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GREEN IRON OPPORTUNITIES IN AUSTRALIA

A CASE STUDY WITHIN THE OECD'S GLOBAL GREEN IRON PROJECT

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Abstract

Australia has an opportunity to play a role in the global green iron industry by leveraging its vast iron ore reserves and high renewable energy potential. This would involve shifting from a traditional "dig-and-ship" model and adding value to its iron ore through direct reduction, aligned with the global steel sector transition. Despite its natural advantages, Australia's green iron sector remains nascent, with limited project investment and barriers including infrastructure gaps and policy fragmentation. Major mining and steel companies show varied commitment levels, and new entrants face financing and logistical hurdles. International competitors are advancing rapidly through integrated strategies and lower-cost energy. Renewable energy access and co-located production models are key enablers, though technically complex. Australia's success depends on scaling up infrastructure, improving policy coordination, and forging international industrial alliances. With rising global demand for green inputs and evolving trade policies, Australia must act decisively to secure a competitive position in the emerging green iron value chain.

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This paper forms part of the broader Green Iron project led by the Secretariat, which aims to deepen policymakers' understanding of global green-iron developments and to strengthen dialogue between governments and industry on the opportunities and challenges of the emerging global green iron market.

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Executive Summary

Australia aspires to be a global leader in green iron, leveraging its mineral wealth and renewable energy potential. With vast reserves of iron ore and exceptional solar and wind resources, Australia sees a unique opportunity to become a central node in the emerging global green iron value chain. Supported by growing government ambitions and policy frameworks, the country aims to shift from its current "dig-and-ship" model toward value-added green iron production, aligning economic growth with decarbonisation goals.

Global steel decarbonisation trends are transforming the traditional iron and steel value chain, opening up new roles for resource-rich countries. Countries and companies are exploring the geographic relocation of ironmaking and steelmaking activities, with green iron production that will likely be concentrated in regions with cost-effective renewable energy and raw materials. This trend, if realised at scale, could redefine comparative advantage in the steel sector, especially as green iron gains prominence in corporate decarbonisation strategies.

Despite its potential, Australia's green iron industry is in early development, with a gap between long-term visions and current investments. Multiple studies highlight an immense potential of green iron exports, projecting up to AUD 304 billion in annual export value. Yet, the actual portfolio of announced projects—such as Fortescue's Christmas Creek pilot and Green Steel WA's Geraldton DRI proposal—represents only a fraction of this potential, indicating that significant barriers to investment and deployment remain.

Australia's main iron ore producers exhibit divergent approaches to green iron, with only a few moving decisively beyond their traditional business models. Fortescue is leading the charge with bold commitments and partnerships, while Rio Tinto and BHP are exploring alternative technologies or limited downstream processing. Hancock Prospecting has adopted a more cautious stance. These strategic differences reflect the tension between the profitability of existing export models and the uncertain returns of green iron ventures.

Steelmakers and emerging players are experimenting with diverse green iron business models, often shaped by resource access and policy support. GFG Alliance, now under administration, had developed an ambitious green iron strategy in Whyalla, while BlueScope has adopted a more incremental decarbonisation path. Meanwhile, newer entrants like Green Steel WA, Iron Road, and Progress Green Solutions are developing export-oriented green DRI projects, often through consortia and with foreign partners, though financing and infrastructure challenges remain.

Australia faces growing international competition from faster-moving regions like MENA, Sweden, and Brazil. Countries like Saudi Arabia and Oman are rapidly scaling up DRI capacity using natural gas, benefitting from lower energy costs and integrated industrial policies. Global players like VALE are advancing "mega hub" models that integrate high-grade ore supply with low-cost green energy in partner countries. Compared to these developments, Australia's progress appears slower and less coordinated.

The availability and scalability of renewable energy are emerging as critical locational factors for green iron production. Rapid growth in renewable capacity — particularly in Asia, MENA, and Australia — is enabling new models of industrial development based on co-located, off-grid energy systems. In Australia, where key iron ore regions like the Pilbara are not connected to the national grid, green iron projects must rely on islanded systems that integrate renewable generation, hydrogen production, and ironmaking on-site. While this model offers strategic and logistical advantages, it also entails higher costs and technical risks. Targeted public investment in enabling infrastructure could help reduce these barriers. In the interim, gas-based ironmaking may act as a transitional pathway, but its competitiveness is likely to decline as green hydrogen infrastructure matures.

The viability of Australia's green iron sector will depend on global demand dynamics and the pace of decarbonisation policies in key markets. While steel demand in traditional destinations like Japan and Korea is expected to remain stable, future demand for green DRI and HBI will depend on these countries' policy incentives and willingness to import green inputs. Emerging markets in Southeast Asia and India could offer growth opportunities, while carbon border measures in the EU and US may indirectly boost demand for green Australian inputs.

Logistics and trade infrastructure will play a critical role in scaling green iron exports. Unlike iron ore, green DRI and HBI require specialised handling and transport due to safety and stability concerns. Although Australia's port infrastructure is world-class for bulk ores, significant investments will be needed to handle and store green iron products. Transportation costs, though not prohibitive, may affect Australia's competitiveness in more distant markets compared to closer MENA suppliers.

Policy support for green iron in Australia is growing but still fragmented and uneven. While the federal government's Future Made in Australia plan and AUD 1 billion Green Iron Investment Fund signal a major policy shift, concrete financial flows and infrastructure support are still ramping up. State governments, particularly in South and Western Australia, have launched initiatives to attract green iron investments, including support for specific projects and precinct planning. However, policy coordination between states and the federal level could be improved.

Australia's green iron success depends on stronger industrial alliances, targeted infrastructure investment, and decisive early action. To secure a place in the global green iron trade, Australia must accelerate project development timelines, align infrastructure planning with investment needs, and engage more assertively with key industrial partners abroad. Delays risk losing ground to more agile competitors already forging international supply chains and capturing early-mover advantages.

1 Introduction

Australia has the ambition to become a global hub for green iron[1] production and trade. Its abundant resources of iron ore, in combination with favourable conditions for renewable energy production and a supportive policy environment are important assets underlying this ambition. The way to realise this green iron ambition is currently a hot topic among policymakers, think tanks, universities and civil society organisations as well as the private sector, with a plethora of consultations, papers, initiatives and conferences delivered or planned.

Australia's ambitions take place against the background of global developments in green iron markets. With a view to developing cost-effective steel decarbonisation pathways, various countries and companies along the steel value chain are exploring options to decouple the iron and steel making process geographically, with green iron production concentrated in regions that offer the most favourable circumstances. Low-carbon iron products would subsequently be exported to steel producing economies. Comparative advantage in a decarbonised global economy would play a significantly increased role in the steel value chain. While this rapidly evolving green iron market holds significant potential to transform the steel industry and advance global decarbonisation efforts, current developments in this area remain underexplored and poorly understood, posing challenges to both industry stakeholders and policymakers. In particular, the potential misalignment between government strategies across diverse geographies aimed at supporting and attracting green iron production can lead to inefficiencies, contradictory policies, and heightened policy competition, with possible repercussions for both developed and developing economies.

