if required), with our members BHP and Rio Tinto partnering with BlueScope to investigate an ESF pilot plant using Pilbara ores,⁶³ and member Fortescue progressing an ESF pilot at its Christmas Creek project.⁶⁴

⁵⁴ Deloitte, [A roadmap for decarbonising Australian alumina refining](#), reported prepared for the Australian Renewable Energy Agency with Alcoa, Rio Tinto and South32, November 2022. AAC, [Aluminium: The original critical mineral and clean energy export](#), November 2023.

⁵⁵ CME, [WA 2024-25 pre-Budget submission](#), submission to the WA Department of Treasury, October 2023.

⁵⁶ Government of Western Australia, [Sectoral emissions reductions strategy for Western Australia](#), December 2023, figure 4.

⁵⁷ CME, [Electricity and Energy Sector Plan](#), submission to DCCEE, 3 May 2024.

⁵⁸ Because gas is available during peak demands. AEMO, [Quarterly Energy Dynamics Q1 2024](#), 23 April 2024, pp 62-66.

⁵⁹ Peak demand for coal, oil and natural gas before 2030. IEA, [World Energy Outlook 2023](#), 10 October 2023. Natural gas-fired generation expected to rise slightly. [Electricity 2024: Analysis and forecast to 2026](#), January 2024.

⁶⁰ Australian Industry ETI, [Pathways to industrial decarbonisation: Positioning Australian industry to prosper in a net zero global economy](#), phase 3 report, February 2023.

⁶¹ Aside from charcoal in BF. IEA, [Iron and Steel Technology Roadmap](#), October 2020, table 2.1, pp 90-92.

⁶² Shahabuddin M, Rahbari A, Sabah S, Brooks G, Pye J and Rhamdhani MA, [Process modelling for the production of hydrogen-based direct reduced iron in shaft furnaces using different ore grades](#), Ironmaking & Steelmaking, 22 May 2024.

⁶³ BHP and Rio Tinto, Australia’s leading iron ore producers partner with BlueScope on steel decarbonisation, 9 February 2024.

⁶⁴ CSIRO, [Christmas Creek Green Iron Trial Commercial Plant](#), HyResource, 23 November 2023. The plant will produce a high-purity pig iron from Pilbara hematite using renewable hydrogen. If the trial is successful in proving this technology, commercially representative quantities will be produced from 2025 and Fortescue will proceed with commercial scale demonstration with a 1 to 2 Mtpa hydrogen reduction and ESF green iron plant.

As noted throughout this submission, green steel production is unlikely to be an area of comparative advantage for Australia. Green steel production is not considered by the Australian Energy Market Operator (AEMO) in the 10-year expected decarbonisation scenario under the 2023 WA Gas Statement of Opportunities⁶⁵ or the 2024 WA WEM Electricity Statement of Opportunities,⁶⁶ but rather only in the high case of strong climate policy action. However, the expected modelled scenario does include the electrification of alumina refineries via mechanical vapour recompression, electric calcination or direct electrification of heat processes as feasible technologies. Importantly, these outlooks are underpinned by multi-sector modelling that suggests hydrogen export opportunities, inclusive of hydrogen used in DRI processes, are more likely to affect underlying electricity consumption forecasts instead of domestic end use.⁶⁷

Q13. To what extent are barriers comprised of upfront capital costs or ongoing operational costs?

The Mission Possible Partnership estimates that transitioning existing global steelmaking assets to net zero will require an additional US\$8 to \$11 billion investment per year, which is in addition to the \$47 billion needed per year for maintenance and meeting growth in demand.⁶⁸ A net zero global steel value chain will require a cumulative investment of up to US\$6.1 trillion by 2050, with over two-thirds of this investment across carbon capture and storage (CCS) (residual emissions in upstream coal mining contributing US\$60 billion per year), hydrogen infrastructure, electricity generation and networks. It will also require up to a 12-fold increase in iron ore beneficiation capacity by 2050 to improve the quality of low grade ores for DRI steelmaking. However, there is much discourse internationally on the timing of shifting away from coal used upstream and this will affect the transition opportunity for WA.

The Mission Possible Partnership also estimates that US\$1 trillion in cumulative investment will be needed by the global aluminium value chain by 2050 across low carbon power (\$500 billion for power purchase agreements, electricity grid decarbonisation and CCS retrofits), low carbon anode smelter retrofits, transitioning refineries to low carbon fuels and CCS infrastructure.⁶⁹

Further to our comments above on energy as the key barrier to decarbonisation, rising wholesale electricity costs in Australia are likely to pose a barrier in the medium to longer term to industrial electrification. The delivered cost of energy in WA's WEM has increased to above \$100 per megawatt-hour (MWh) and persisted since.⁷⁰ This is a doubling of prices since 2018-19 and does not capture increases proposed recently to the Benchmark Reserve Capacity, Supplementary Reserve Capacity, AEMO's market fees or doubling of the maximum Energy Offer Price Ceiling.⁷¹ Combined with relatively higher costs for labour,⁷² inputs and construction, this electricity price is unlikely to support an internationally competitive value adding manufacturing industry in WA nor avoid carbon leakage. **We support a fair, equitable, and orderly energy transition in the WA WEM, particularly for maintaining system reliability and keeping long-term supply costs low.** We thus recommend the consideration of continued or increased energy incentives to keep demand management facilities on the grid.