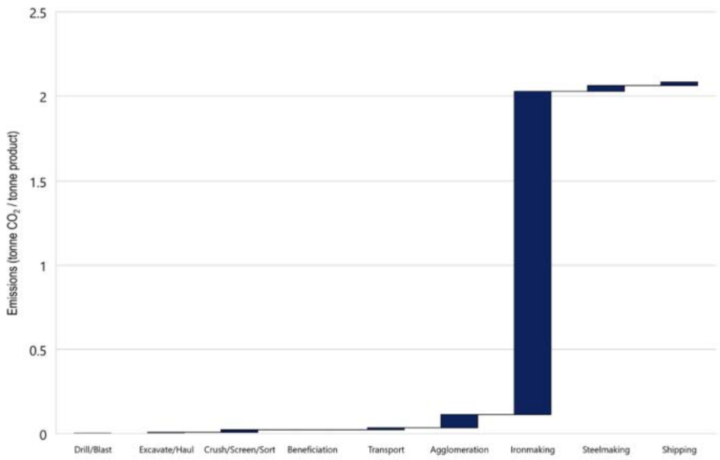
This case study on green iron developments in Australia is part of a wider OECD green iron project as part of the Programme of Work and Budget of the OECD Steel Committee, that aims to help better understand developments in green iron markets and provide a platform for international discussion and cooperation on the topic. The case study reviews Australian green iron developments against the background of how global green iron markets are taking shape and the positioning of firms and jurisdictions across the steel value chain. The paper analyses green iron developments from the perspective of four key drivers: renewable energy availability, raw material availability, demand considerations and policy settings (see Annex B for a comprehensive explanation of the approach to the study). As such, the case study aims to provide both a benchmarking of Australian policy and company strategies, as well as an assessment of how developments in Australia link to the broader global green iron context and its drivers. The case study builds on wider OECD work on industrial decarbonisation in Australia, such as the 2023 OECD Economic Survey on Australia (OECD, 2023[1]), an OECD study on the Pilbara (OECD, 2023[2]) and wider OECD industrial decarbonisation analysis (OECD, 2023[3]).

The case study was executed on the basis of extensive data analysis, interviews with over 100 Australian stakeholders, a structured questionnaire and a mission to Australia late November 2024 (see Annex A). The paper first discusses developments in green iron markets from the perspective of Australia and thereafter assesses these through the lens of the four drivers.

Why is this important?

1. The steel industry, responsible for over 8% of global CO2 emissions, must undergo significant transformation to meet climate targets set by the Paris Agreement (IEA, 2023[4]). Although progress in incremental step change in emissions reduction and energy efficiency has been made, these efforts remain insufficient for full decarbonisation. A major shift is required toward greener inputs, primarily in iron production, which makes up for a significant share in steel industry CO_2 emissions. Transitioning away from metallurgical coal-based reduction is also critical to mitigating coal mine methane emissions in the steel value chain, an often overlooked aspect of the embedded emissions in steel production. The investigation into hydrogen-based direct reduced iron (DRI) and hot briquetted iron (HBI) has expanded rapidly, with many companies expressing an interest in producing H2-DRI/HBI, however final investment decisions and capital flows into project proposals remain slow. OECD analysis shows that nearly 60% of steel companies now include hydrogen-based DRI in their decarbonisation roadmaps, highlighting the growing focus on green ironmaking technologies (OECD, 2025[5]).

Figure 1. Emissions across the steelmaking value chain in BF-BOF route



Source: MRIWA, retrieved from (Pollard and Buckley, 2024[6]).

2. As low-emission factors of production become increasingly representative of the overall costs of iron in the steel value chain, the question arises of where such production can best be located. Instead of co-locating green iron and steel production, green iron production may be located where circumstances are most favourable after which it could be exported to steel plants elsewhere. This could entail a significant restructuring of the steel value chain and offer opportunities for countries such as Australia. For other countries, it raises the question on advantages and disadvantages of relying on green iron imports. This makes a better understanding of developments in green iron production not only important from an economic but also a political perspective.

2 Developments in green iron production, trade and investment

This section discusses developments in global green iron production, investment and trade from the perspective of Australia. It provides an analysis on the basis of production, trade and investment data as well as on the basis of an assessment of company strategies along the steel value chain, as discussed in the previous section.

The second part of this section aims to map how Australian companies are positioning themselves in the emerging green iron sector. This analysis tracks their current and future investments and strategic orientations through the key drivers of green iron production identified earlier. Specifically, it examines how companies' investments leverage the companies' access to energy inputs and raw material supply — particularly high-quality iron ore— but also how companies' investments in the green iron space respond to export market dynamics and are mediated by the evolving policy landscape.

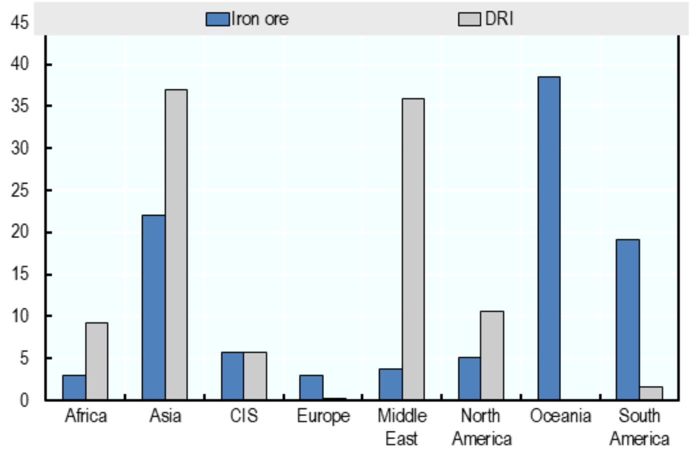
DRI capacity and investments: an international perspective

DRI production currently accounts for a modest share of iron and steel making and is concentrated in Asia and the Middle East, Australia does not yet have a share

The geographical distribution of iron ore production and DRI production exhibits distinct patterns, with limited overlap of the two. Major iron ore producers such as Australia, Brazil, and China dominate global supply, with Australia alone producing 960 million metric tons in 2023. However, currently these countries are not the largest producers of DRI. Instead, India, Iran, Egypt, and the Russian Federation (hereafter Russia) lead in DRI production, despite having comparatively lower iron ore production levels.

This divergence suggests that factors beyond iron ore availability drive DRI production, particularly the cost of natural gas. Countries in the MENA region, such as Egypt, Saudi Arabia, and Oman, have significant DRI output, due to their access to low cost natural gas, the reducing agent used in DRI production to date. China, the world's largest steel producer, has limited DRI production, with its steel industry centred on traditional blast furnace technology fed by coking coal rather than EAF-based production.

Figure 2. Iron ore and DRI production take place in different geographies

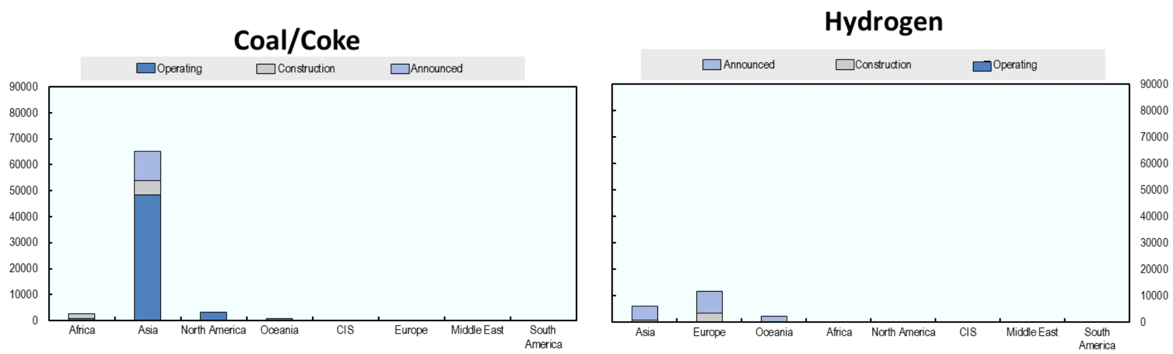


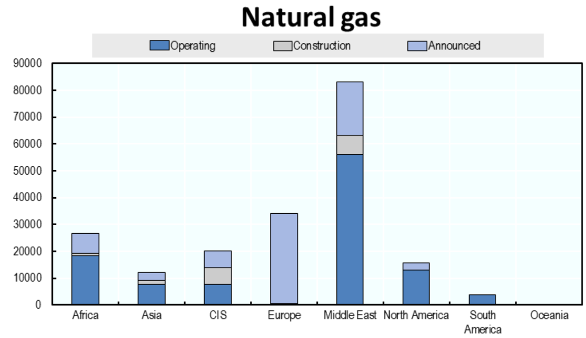
Source: Iron ore production data are obtained from the US Geological Survey, annual publication, Iron ores. DRI data are obtained from the MIDREX 2023 Direct Reduction Statistics.

Most of current DRI capacity is not green but coal- or gas-based, particularly in Asia, with currently limited use of hydrogen.

Current DRI production is predominantly reliant on natural gas and, to a lesser extent, coal, making it far from a fully green technology. The majority of global DRI capacity uses gas-based reduction, particularly in regions with abundant and low-cost natural gas supplies, such as the Middle East, North Africa, and parts of North America. Coal-based DRI, though less common, is still significant in India, where coal availability supports its use in rotary kiln-based production. In contrast, hydrogen-based DRI remains an emerging technology, with only a few pilot projects and demonstration plants in Europe and Asia currently in operation. The primary barriers to large-scale H2-DRI deployment are high investment costs, infrastructure constraints, and the need for a reliable supply of green hydrogen at an affordable price, which itself depends on large-scale renewable energy capacity.

Figure 3. Hydrogen-based DRI is still a limited portion of total DRI capacity





Notes: Data in thousand of tonnes.
Source: Authors' calculation based on Laplace data.

Green iron potential in Australia is significant, with production expected to grow

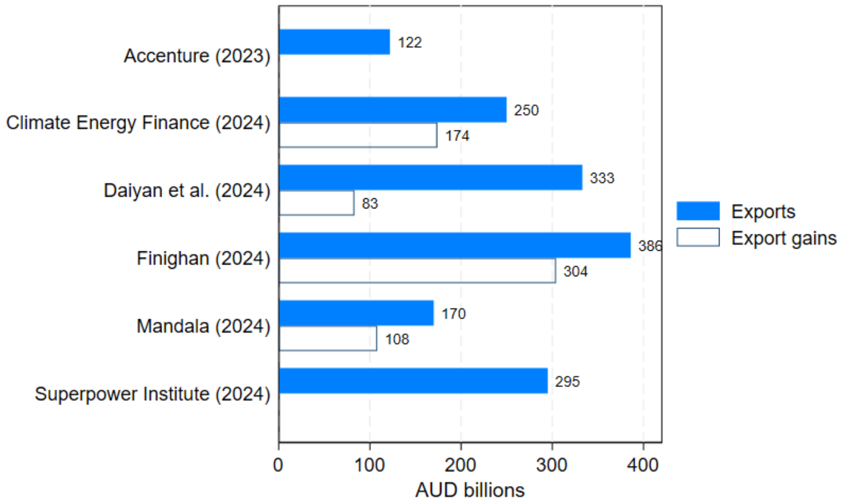
Despite the limited size of current global DRI capacity, Australia is well positioned to play a significant role in the global DRI market. Several reports provide a positive outlook to the Australian DRI potential. For example, (Finighan, 2024[7]) suggests that Australia's iron ore exports could be converted into around 560 Mtpa of DRI, reaching AUD 386 billion annually with a 40% global market share in global iron and steel production in 2050. A report by Climate Energy Finance (Pollard and Buckley, 2024[6]) indicates that switching 40% of Australia's iron ore exports into green iron exports could generate AUD 174 billion per year in export revenues from green iron, which coupled with additional iron ore export revenues of AUD 77 billion per year would translate to a doubling of export revenues from the iron export industry to AUD 250 billion per year. On the other hand, the associated costs of inaction and the associated reduced exports of iron ore as result of global steelmakers decarbonisation strategy would instead cost up to AUD 69 billion (approximately USD 45 billion) per year. Australia's potential for wider greener exports is also emphasised by (Daiyan et al., 2024[8]): according to their estimates, Australia has the opportunity to establish a high-value green export sector worth an estimated AUD 333 billion per year, driven by the growing global demand for low-carbon products including green iron, green steel, renewable hydrogen, ammonia, green aluminium, and critical minerals.

A report by Mandala (2024[9]) looks at the opportunity of switching to green iron for Western Australia, the Australian state with the largest reserves of iron ores. The study estimates that in presence of a supportive policy settings, Western Australia has the potential to produce at least 4.5 Mtpa of green iron in 2030. To achieve this, the required level of investment is estimated to be AUD 37.5 billion, a large share of which (AUD 23 billion) would be for renewable energy related investments e.g. generation, storage and transmission (Mandala, 2024[9]). A report by Springmount Advisory argues that Western Australia's green iron potential could mean creating 24,000 ongoing jobs in Western Australia, with an additional 11,000 full-time construction jobs on average per year, and drive emissions from Australia down, with a reduction of 274 Mtpa CO2 of emissions in 2040 (Springmount Advisory, 2024[10]). Over the longer term, the Mandala's report states that Western Australia could supply more than 14% of global green iron by 2050, generating AUD 74 billion of economic value, which correspond to about 310 Mtpa and 20% of global green iron demand.