The MRIWA report estimates that operating costs for domestically produced green steel from hematite in WA would be 56 per cent more expensive than traditional fossil fuel-based processes offshore. The report also estimates that WA is unlikely to be competitive in green steel production unless the price of hydrogen reaches \$3.20 per kilogram (/kg), in addition to substantial capital costs.⁷³ Views on the medium and long term price of hydrogen, and the pathway to get there, vary significantly. The Sunshot Alliance report assumes an optimistic hydrogen price of \$1/kg in green iron production processes by 2040,⁷⁴ while the Australian Industry ETI assumes hydrogen production costs in WA under the 1.5°C major transformation scenario will be \$2.25/kg by 2050.⁷⁵ The role of hydrogen and its contribution to costs will differ for each operation.

Q14. What options are there at each intermediary step to reduce emissions for metal products?

⁶⁵ AEMO, [2023 WA Gas Statement of Opportunities](#), December 2023.

⁶⁶ AEMO, [2024 WEM Electricity Statement of Opportunities](#), 18 June 2024.

⁶⁷ Reedman L, Gordon J, Murugesan M, Croser L, Li M, Hayward J, Khandoker T, Brinsmead T and Havas L, [Multi-sector energy modelling 2022: Methodology and results](#), CSIRO, final report EP2022-5553, 2 December 2022.

⁶⁸ Mission Possible Partnership, [Making net-zero steel possible](#), September 2022, p 18.

⁶⁹ Mission Possible Partnership, [Making net-zero aluminium possible](#), April 2023, p 16.

⁷⁰ Two successive quarters. AEMO, [Quarterly Energy Dynamics Q1 2024](#), 23 April 2024, figure 113, p 72.

⁷¹ Subject of Economic Regulation Authority's consultations within the last quarter.

⁷² The US [International Trade Administration](#) and [US Department of State](#) provides investment guidance that Australia has a high cost of labour.

⁷³ MRIWA estimates \$7/kg for hydrogen produced using natural gas, costing \$6 to 7 per gigajoule with a return on capital of 6 per cent.

⁷⁴ To displace natural gas. Accenture, [Sunshot: Achieving global leadership in clean exports – A policy roadmap for Australia](#), final report commissioned by the ACF, ACTU, BCA and WWF, September 2023. The report builds upon the [October 2021 economic value-added analysis](#).

⁷⁵ Figure 2.14, p 35.

There is an opportunity to reduce emissions at each segment of the green metals value chain, starting with upstream ore mining in the near term. Switching from diesel and liquefied natural gas (LNG) to low carbon liquid fuels (LCLF) and onsite electricity powered from renewable sources will be the primary decarbonisation pathway for the WA resources sector in the near-term. Fuel switching throughout the global aluminium value chain is estimated to result in 12 per cent savings of cumulative emissions by 2050.⁷⁶ Some of our members also have interim targets to wholly or partially replace fossil fuels from their operations by 2030.

The MRIWA report estimated it is commercially viable to replace all mine site fossil fuel use in the near term at electricity prices at or below \$100/MWh. However, large scale trials for heavy machinery, trains, trucks and ships and other operations traditionally powered by diesel or LNG are still underway and may take longer.⁷⁷ The Australian Industry ETI⁷⁸ and State of Play⁷⁹ nuances the productivity and electrification difficulties of these demonstration trials further, indicating biodiesel will be the replacement fuel in mining heavy haulage in the near term, at least until low emission battery electric vehicles and hydrogen fuel cell electric vehicles become more available and cost competitive in the medium term. In addition, while many of our members such as Fortescue have agreements with original equipment manufacturers (OEMs) to pursue development of alternative battery electric vehicle and heavy mobile equipment technologies, the capacity of OEMs to manufacture and supply for industry wide deployment will be a limiting factor. Because of its compatibility with existing assets and infrastructure, member companies such as bp, Rio Tinto and Thiess are also assessing the use of renewable diesel and LCLF in heavy duty mining fleets to displace diesel.⁸⁰

BHP and Rio Tinto are also investigating the use of green and low-carbon ammonia in the Pilbara iron ore shipping route, however, there is a significant cost gap compared to conventionally-fuelled vessels for the foreseeable future.⁸¹ Fortescue has also trialled a world first in the use of ammonia as a marine fuel in a dual-fuelled ammonia-powered vessel in Singapore.⁸² We note the upcoming LCLF Strategy will consider demand support mechanisms to increase uptake of decarbonised fuels in maritime transport. **Any policy on LCLF should be future proofed to support sustainable non-biogenic feedstocks.**

MRIWA suggests WA's green iron opportunity is in the form of HBI from green pellets as feedstock for the EAF or BF-BOF pathways.⁸³ There is a gas-fired HBI and pelleting plant in WA proposed by a POSCO subsidiary, which indicates green hydrogen in fluidised bed DRI processes is 10 years away from commercial viability, but natural gas with 1 per cent hydrogen blending, will be an interim enabler, supplemented by renewables and CCS implementation.⁸⁴ However, the Australian Industry ETI projects DRI-smelter-BOF technology will start in 2030.⁸⁵ As discussed above, Fortescue and BHP are pursuing the latter pathway as a more reflective opportunity in utilising Pilbara iron ores. We recommend that the Australian Government consider targeted support to increase and expand our existing strengths in providing feedstock inputs to global value chains. **Developing government policies on industrial transition and emission pathways will thus be a balancing act but should appropriately reflect our growing opportunity to further process ores locally.**⁸⁶

For alumina processes, decarbonisation will occur in parallel with progress on various technology readiness levels (TRL) and will differ per operation. Please see the AAC's submission for details.⁸⁷ Enabling different forms of hydrogen production may facilitate staged investments in existing infrastructure.