Although estimates of green iron opportunities are quite optimistic, the announced projects so far represent only a limited share of the green iron potential projected in various reports

Summing up the estimates from multiple sources (Accenture, Climate Energy Finance, Daiyan et. Al, Finighan, Mandala and the Superpower Institute), in the long term the export gain produced by transitioning to green iron in Australia is expected to be valued between AUD 83 billion and AUD 304 billion. While these estimates highlight a significant opportunity for a large-scale green iron market in Australia, current ambitions and corporate efforts in this sector appear to fall short of these projections.

Figure 4. Estimates of Australia's green iron export opportunity



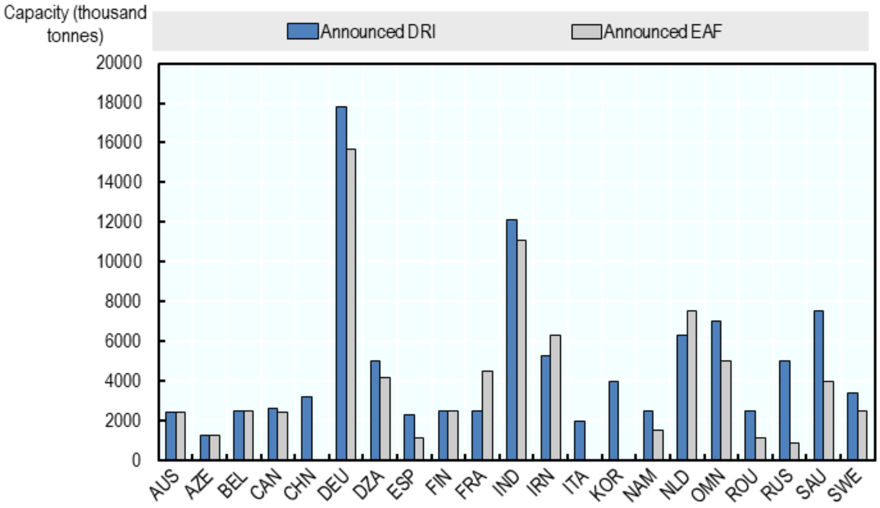
Notes: Estimates obtained from the Mandala's report refer to Western Australia only. Export gains refer to the estimated additional exports in values generated by transitioning to a green iron industry.
Source: Various reports (cited in the figure).

Australia's green iron ambitions are taking shape through several green hydrogen-based DRI proposals. The proposed Port Hedland Green Steel Project (POSCO) is in its pre-feasibility stage, planning a 2 Mtpa HBI facility, initially utilising natural gas, while Fortescue's Christmas Creek green iron pilot plant is a smaller-scale initiative expected to produce around 1,500 tonnes of green iron per year. One ambitious proposal is the Mid-West DRI Plant being developed by Green Steel WA, which would consist of a AUD 1.5 billion hydrogen-based DRI facility able to operate on natural gas and gradually transition to green hydrogen, with an estimated capacity of 2.5 Mtpa (Green Steel WA, 2024[11]). Whyalla steelworks (currently under administration) had announced plans to replace blast furnace operations with a 1.8 Mtpa DRI plant and an EAF plant. Lastly, the proposed Gladstone Green Iron Project (Quinbrook) remains in early development, and the QLD state government has withdrawn financial support for the plant that would have provided hydrogen to the Quinbrook proposal (Quinbrook infrastructure partners, 2024[12]).

While these proposals highlight Australia's strong potential, they are not all hydrogen-based, and DRI proposals elsewhere are advancing at a faster pace

The pipeline of DRI proposals across Europe, India[2], and MENA region has increased significantly. Germany and the Netherlands are leading Europe's hydrogen-based DRI transition, with ThyssenKrupp Steel building a 2.5 Mtpa DRI plant in Duisburg and Tata Steel Netherlands planning a full hydrogen-based transformation at Ijmuiden. India is scaling its DRI capacity using natural gas and coal, with JSW Steel and Tata Steel investing in new plants and long-term hydrogen integration. In MENA, Saudi Arabia, Oman, and Iran are expanding their investment pipeline, with Saudi Arabia developing hydrogen-ready DRI plants, Oman expanding gas-based DRI with hydrogen plans, and Iran already a global leader in gas-based DRI production.

Figure 5. Announced EAF and DRI projects by country



Source: Authors' calculation based on Laplace data.

DRI is currently not often traded internationally but is supplied to steel firms in the vicinity of DRI producers

Currently, only 4.8% of global DRI production is traded internationally, corresponding to about EUR 2 billion per year. This limited trade is primarily because most DRI facilities are designed to supply nearby steel producers or integrated facilities. In many cases, these facilities are integrated into steelmaking plants, directly feeding BOF or EAF operations, as part of steel companies' decarbonisation strategies. A plant-level analysis of DRI capacity in 2023 based on World Steel Dynamics data indicates that only 21.3% of global DRI capacity was not part of integrated steelmaking operations — a pattern that appears to persist in upcoming investments. Among announced DRI proposals, only 22% are planned as standalone facilities, separate from EAF or BOF plants.

With the increasing production of DRI, an intensification of DRI/green iron trade is expected

On the basis of these plant-level projections, with almost 80% of planned DRI additions being part of integrated steelmaking operations, a strong rise in DRI trade is unlikely to occur immediately. However, there are reasons to expect that DRI trade will increase in the coming decade from both a demand and supply perspective. First, decarbonisation policies and net zero targets in various countries may incentivise steel firms to decarbonise further and seek cost-effective ways to do so. If more cost-effective options for green iron production become available at other locations than where integrated steel firms are currently located, they may be inclined to buy (and import) green iron. Secondly, various economies, including Australia, Brazil, Canada and MENA countries, are currently positioning themselves in green iron production and may become green iron suppliers (and exporters) towards these regions where demand rises. As more countries, particularly in Europe, India, and the MENA region, expand their DRI capacity, international trade in DRI and HBI is thus likely to increase. However, the increase in DRI/HBI trade will strongly depend on the extent to which ironmaking and steelmaking decouple, and whether certain regions take the lead in this transition and are willing to buy green iron from elsewhere. If steelmakers increasingly source DRI/HBI from external suppliers rather than producing it in-house, new trade routes are likely to emerge. Conversely, if most steel-producing countries invest in domestic DRI capacity, international trade in DRI may remain limited.

The outcome of these developments are of critical importance for the question of whether Australia will become a key player in the green iron trade. It seems fair to say that the estimates of Australia's potential in green iron production and exports are ambitious. To provide some perspective, the estimated 560 Mtpa of DRI in Australia in one of the studies cited above is more than 25% higher than the current total volume of world steel trade and is four times higher than global DRI production in 2023 according to Worldsteel.

Mapping company strategies towards green iron in Australia

Australia's green iron ecosystem encompasses a diverse set of actors, each playing a distinct role in shaping the country's transition. Iron ore producers are central to this landscape: Australia is the world's largest exporter of iron ores and their control over raw material supply positions them as possible key enablers of the green iron transition. Although Australia's steel industry is relatively small compared to other major producers, its existing players remain crucial in driving this shift, given their role in developing low-carbon steelmaking technologies and integrating green iron into their supply chains.

Iron ore producers

Australian iron ore producers are exploring diverse strategies for green iron, with many assessing the potential to move downstream in the iron value chain by producing more value-added products such as DRI/HBI, and high-grade pellets. In many circumstances, the shift is driven by the opportunity offered by favourable policy setting and the conditions created by Australia's growing investments in renewable energy, particularly solar and wind. However, despite these opportunities, Australian iron ore producers continue to operate under a highly profitable business model focussed on exporting iron ore, which remains in strong demand globally. This profitability has, in many cases, limited their urgency to invest in green iron solutions, as the economic incentives for moving downstream are not yet as compelling as and more risky than their current export-driven operations.

Fortescue

Fortescue's green iron strategy is ambitious and unique. A giant in the Australian iron ore industry, the company's shift away from a dig-and-ship model and towards hydrogen DRI technology has gained significant interest over the last five years and has been a key driver of green industry discussions in the country. With their Christmas Creek Trial Plant, Fortescue expects to produce more than 1,500 tonnes annually starting in 2025. Their target is to scale up to 200 Mtpa by 2040.

The company opened in 2023 high-grade magnetite mining operations as part of their Iron Bridge project with a first run grade of 67% Fe. The product is transported from the mine to Port Hedland through a slurry pipe, then further concentrated before being shipped overseas (the first shipment went to Vietnam).

However most of Fortescue's iron ore resources are hematite, which has informed their green iron strategy, centered around an emerging two-step smelting process. Their Christmas Creek Green Iron Trial Commercial Plant, with USD 50 million in investment, began construction in August 2024 and aims to prove the viability of their method using green hydrogen, green electricity from solar generation, and existing infrastructure and technical capacity.

Fortescue and Baowu Resources signed a memorandum of understanding for "further accelerating the development of green iron technology and ensure that [the companies] will be able to meet growing demand for green iron in and outside China" in January 2025 (Lv and Jackson, 2025[13]). Media outlets indicated that Fortescue's Chairman Andrew Forrest welcomed the Australian federal government's allocation of AUD 6.7 billion in tax incentives for renewable hydrogen, viewing it as a catalyst to fast-track the development of a green iron industry in Australia (Vorrath, 2024[14]).

Rio Tinto

Rio Tinto's interest in green iron production is limited compared to Fortescue, but the company is interested in proving the feasibility of two ironmaking routes: a biomass-fueled process called BioIron, and electric smelting furnace (ESF). They plan to commission in 2026 a USD 143 million pilot plant in Perth that will use raw biomass like wheat straw and canola stalks to make iron, in a process already demonstrated at a small-scale plant in Germany (Rio Tinto, 2024[15]). Rio Tinto evaluates the CO2 emissions reduction potential of this method at 95% when compared with a blast furnace.

The company runs a technology programme in partnership with Baowu to test ESF technology in China, which they hope will be able to remove impurities from iron made with low- to medium-grade iron ores. In Kwinana (Western Australia), Rio Tinto is participating in the NeoSmelt proposal, planning to build a pilot DRI-ESF plant as part of their pre-feasibility study in partnership with Bluescope and BHP, with a potential output of 30,000-40,000 tonnes molten iron per year. The pilot plant was announced to run on renewables but the inclusion of Woodside Energy as a partner and energy supplier has led some observers to foresee a bigger role for natural gas in the proposal. The state government committed to invest AUD 75 million to support the pilot facility in December 2024.

In parallel, Rio Tinto is exploring how beneficiation and pelletisation of their low-grade ores could make them suitable for future low-carbon steelmaking.

BHP

BHP's interest in green iron production is limited to investigating the suitability of their hematite iron ores for future green iron production outside of Australia. As mentioned above, BHP entered into a MoU with Rio Tinto and BlueScope for the NeoSmelt Project, to jointly investigate the development of an ironmaking electric smelting furnace (ESF) pilot plant, to be sited in Western Australia. The company sees high infrastructure and labour costs in the Pilbara as too large of a barrier for a DRI industry in the region.

BHP mines medium-grade hematite iron ore and very little magnetite. Their customers are mostly overseas steel companies using blast furnaces and working with partners on reducing the emissions intensity of the BF route.

Hancock Prospecting

Hancock Prospecting, while a major iron ore producer in Australia, operates at a lower scale than Fortescue, Rio Tinto or BHP. Their Roy Hill operation, of which they own 75%, produces 64 Mtpa shipped from Port Hedland. Their interest in green iron production seems limited, adopting a "wait and see" approach to the market. When POSCO, who owns a 12.5% stake in Hancock Prospecting, began exploring their Port Hedland HBI project, Hancock Prospecting purchased land for magnetite mining in the area. However, Hancock Prospecting decided to not pursue these operations, which represented a capital-intensive business model compared to their usual hematite iron ore mining.

Further, the company seems reluctant to move downstream into producing any DRI themselves as the wide profit margins of their dig-and-ship model are more attractive to them then a value-added product. They see the lack of common use infrastructure in the Pilbara as a barrier, as well as the financial risk and technological limitations.

Grange Resources

Located in Tasmania, Grange Resources owns and operates an integrated iron ore mining and pellet plant using magnetite from their mines in both Tasmania and Western Australia, producing 2.5 million tonnes of iron ore pellets in 2024 (Grange Resources, 2025[16]).

Steel companies

Australia's steel industry was, until the recent decision to put the Whyalla steelworks under administration, dominated by two major players: GFG Alliance and BlueScope Steel, each pursuing distinct strategies towards green iron. GFG Alliance, which operated the Whyalla Steelworks through Liberty Primary Metals Australia until administration proceedings occurred in February 2025, was more vertically integrated with upstream mining operations, giving it a strong incentive to invest in hydrogen-based DRI production as part of its transition to green steel. In contrast, BlueScope Steel, which operates the Port Kembla Steelworks, is focusing on natural gas-based solutions for its decarbonisation efforts. Its strategy reflects the limited availability of hydrogen infrastructure in Australia and the need for an intermediate step before a full transition to green hydrogen.