Interestingly, the Net Zero Australia project finds onshoring the production of green iron and alumina is 40 per cent cheaper than exporting primary clean energy in the longer term.⁸⁸ The underlying study assumes all Australian iron ores are of similar quality and efficiency for DRI processes, however, this is not the case. We

⁷⁶ Mission Possible Partnership, [Making net-zero aluminium possible](#), April 2023, p 43.

⁷⁷ Government of Western Australia, [Sectoral emissions reduction strategy for Western Australia: Pathways and priority actions for the state's transition to net zero emissions](#), Department of Water and Environmental Regulation, December 2023, p 19.

⁷⁸ Australian Industry ETI, [Pathways to industrial decarbonisation: Positioning Australian industry to prosper in a net zero global economy](#), phase 3 report, February 2023, table 3.01, figure 3.02 and figure 5.02.

⁷⁹ State of Play, [The Electric Mine Consortium: A case study in transformative collaboration](#), October 2022.

⁸⁰ bp, [Enabling supply of renewable diesel in Australia: A consultation paper on establishing a paraffinic diesel fuel standard for Australia](#), submission to DCCEEW, 15 February 2024. Rio Tinto, [Climate Change Report 2023](#), 21 February 2024. Thiess Group, [2022 Sustainability Report](#), 1 March 2023.

⁸¹ Global Maritime Forum, [Fuelling the decarbonisation of iron ore shipping between WA and East Asia with clean ammonia](#), May 2023, p 11.

⁸² Fortescue, [World's first use of ammonia as a marine fuel in a dual-fuelled ammonia-powered vessel in the Port of Singapore](#), 15 March 2024.

⁸³ ES-17, p 23.

⁸⁴ Proposals to the WA Environmental Protection Authority (October 2023), [media statement](#) and referral to the EBPC (April 2024).

⁸⁵ P 52.

⁸⁶ Government of Western Australia, [Sectoral emissions reduction strategy for Western Australia: Pathways and priority actions for the state's transition to net zero emissions](#), Department of Water and Environmental Regulation, December 2023, p 10.

⁸⁷ AAC, [Re: Electricity and Energy Sector Plan Discussion Paper](#), submission to DCCEEW, 26 April 2024.

⁸⁸ Assuming hydrogen is cost competitive for local industrial use. Net Zero Australia, [How to make net zero happen: Mobilisation report](#), partnership between the University of Melbourne, the University of Queensland, Princeton University and Nous Group, July 2023.

note BHP, Fortescue, Rio Tinto and Roy Hill are each investigating the use of lower-grade Pilbara iron ores as feedstock into iron and steelmaking processes.⁸⁹ Further R&D support may be needed.

How existing policies shape decarbonisation strategies and investment decisions

Q22. To what extent has government support influenced investment thinking in Australia in respect to projects targeting decarbonisation?

Regulatory and policy settings directly affect the ability of the WA resource sector to compete internationally, including the ability to attract investment for decarbonisation projects. Given the longstanding question on the commercial viability and sustainability of finished metal production in Australia, government support targeted at feedstock inputs will be important to attracting investment. Key policy focus areas that influence investment thinking include:

- Competitive tax settings that provide certainty to investors that Australia remains a stable and cost-competitive jurisdiction relative to international jurisdictions.
- Fiscal settings that reduce financing, capital and operating costs are key policy levers that can attract investment to Australia. See our discussion below on supply side options.
- Improving regulatory efficiency and effectiveness through streamlining project assessment and approvals processes.⁹⁰ Lengthy and opaque project assessment timelines in Australia increase investment risk through costly delays. To attract investment, it is important that the design of the proposed Nature Positive Reforms incorporates ecological sustainable development principles in decision-making and reduces the regulatory overlap between state and federal regimes to remove duplication and inconsistencies in assessment processes and conditions. See additional commentary below.
- Optimised Safeguard Mechanism settings and support to reduce the risk of carbon leakage from the Australian economy and ensure settings are relevant to the industry's opportunity to expand supply and diversify into feedstock inputs. See additional commentary below.
- Australia's Sustainable Finance Strategy must align with the development of a green iron and alumina industry. See additional commentary below.

We acknowledge the Sunshot Alliance report recommends priority status in environmental assessments and approvals for onshore value added mines that supply green iron. However, preferential treatment may not be a practical or sustainable policy approach if there is a change in government or societal expectations.

Regardless of commodity or proposed economic benefit to Australia, CME members note the increasing cumulative burden and incremental policy scope creep of federal-state regulatory reforms across the environment and climate. A lack of policy consistency, certainty and stability can make it harder to do business in Australia. Rather, **we take this opportunity to recommend the alignment of project facilitation services to ensure federal-state assessment processes can be conducted by one agency.** This action would reduce regulatory complexity and administrative costs, ensure consistency in conditioning and shorten the end-to-end approvals processing timeframe.

CME supports the objectives of recent reforms to the Safeguard Mechanism but notes they have introduced a risk of potential carbon leakage from the Australian economy. We support the current review by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) of policy options that may reduce carbon leakage and protect domestic industries (the Carbon Leakage Review). Additionally, it is important for the Australian Government to continue to review incentives provided by other countries and assess the effectiveness of support available to Safeguard Mechanism Trade Exposed facilities. Support should be aimed at minimising the risk of carbon leakage and incentivising project investment in Australia.