Whyalla Steelworks

GFG alliance is the owner of OneSteel Manufacturing, a mining and steel company that was operating the Whyalla steelworks in South Australia prior to the plant being placed into administration by the South Australian government in February 2025. Out of 5.4 Mtpa of steel produced in Australia, approximately 1.2 Mt was made at the Whyalla steelworks, and it is estimated that the company produced roughly three quarters of the structural steel consumed domestically. The company’s green iron strategy was ambitious: GFG Alliance’s target was to produce over 1 Mtpa of DRI-HBI in 2030, although not all necessarily within the country. They also aimed to sell magnetite concentrate and finished steel made in the new EAF they recently purchased. However, it is not yet clear how or if these plans will be pursued by the future operator which is not yet determined at the time of writing.

GFG alliance operates hematite mines as well as magnetite mines which are connected to the steel plant by slurry pipes. The magnetite mine they operate in the Middleback ranges provided 100 Mtpa for the Whyalla blast furnaces. The deposit contains significant JORC-compliant magnetite resources, and more sites were planned to open.

They planned to feed the DRI operation at the Whyalla steelworks with a scalable hydrogen plant on site with 120MW-capacity modules, which will run on electricity generated from the wind and solar farms in the Eyre Peninsula. In the medium term, they planned to make their DRI using natural gas, and increasingly blend it with green hydrogen. This hydrogen project was to be developed with significant financial assistance from the state government, however the state’s Hydrogen Jobs Plan has recently been deferred which may impact this project (Government of South Australia, 2025[17]).

GFG Alliance planned to keep their existing workforce which would be retrained to work in the new DRI plant. They foresaw customers for HBI in Europe and in Korea but aimed to first supply HBI and finished steel to the domestic market. It remains to be seen whether this will also be the end goal of the chosen buyer of the plant.

BlueScope

BlueScope's decarbonisation ambition towards green iron is relatively more cautious. The company has invested in relining its blast furnace in Port Kembla, New South Wales, signaling a continued reliance on more traditional steelmaking, and is skeptical of hydrogen steelmaking because of infrastructure and supply constraints, and instead sees natural gas as a viable alternative. However (as mentioned above) they are in partnership with BHP and Rio Tinto on the development of an Electric Smelting Furnace (ESF) pilot plant through the Neosmelt Project in Western Australia (Bluescope, 2024[18]).

The company's decarbonisation efforts extend beyond Australia, working with companies like POSCO, ThyssenKrupp, Tata Steel, and Nippon Steel. BlueScope has conducted feasibility studies on DRI pathways in the past but remains cautious about the use of lower-quality iron ore in DRI processes. Overall, the company is positioning itself strategically within the evolving steel industry but remains unconvinced that hydrogen will play a major role in the near term.

POSCO

The Korean steel company POSCO, 7th largest in the world by volume[3], is a key potential player in the green iron space both as a potential producer and offtaker. POSCO has announced plans to expand its operations in Australia, Southeast Asia and India. POSCO aims to develop its hydrogen-based low-carbon ironmaking process, HYREX, to reach demonstration stage in 2026 and industrial scale in 2030. Its technology uses sinter feed with low-grade iron ore, skipping pelletisation processes.

POSCO's strategy is centred on establishing international partnerships, particularly with Australia, Malaysia and Oman, with the goal of accessing regions with cost-competitive low-carbon energy sources to produce green hydrogen and supply it to Korea, potentially embedded in a low-carbon product. In terms of hydrogen production, two key regions in POSCO’s strategy are Australia and Oman.

In late 2022, POSCO announced that it would invest AUD 28 billion in green hydrogen and AUD 12 billion in green steel with its local Australian partners by 2040, which would make the company Australia’s second largest foreign direct investor. For example, POSCO announced a 2 Mtpa DRI/HBI plant in the Boodarie Strategic Industrial Area of Western Australia, near Port Hedland (the Port Hedland Iron project), and conducted a feasibility study for the project in 2022. As of October 2023, ENGIE and POSCO agreed to undertake a pre-feasibility study for a green hydrogen initiative which is expected to supply the HBI plant. It has been recently announced that the Western Australian government is contributing AUD 15 million towards this project.

POSCO also has a strong relationship with a number of Australian iron ore companies. Fortescue has been a long-standing supplier of iron ore to POSCO, while POSCO and Hancock Prospecting are partnered on several projects, most notably as part of the Roy Hill mining operation. Hancock Prospecting owns majority shares in the operation while POSCO has a 25% stake. The operation produces 60 Mtpa of iron ore, 16 of which are supplied to POSCO. Roy Hill and POSCO announced they would explore different ways to produce hydrogen in Australia, initially using natural gas with CCUS, and ultimately solar and wind power.

While POSCO has the potential to be a key partner for a green iron industry in Australia, it is not yet certain whether their investment commitments will materialise as announced, or whether they may move towards other regions more ready for DRI production in terms of infrastructure and energy generation.

Emerging players

The steel industry has a long history with deep roots in complex energy-intensive process, heavy infrastructure, influenced by the vibrant international trading market system. As a result, the current decarbonisation movement represents a pivotal and unprecedented shift for the steel industry. Due to these complexities and the significant capital required for replacement, newer players, like Stegra, GravitHy, etc., are less impacted by legacy operations and infrastructure but with different challenges, are moving faster and taking different pathways to adopt and scale green technologies compared to incumbents. Within the Australian steel eco-system, a variety of new emerging players and consortia are being set-up in the green iron space.

Green steel WA

Green Steel WA is an emerging player in the DRI landscape in Australia who has two main projects, in addition to having applied for the EoI process in South Australia as part of a consortium. First, a planned EAF steel plant in Collie to make rebar for local and international consumption, which would be the first steel mill in the state and the first EAF plant in the country, expected to be operational in 2027. The project has already received AUD 2.7 million of government grant support through the Collie Futures Fund.

Secondly, Green Steel WA has proposed an export-oriented 2.5 Mtpa green hydrogen DRI plant near Geraldton, in the Mid-West of the state, with a cost of roughly AUD 3 billion (Thomson, 2025[19]). The project is expected to take a final investment decision in late 2025 with operations beginning in 2028. They foresee offtake to be in Thailand, where the offtaking company also has investors in the project.

The company is consortium-minded, collaborating with multiple other small-scale players in order to reach viability. Tempest Minerals signed a MoU with Green Steel WA in early 2025 to explore opportunities for making high-grade magnetite concentrate from their Remorse magnetite deposit for use in the Mid-West DRI plant. Recent drilling at Remorse found magnetite with grades up to 39% Fe, and the company plans to conduct further drilling and testing in the March quarter to validate the deposit (Thomson, 2025[19]). It is proposed that the DRI plant will begin operations on natural gas and transition to green hydrogen as it is made available by their partner, BP.

Green Iron SA

Green Iron SA is a consortium of four companies - Magnetite Mines, Aurizon Holdings, Flinders Port Holdings, and GHD – launched with the goal of producing green iron in South Australia, and taking part in the South Australian government's Expression of Interest programme. The iron ore will be sourced by Magnetite Mines from the Braemar region, and the consortium plans to both produce the green iron and export it from Port Pirie. New infrastructure for water, energy and transport is needed for the project, however, the consortium hopes the South Australian government will provide the necessary financing.