Further review of the Safeguard Mechanism's settings directly relevant to inputs needed for green metal production should be prioritised to ensure that policy settings align with the industry's development aspirations. For example, current best practice iron ore production variables under the Safeguard Mechanism do not differentiate differences in metallurgical processing, energy and emissions of magnetite from hematite ores.⁹¹ We note there is a net reduction in steelmaking's direct emissions if magnetite is used as pellet feedstock in

⁸⁹ Various industry and research partnerships to assess suitability of Pilbara ores for fluidised bed DRI production, direct electrochemical reduction, lime magnetite pellet agglomeration, renewable injections into existing BF-BOF routes, electric smelting and [BioIron](#) low carbon ironmaking.

⁹⁰ In WA, the cross-agency Green Energy Approvals Initiative focuses on streamlining environmental assessments and approvals for major green energy projects but does not seek to assist decarbonisation of existing industrial projects. Aside from large-scale capital expansions, the Australian Major Projects Facilitation Agency also does not list brownfield projects as an example of regulatory complexity.

⁹¹ The Australian, [Safeguard rules a 'threat to magnetite'](#), 7 April 2023.

current pathways.⁹² However, magnetite projects are, on average, almost three times as capital-intensive as hematite projects in WA, which can create challenges in attracting investment.⁹³ In addition to our discussion above on the greater labour intensity needed in onshoring magnetite processing, **there is a case to create separate production variables for hematite and magnetite ore to address these material differences in ore.**

The proposed development of Australia's sustainable finance taxonomy will be important for attracting finance for projects that provide feedstock inputs to the emerging green metals value chain. We note that the draft taxonomy does not align with other Australian Government policy frameworks being established to guide Australia's net zero transition. Specifically, it must encompass a broader range of resource sector outputs or decarbonisation technology measures.⁹⁴ Most relevant to this consultation paper, the proposed linkage of sustainable financing to Scope 3 emissions for iron ore projects is not supported. This requirement could disincentivise the development and implementation of decarbonisation measures for iron ore projects within Australia, as third-party downstream facilities may not align with the taxonomy's requirements. Emissions reporting should be transparent and reliable, but this is not possible if downstream third-party steelmaking processes must be captured in upstream Australian iron ore operations. **CME recommends that the draft taxonomy is revised to ensure that detail aligns with other net zero transition-related Australian Government frameworks.** Taxonomy settings must work towards the same goals as other frameworks to ensure that global capital can be accessed for investments in Australia. Specific to this consultation, the taxonomy must be aligned with the following:

- Australia's Net Zero Plan and the associated technology pathways on emissions abatement, removal and efficiency identified in the six sectoral decarbonisation plans currently under development
- Scope 1 emission focus and emission intensity settings within the Safeguard Mechanism
- Renewable electricity target and mechanisms supporting the achievement of the 82 per cent target, focused on the provision of low emission, reliable (firmed) and cost-competitive electricity
- National Hydrogen Strategy
- Future Gas Strategy
- Critical Minerals Strategy 2023-2030; and the
- National Greenhouse and Energy Reporting Scheme.

Looking internationally, the Australia-Germany Hydrogen Accord,⁹⁵ particularly the H2Global offtake scheme combined with Germany's position as the 7th largest producer of crude steel,⁹⁶ could have a positive effect on green iron and steel industry development. For example, the REPowerEU will link the H2Global initiative with the European Hydrogen Bank to support international hydrogen imports, citing the European steel sector as a main driver for increased hydrogen consumption.⁹⁷ The Mission Possible Partnership recommends steelmakers with strong Scope 3 emission targets for their upstream inputs (i.e., in iron ore or iron production) pursue long term offtake agreements underpinned by a price premium proportional to the additional costs involved in reducing upstream emissions. Like what is considered by the SA Government,⁹⁸ **there is an opportunity for the WA and Australian Governments to work with key trading partners in valuing high ESG standards and facilitating long-term export offtake agreements on value added feedstock inputs.**

The E3G notes that private sector investment alone will not successfully scale up the investment required to build the energy infrastructure needed for green iron exporting countries.⁹⁹ It will need public-private and international partnerships, underpinned by proactive government policies on green iron trade and investment. Notably, it focuses on developing countries as prime examples.¹⁰⁰ In contrast, Wood Mackenzie notes Australia could be well positioned to capitalise on this opportunity of growing seaborne green DRI trade, acknowledging

⁹² Hooey L, Riesbeck J, Wikstrom JO and Bjorkman B, [Role of ferrous raw materials in the energy efficiency of integrated steelmaking](#), ISIJ International, vol 54, iss 3, March 2014. Larsson M, Grip CE, Ohlsson H, Rutqvist S, Wikström JO and Angström S, [Comprehensive study regarding greenhouse gas emission from iron ore based production at the integrated steel plant SSAB Tunnplåt AB](#), International Journal of Green Energy, vol 3, iss 2, February 2007. The Crucible Group, [Greenhouse emissions and magnetite iron ore 'from pit to product'](#), report commissioned by CITIC Pacific, 25 October 2022.

⁹³ \$225 per tonne versus \$82 per tonne. Commonwealth of Australia, [Resources and Energy Major Projects](#), DISR, dataset at 31 October 2023, 18 December 2023.

⁹⁴ CME, Australian Sustainable Finance Taxonomy: Consultation paper, submission to the Australian Sustainable Finance Institute, 5 July 2024.

⁹⁵ Australian Government, [Australia and Germany partner on hydrogen initiatives](#), media statement by the former Minister for Industry, 13 June 2021.

⁹⁶ Worldsteel, [World steel in figures 2024](#), 27 May 2024.

⁹⁷ European Commission, [Joint statement by Commissioner Simson and German Minister Habeck on energy issues](#), 31 May 2023.

⁹⁸ Wang C and Walsh C, [Modelling green iron production with renewable hydrogen and magnetite iron ore in SA](#), Monash University, 19 January 2024. Government of South Australia, [SA-NW Europe via Rotterdam: Green steel supply chain analysis](#), February 2024. Government of South Australia, [SA's Green iron and steel strategy: Partner of choice to decarbonise global steel](#), June 2024.

⁹⁹ E3G, [Raising ambition on steel decarbonisation: 2023 Steel policy scorecard](#), 8 February 2024, p 38.

¹⁰⁰ The report and accompanying country profiles make one mention of Australia's opportunity as a green iron ore supplier.

our availability of land, renewable power and natural gas resources as catalysts.¹⁰¹ However, supportive policies will be required in Australia to complement the rebalancing of the European Union's steel trade in response to the CBAM policy. **Australia's Carbon Leakage Review needs to be holistically expanded to support export-oriented, energy-intensive and value-adding industries such as feedstock inputs to green metals to avoid carbon leakage and support domestic economic activity, investment and jobs.** For more information, please see our recent submission to the Carbon Leakage Review.¹⁰²

The US Administration has recently tripled the Section 301 tariffs on strategic goods such as steel and aluminium.¹⁰³ Although the Office of the Chief Economist indicates the immediate impacts of this trade statement will be muted,¹⁰⁴ coupled with the IRA's effects on sourcing critical minerals from US free trade agreements, there is an **immediate strategic opportunity for the Australian Government to deepen the bilateral investment relationship.**

We support the recent inclusion of aluminium and copper on the Strategic Material List. However, because of their criticality, they should be **elevated to Australia's Critical Minerals List to ensure alignment with our key trading partners.** We also note the List of Critical Technologies in the National Interest does not list green metals as an example application under the 'advanced manufacturing and materials' or 'clean energy generation and storage' technology fields. While green metals are articulated in the Critical Technologies Statement as a low emissions manufacturing opportunity, it could be better communicated in the next iteration of the List and thus allow for greater alignment and consistency of government efforts across co-investment plans, attracting and retaining skilled talent and international partnerships.

We note government policies on green metals in other jurisdictions reflect inherent differences in their economy's level of industrialisation and willingness to directly participate in markets. In Australia, it is the view of most of our members that **a comparable, competitive and combined suite of policy, regulatory and supply side support measures from both the WA and Australian Governments may be needed.** This will also require a regular review of existing initiatives to ensure they remain relevant and their mandates adjusted in response to market developments to achieve national interest objectives:

- The CIS in the WA WEM should progress in a timely manner. We also support expanding the CIS design to consider other sources of energy such as hydrogen. At a future date, there is merit in considering extending the CIS beyond 2030 to assist with the achievement of Australia's long-term renewable energy and decarbonisation targets.
- Demand side management facilities in the WA WEM's Reserve Capacity Mechanism process.
- Funding under the Clean Energy Finance Corporation's Rewiring the Nation Fund is committed to shared infrastructure projects. We welcomed the federal-state landmark agreement on the NWIS last year,¹⁰⁵ however, the quantum of allocation and timing of when this investment will flow through to facilitate decarbonisation is unknown. This may also require greater planning and funding consideration to integrate multiuser infrastructure across electricity, transport, pipelines, hydrogen and different industrial decarbonisation trajectories to better align generation and transmission development opportunities.¹⁰⁶
- Additional rounds to the Hydrogen Headstart Program could help lower the cost of hydrogen production for domestic use sooner. The announced Hydrogen Production Tax Incentive should also be designed and implemented in a timely manner to support the financial viability of and attract investment into Australia's green hydrogen industry.
- Australian Renewable Energy Agency's (ARENA) Powering the Regions Industrial Transformation Stream could be expanded to cover more decarbonisation scenarios, and thus more technologies, beyond the focus areas of the first round of funding. In particular, additional support may be needed for early-stage R&D and pilot programs for new innovations.

For alumina specifically, our views on the need for a suite of levers align with the AAC's recommendations.¹⁰⁷

Types and design of supply side options that should be considered

¹⁰¹ Wood Mackenzie, [Metalmorphosis: How decarbonisation is transforming the iron and steel industry](#), Horizons report, 19 October 2023

¹⁰² CME, [Carbon leakage review: Consultation paper](#), submission to DCCEEW, 12 December 2023.

¹⁰³ The White House, [President Biden takes action to protect American workers and businesses from China's unfair trade practices](#), 14 May 2024.

¹⁰⁴ Commonwealth of Australia, [Resources and Energy Quarterly: June 2024](#), Office of the Chief Economist, DISR, 1 July 2024.

¹⁰⁵ Government of Western Australia, [\\$3 billion Rewiring the Nation deal to power WA jobs and growth](#), joint media statement, 29 August 2023.

¹⁰⁶ IEA, [Electricity grids and secure energy transitions](#), 10 October 2023, pp 110-111.

¹⁰⁷ AAC, [Aluminium: The original critical mineral and clean energy export](#), November 2023, pp 11-12.

Q23. What approach and features do you consider to be most effective?