Iron Road

Iron Road, in consortium with Amp Energy, is aiming to develop a green iron hub in Cape Hardy, South Australia. Amp Energy was originally aiming for an export-oriented green ammonia plant, but now it is shifting its focus towards green iron, both for export and domestic consumption. A final investment decision is expected by 2027 and first green hydrogen production is planned for 2030.

Stage 1 of the project requires approximately 2.5 GW of renewables for the 1 GW hydrogen electrolyser, with a cost of AUD 10 billion. Stage 2, at a cost of AUD 30 billion, involves scaling up to 5 GW of electrolyser capacity, and hydrogen user facilities including ammonia, green iron, peak generation, or green fuels.

Amp has secured a portion of the Cape Hardy Precinct through an agreement with Iron Road and has signed an infrastructure agreement with the aim to share the use of any common infrastructure. Amp has also signed an agreement with the Northern Water Project to facilitate access to produced water and sharing of information.

Progress Green Solutions (PGS)

Progress Green Solutions (PGS), a small WA-based start-up with investment from POSCO and in partnership with Germany and Japan, has high ambitions for green iron production in the Mid-West of the state. The company envisages that due to good wind energy potential, the operation can produce at 65% capacity without any hydrogen storage, with a 1.4GW electrolyser supplied by Thyssenkrupp Nucera.

Phase 1 of the project aims to produce 7.5 Mtpa of low-carbon DRI pellets for export by end of 2028, with a total CAPEX of AUD 3.2 billion. Currently, 480ha of private land has been purchased, and development approvals are ongoing as well as feasibility studies. The plant will be supplied in an integrated way from iron ore mines in Karara that PGS aims to purchase.

In August 2025, Thyssenkrupp signed a memorandum of understanding (MoU) with PGS to buy 100% of the green iron pellets and HBI from the Mid-West project, marking Australia's first green iron offtake agreement (Fuel Cells Works, 2025[20]).

Other projects

- *Mid West Green Pellet Plant (Pilbara Green Steel) :* A project to produce high-grade pellets to be exported from Geraldton port is being proposed with consultation with iron ore suppliers and logistic providers. It could potentially support regional magnetite production without the need to go to green iron. No public announcement has however been made. The potential project could be based on Metso H2 pelletising process (100% hydrogen) and the market will likely be Japan and Korea for reduction of blast furnace emissions. The requirement of hydrogen is estimated to be 60,000kg per year.
- *Zero Emissions Steel Technology (ZESTY) pre-FEED / FEED Study (Calix):* AUD 1.96 million pre-Front End Engineering and Design (FEED) and FEED study will scope the design for a proposed demonstration scale H2-DRI plant. The company will receive an AUD 44.9 million grant from the Australian Renewable Energy Agency (ARENA) to build the plant which aims to produce 30,000 tonnes per annum of H2-DRI or HBI (Calix, 2025[21]). The process builds on Calix's existing Calix Flash Calciner technology that is used for a variety of industrial processes (Calix, 2022[22]).
- *Element Zero*: A Western Australian based technology company that looks at an electro-chemical approach to producing iron, with demonstration facility planned for the Perth Area. The company is subject to action on an intellectual property dispute with Fortescue (Federal court of Australia, 2025[23]).

Positioning Australia's companies in the global competition context

Australia is approaching the green iron transition at a time of intensifying global competition, with some MENA countries, Sweden and Brazil positioning themselves as possible frontrunners

Despite Australia's ambition in transitioning to green iron production, the scale and speed of its companies' investments in green iron remain relatively modest, raising concerns about its ability to compete in a rapidly evolving market.

One of Australia's biggest challenges is the competition from MENA producers, who benefit from well-established natural gas infrastructure and strong renewable energy potential. Countries like Saudi Arabia, Oman, and the UAE are leveraging their low-cost natural gas and abundant solar and wind resources to ramp up gas-based DRI production. Their ability to integrate existing gas-based reduction technologies with future green hydrogen supply gives them a first-mover advantage, making them attractive suppliers to steelmakers in Europe and Asia.

According to a report prepared by IEEFA (Basirat, 2024[24]), the Turkish steelmaker Tosyali, in partnership with Libya's SULB, is establishing the world's largest DRI facility with an 8.1 Mtpa capacity, starting with a 2.7 Mtpa phase using Midrex Flex technology, which enables ironmakers to gradually shift from natural gas to hydrogen as a reducing agent without needing a complete plant rebuild. Additionally, Tosyali plans to build a 4 Mtpa flat steel plant in Saudi Arabia's Ras Al-Khair industrial zone, integrating two Midrex Flex DRI plants. Meanwhile, Libya's LISCO has partnered with Danieli to produce 2 Mtpa of DRI/HBI for domestic use and exports to Italy, and Danieli has proposed a USD 4 billion integrated steel mill in Egypt, featuring a DRI facility and hydrogen plant to supply low-emissions steel to the EU.

North Africa is also emerging as a key player in green iron, with CWP Global planning to use hydrogen from its 30 GW AMAN project in Mauritania to produce green HBI for export to Europe. Mauritania's AMAN Green Energy has signed an MoU with SNIM, the country's largest iron ore producer, to begin green iron production by 2030. The European Commission has highlighted Mauritania's potential as a major supplier of green hydrogen and iron, given its vast renewable energy resources. Additionally, China's Baosteel is expanding its investment in Saudi Arabia's BAP Al-Khair Steel Company, a joint venture with PIF and Aramco, to maintain its 50% stake. This venture aims to produce low-emission thick plates using DRI-EAF technology, further cementing the region's role in the global green steel transition.

At the same time, emerging business models, such as VALE's green iron "mega hubs" or the new business model proposed by Stegra are reshaping global supply chains

The "mega hubs", strategically located in regions with low-cost renewable energy, enable the production of HBI and DRI for export to closer high-demand regions (e.g. Europe). By developing these large-scale industrial ecosystems, VALE and other international players are creating a new dynamic in iron production, where iron ore suppliers evolve into value-added green iron producers. Despite the relatively favorable circumstances, this model is not easily replicable by Australian large iron ore producers because of multiple factors, in particular the limited engagement of companies from closer high-demand countries (e.g. Korea and Japan) and lack of strong commitments from these key industrial partners.

Stegra, a steel start-up in Sweden, is developing the world's first industrial scale decarbonised 100% green hydrogen-based DRI-EAF steel project in Boden, Sweden. Stegra is in the unique position of advancing faster than incumbents by focusing solely on green hydrogen-based DRI-EAF technology route without planning to use a bridge fuel or alternative technology options, e.g. natural gas-based DRI, CCUS. Its DRI plant is to operate in 2026 with the aim of producing 5 Mtpa of green steel. Stegra has secured substantial financial support from global financial institutions, public financing agencies, and steel end consumers, who have already signed binding long-term supply agreements for Stegra's green steel. The company is also looking to expand its iron and steel production in different countries with abundant access to renewable energy sources and strong grid connection, such as Portugal, Canada and Brazil, but not in Australia (Parkes, 2024[25]).