To ensure the long term viability of a green metals industry in Australia, we support the consultation paper's focus on exploring supply-side measures over demand-side options. **Targeted, well-designed incentives that can provide support beyond a single budget lifecycle or term of government**, such as a production tax incentive (PTI), could be effective for increasing private investment. Introducing a competitive PTI, alongside other measures, for these value chains will send a clear signal that Australia is keen to maintain and attract investment in capital and energy-intensive industries.

We note, that globally, industrial sectors such as steel, aluminium and renewable energy, typically benefit from government support in the form of below-market debt financing (over 70 per cent), below-market energy inputs, tax expenditures, and to a lesser extent, grants for rolling stock (less than 10 per cent).¹⁰⁸ This level and type of support provided to steel and aluminium will also differ for each country. **A PTI alone is thus unlikely to compete with the quantum of these industrial subsidies provided to international competitors**, particularly in the energy and emissions intensive segments of the metals value chain.

Specific to our members, the Alcoa and Rio Tinto ELYSIS partnership received equity support from the Governments of Canada and Quebec to support carbon-free aluminium smelting in 2018, with an industrial-scale demonstration of the technology recently announced.¹⁰⁹ We thus welcomed the recent introduction of the *Future Made in Australia Bill 2024* (Cth), which has inbuilt flexibility in the form of government support that may be provided (e.g., indemnity, investment of money or equity). The ability to discuss bespoke and innovative commercial support models, including public-private partnerships, will help achieve the final investment decision (FID) for some members.

Ahead of Minister King's nickel roundtables in January and the 2024-25 Federal Budget in May, CME actively engaged with the Department of Industry, Science and Resources and the Federal Treasury on introducing a PTI for critical minerals. Throughout these discussions, we noted that the introduction of a PTI, in combination with other supportive measures, would be most effective in bridging Australia's gap in competitiveness. Please see the Energy Transitions Commission's insights on the investment effects of combining a hydrogen PTI with DRI capital expenditure subsidies or CBAM operational expenditure in unlocking steel.¹¹⁰

In addition to an effective PTI targeted at Australia's opportunity in the green metals value chain, **in-principle, CME supports financial incentives such as instant or accelerated depreciation for facility conversions as these provide an enduring benefit across asset's life**. This should fit under existing tax regimes, and for most members, will help address the capital-intensive nature of investments, as well as support decision-making done at a group level across multiple operations.

We also support the use of grants such as the Future Made in Australia Innovation Fund and those currently under ARENA. Our members engage directly with ARENA on the Iron and Steel R&D Funding Rounds, Advancing Renewables Program, Hydrogen Headstart Program and Powering the Regions Fund. As described below, we note they can be limited in application to early-stage R&D, full-scale conversions, demonstrations and deployments. Relative to GDP, we highlight the AAC's view that the magnitude of funding provided through the Powering the Regions Fund is smaller than competing jurisdictions and support their view it should apply to existing and new assets, both on and offsite investment.¹¹¹ Grants may be better suited for incentivising targeted segments of the value chain that are less capital intensive.¹¹²

We also **support expanding the eligibility of the R&D Tax Incentive program or other government grants for early-stage R&D, large-scale pilot studies, and commercialisation activities prior to mass deployment**. To date, technological breakthroughs in reducing direct emissions intensity in the global steel and aluminium sectors have been incremental and yet to be proven as reliable replacements for incumbent processes.¹¹³ For some members, supporting business investment in commercial-scale trials could help.

¹⁰⁸ OECD, [Measuring distortions in international markets: Below-market energy inputs](#), trade policy paper no 268, 15 February 2023. [Government support in industrial sectors: A synthesis report](#), trade policy paper no 270, 7 April 2023. [The return of industrial policies: Policy considerations in the current context](#), 31 May 2024, figure 2, p 12.

¹⁰⁹ ELYSIS, [Rio Tinto and Alcoa announce world's first carbon-free aluminium smelting process](#), 10 May 2018. Alcoa, [Alcoa announces agreement on industrial-scale demonstration of ELYSIS™ carbon-free smelting technology](#), 28 June 2024. Rio Tinto, [Rio Tinto to install carbon free aluminium smelting cells using first ELYSIS technology licence](#), 28 June 2024.

¹¹⁰ Energy Transitions Commission, [Unlocking the first wave of breakthrough steel investments: International opportunities – The UK, Spain, France and the US, insight report](#), April 2023.

¹¹¹ AAC, [Aluminium: The original critical mineral and clean energy export](#), November 2023, p 11.

¹¹² Aluminium value chains are capital intensive and have high debt-to-asset ratios when compared to technology-oriented sectors that attract government grants. OECD, [Government support in industrial sectors: A synthesis report](#), OECD trade policy paper no 270, 7 April 2023., p 14.

¹¹³ More specifically, steel. IEA, [Breakthrough Agenda Report 2023](#), 14 September 2023, p 92. [Net Zero Roadmap: A global pathway to keep the 1.5 goal in reach – 2023 Update](#), 26 September 2023, p 95.

At the state level, CME calls for the WA Government to conduct a **targeted review of the royalty regime as it applies to value-added mid- and downstream processing projects**. Reiterating our position,¹¹⁴ there may be a case-by-base basis to permanently lower royalty rates for feedstock intermediaries to strategic industries such as the green metals value chain. The presiding ad valorem netback method is over 40 years old and does not accommodate the significant capital, chemical processing and labour intensities needed to producing higher value products (rather than high purity metals). For example, netback modelling previously commissioned by CME and conducted by Australian Venture Consultants supported a permanent reduction to the royalty rate for magnetite.

Q24. Are there parts of the value-chain that require particular support (for example, energy inputs, green alumina or iron inputs, or green aluminium or steel production)?

Support should initially be prioritised to upstream and midstream segments of the value chain where there is existing capability and competitive advantage (i.e., a robust business case), such as leveraging established pathways to market, technical expertise and infrastructure.

It should be a broad-based approach that enables resilience and scale (i.e., driving down the cost of energy), fostering international competitiveness and longevity of the green metals industry in Australia. To reflect the majority of the upstream and midstream opportunities in WA, **we recommend government support is prioritised for allocation towards WA on energy infrastructure**. Please see our discussion above on government policy and common user transmission infrastructure. We consider this will equally benefit the steel and aluminium value chains irrespective of the project's development stage or technological pathway. To a lesser extent, support may also be needed in transport infrastructure.

Q25. Where support is provided across a value chain, such as intermediate metal outputs, what design features are necessary to ensure support is effective for producers with different levels of vertical integration?

For non-integrated producers, as discussed above on government policy, government support could be targeted to reduce commercial risk and facilitate discussion of long-term export offtake agreements with major trading partners. Like critical minerals, this should include **supporting transparency and development of price premiums for high ESG standards in international markets**.

For some vertically integrated producers, transporting intermediate outputs to interstate or international mid- and downstream facilities and managing the associated emissions of conventionally-fuelled transport may be challenging depending on its contribution to Scope 3 emissions. Government support to accelerate the decarbonisation of liquid fuels used in the maritime, rail and road transport industry is encouraged, noting such support should not lead to perverse outcomes such as favouring facilities with higher emissions intensity. For most Safeguard Mechanism-liable facilities that form part of the green metal supply chain, **CME recommends that the Australian Government increase the scale of support available to Trade Exposed facilities to minimise the risk of carbon leakage** and incentivise continued investment in upstream and midstream Australian operations while green metal technology is under development.

Q26 and 27. What eligibility thresholds would be appropriate to access production incentives? Should incentive levels be varied for different thresholds?

A minimum amount of green metal production output or eligible business size is appropriate to warrant the administration and compliance of a new regime.

Notwithstanding the challenges of administering a threshold system, we believe it is reasonable to vary incentive levels for different emissions intensity reductions per unit of production. Preliminary results from the OECD's study on below-market energy government support indicate it has led to increased emissions from aluminium and steelmaking production through increased output.¹¹⁵ A threshold system will help incorporate carbon abatement cost curves and help minimise these types of unintended implications. However, it **must be aligned with the Safeguard Mechanism's focus on Scope 1 emissions, the 82 per cent renewable electricity target by 2030, other interrelated government strategies on climate, energy and industrial development and consistent with international standards**. Please see our discussion above on the investment effects of existing government policies. For example, Australia's proposed sustainable finance

¹¹⁴ CME, [Mining Amendment Regulations \(No 5\) 2019: Consultation draft](#), submission to DEMIRS, 24 January 2020.

¹¹⁵ Subsidies on fossil fuels (natural gas) and electricity. OECD, [Measuring distortions in international markets: Below-market energy inputs](#), trade policy paper no 268, 15 February 2023.

taxonomy appears to be inconsistent in its use of 100 per cent metal for its intensity benchmark, rather than ore. Designing thresholds must be contextualised to Australia's competitive advantage.

Further to our discussion above on verifying and measuring green metals, we reiterate we **do not support duplication of existing frameworks or standards**. Expanding the Australian Government's Guarantee of Origin Scheme to certify the emissions intensity of green metals should be aligned with existing customer preferences and market-based accounting approaches used under widely adopted regimes such as the National Greenhouse and Energy Reporting Scheme and National Australian Built Environment Rating System. This will need to coincide with the development of the Carbon Leakage Review and the rollout of mandatory climate-related financial disclosures to avoid a net increase in required compliance effort.

Because there is potential for misalignment in timing between project development and achieving emission reductions, **it is vital there is flexibility to receive the incentive if a project wavers between thresholds at different points in time**. If appropriate, there should be discretion to consider averaging emissions over the facility. The thresholds should also be designed to avoid incentivising low hanging fruit over medium- and longer-term projects that could achieve substantial reduction in emissions.

Q28. Should there be time limits for accessing production support?

Like our concerns on the timing proposed for the Critical Minerals and Hydrogen PTIs (see our forthcoming submissions to the Federal Treasury), **setting time limits for FID and thus accessing government support should be flexible** if there are factors a proponent cannot control.

Like all projects, green iron and alumina projects will require comprehensive infrastructure planning and certainty over approvals processes across all levels of government to meet FID deadlines. Furthermore, as many projects are likely to be conditional on the build-out of renewable capacity and multiuser transmission infrastructure in WA, and relevant environmental approvals, there is a risk that all but the most advanced projects would qualify for accessing production support.

The proposed timeframe of ten years for the Critical Minerals and Hydrogen PTIs is substantial and will support new projects in the early years of production. However, where the average asset life and associated upfront capital investment, ongoing sustaining capital expenditure and depreciation is significant in midstream and downstream segments of the metals value chain, there should be consideration given to extending or reviewing the ten-year timeframe proposed for these PTIs.

Q29. What would be an appropriate level of incentive to support the development of competitive production for green alumina, aluminium, steel and iron?

Further to our discussions above on price transparency, CME members note an absence of 'green' price premiums for most products, with little ability for producers to pass through the costs of carbon abatement. This will affect the appropriate level of incentive required to support the development of competitive production in different segments of the value chain.

For most members, the level of incentive that would need to be provided to support the development of competitive green metal production will need to be material in partially reducing the current cost gap between green and traditional production. It will need to reduce the financial risk of investing in lower emission capital equipment and production pathways, while also retaining an incentive to undertake further R&D and innovation to substantially reduce emissions at a lower cost. It should also not disincentivise producers themselves from seeking to develop and participate in market-driven price premiums or green financing.¹¹⁶

Q30. How could eligibility criteria be most appropriately linked to the delivery of strong community benefits?

Further to our discussion above on community benefit principles, the WA resources sector is committed to supporting local workforces, businesses and communities in the regions they operate. **It is vital that linking eligibility criteria to the delivery of community benefits is reasonably appropriate, flexible in recognising existing required and voluntary commitments and does not inadvertently create a barrier to accessing government support through the increased administrative burden of demonstrating compliance**.

For example, most of our members currently report to the Payment Times Reporting Scheme, Workplace Gender Equality Agency, Modern Slavery Statements Register, Australian Industry Participation Plan,

¹¹⁶ To align sustainability commitments with financing to meet long-term goals. Alcoa, [Alcoa Green Finance Framework](#), 1 February 2024.

Corporate Tax Transparency Register, and State Agreement Acts. Multinational members will also report a breakdown of payments to local councils, WA, and Australian Government agencies by operation.

Demand side options that could be considered

Q31. What demand side options would best drive confidence for green metals producers?

Like hydrogen, demand may naturally evolve with technology and commercialisation, but measures that assist adoption for some end-use sectors could be required in the near to medium term. This could assist in some markets where steel's application is unlikely to attract a price premium such as in construction.

However, we caution against imposing demand-side targets without industry consultation, as this could lead to inefficient resource allocation for both the public and private sectors and unrealistic goals without achieving the desired results. CME recommends that the Australian Government **collaborate with industry to ensure that any demand-side policy options do not result in unintended consequences** such as increased supply chain costs. This collaboration could take the form of industry representation on green metal policy reviews and targeted consultation for key milestones.

Conclusion

With the world's energy transition there is a significant opportunity for Australia to diversify and entrench itself in the green metals global value chain. However, a sustainable, domestic industry will require substantive, coordinated policy, regulatory and financial support from all levels of government in the areas of industrial policy, environment and climate. The timely delivery of a low emission, reliable and globally cost-competitive energy system is absolutely critical in underpinning Australia's participation in the low-carbon economy, including green metal supply chains.

As this is the department's first consultation regarding green metals, we look forward to future engagement and would be happy to facilitate discussions with our relevant members when design of the supply side options progress further.

If you would like to discuss the matters raised in this submission further, please contact Mr Aaron Walker, Manager – Industry Competitiveness and Economics, on 0477 679 195 or at A.Walker@cmewa.com.

Yours sincerely,



Rebecca Tomkinson
Chief Executive Officer

Copy:
Peter Nicholas
Senior Adviser, Office of the Minister for Climate Change and Energy

Appendix: List of recent CME submissions with relevant policy positions

Strategic industries

- [2024-25 pre-Budget submission](#), submission to The Treasury, 25 January 2024.
- [WA's Battery and Critical Minerals Strategy: Stakeholder consultation paper](#), submission to the WA Department of Jobs, Tourism, Science and Innovation (JTSI), 14 December 2023.
- [Critical Minerals List: Issues paper](#), submission to DISR, 16 August 2023.
- [Accelerating opportunities in WA's critical minerals sector](#), CME position paper, 17 June 2023.

Energy

- [Future Gas Strategy: Consultation paper](#), submission to DISR, 13 November 2023.
- [WA Renewable Hydrogen Strategy refresh: Stakeholder consultation paper](#), submission to JTSI, 20 October 2023.
- [National Hydrogen Strategy Review: Consultation paper](#), submission to DCCEEW, 22 August 2023.
- [Western Power's Fifth Access Arrangement Review: Issues paper](#), submission to the Economic Regulation Authority, 22 April 2022.
- [Towards competitive clean hydrogen](#), CME position paper, November 2021.
- [Energy policy](#), CME infrastructure policy area, published 28 September 2021

Environment

- [Onshore wind farm guidance: Best practice approaches when seeking approval under Australia's national environmental law](#), submission to DCCEEW, 13 June 2024.
- [Updating Australia's Strategy for Nature 2019-30](#), submission to DCCEEW, 11 April 2024.

Climate

- [Australian Sustainable Finance Taxonomy: Consultation paper](#), submission to the Australian Sustainable Finance Institute, 5 July 2024.
- [2024 Issues paper: Targets, pathways and progress](#), submission to the Climate Change Authority, 21 May 2024.
- [Electricity and Energy Sector Plan](#), submission to DCCEEW, 3 May 2024.
- [Safeguard Mechanism implementation: Production variable updates and international best practice benchmarks](#), submission to DCCEEW, 22 January 2024.
- [Carbon leakage review: Consultation paper](#), submission to DCCEEW, 12 December 2023.
- [Safeguard Mechanism guidelines: Setting international best practice benchmarks](#), submission to DCCEEW, 16 August 2023.
- [Climate policy](#), CME policy area, published 5 October 2021.