GravitHy is another new entrant in the European green iron space. With commercial operations projected to begin in France in 2029, the company focuses on DRI - particularly cold DRI pellets - and HBI production to serve nearby European markets. Unlike emerging players in Australia, GravitHy relies on both renewable and nuclear energy, connected to the grid system. A key element of GravitHy's business model is the inclusion of major input suppliers, such as Engie (a French energy operator focused on renewables) and Rio Tinto, in its shareholding structure.

Box 1. Vale's strategy and the emergence of "Mega Hubs"

Australian iron ore producers are displaying a heterogeneous approach to green iron, with some players that seem more inclined to invest in new technologies that could enable green iron production, and others more hesitant in this respect and willing to continue their longstanding and profitable business model. Global iron ore producers like the Brazilian VALE, one of the world's largest producers of iron ore, are adopting a more globally integrated approach by exploiting synergies with companies overseas down the iron ore supply chain and focusing on DRI/HBI and green iron solutions.

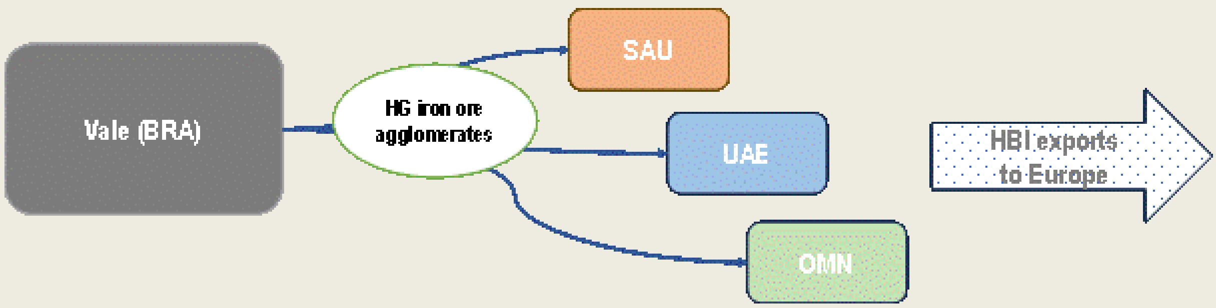
VALE's strategy is underpinned by its abundant supply of high-grade iron ores, primarily produced in its operations in Brazil, such as Carajás. These ores, with Fe content above 65%, are particularly suitable for DRI and HBI production, which require higher-grade feedstock to optimise efficiency and minimise carbon emissions. VALE has also invested in technological advancements, such as its green briquette product, which enables the reduction of CO2 emissions by up to 10% compared to traditional pellets.

VALE's strategy is focused on establishing international partnerships with the aim to accessing regions with cost-competitive energy inputs and favourable industrial strategies. Two key regions in VALE's strategy are Sweden and the MENA:

- **Sweden:** VALE collaborates with Stegra to supply high-grade iron ore in the form of pellets for further production of green steel products (Stegra, 2023[26]).
- **MENA Region:** VALE is forming partnerships with industrial players in MENA by establishing the so-called "Mega Hubs", particularly in countries like Saudi Arabia, Oman, and the UAE (International Mining, 2022[27]).

These partnerships are not only driven by energy considerations (both regions offer abundant and cost-effective natural gas and renewable energy, critical for producing hydrogen and the key input in green DRI/HBI production) but also reflect the growing demand for green iron products in Europe and Asia, where decarbonisation policies are driving investment in cleaner steelmaking processes.

Figure 6. The Megahubs concept



VALE's initiatives are often supported by government frameworks that promote industrial decarbonisation and energy transitions: national visions, such as Saudi Arabia's Vision 2030 and UAE's Net Zero by 2050 initiative, support investments in hydrogen and green industrial projects, which complement VALE's long-term objectives.

3 Drivers of green iron production

This section discusses developments in green iron markets from the perspective of the four key factors that drive these: raw material availability, access to raw materials, demand considerations and policy settings. For each of these drivers, the section first discusses global aspects and then zooms in on Australia.

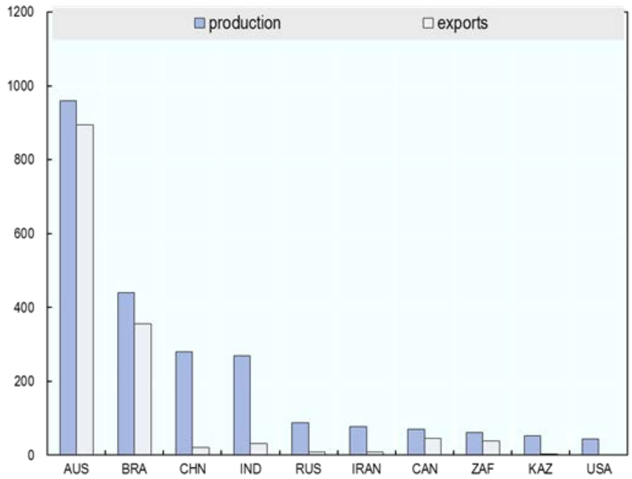
Driver 1: Raw material availability

The iron ore market is a global market, with largest production and exports from Australia and Brazil. Australian exports go primarily to China and other Asian countries

The iron ore market is inherently global, with Australia and Brazil as the two dominant producers and exporters (Figure 7). Australia leads the world in iron ore production, primarily from significant mining operations in the Pilbara region of Western Australia. Most of Australia's iron ore exports are directed to China, the world's largest steel producer, followed by Japan and Korea, both of which depend on Australian supply to sustain their steel industries (Table 1).

Brazil is the second-largest iron ore producer, with vast reserves in the Carajás and Minas Gerais regions. The country's iron ore, predominantly controlled by Vale, is known for its high iron content and low impurities. Brazil's exports are also largely destined for China, but European and Middle Eastern markets play an important role as well.

Figure 7. Australia and Brazil dominate global iron ore production and exports



Source: Production figures are obtained from the US geological Survey, whereas trade data are obtained from ISSB.

Beyond these dominant players, other iron ore-producing countries play crucial roles in regional markets.

South Africa, for instance, is a significant exporter to China and India, with its iron ore mainly extracted in the Northern Cape region. While its production volumes are much smaller than those of Australia and Brazil, South Africa's mines benefit from well-established transport infrastructure linking them to deep-water ports.

Canada also plays an important role in the global iron ore market, particularly as a supplier of high-grade iron ore to North America, Europe, and increasingly Asia. The country’s iron ore production is concentrated in the Labrador Trough, spanning parts of Quebec, Newfoundland and Labrador. Canadian producers such as Iron Ore Company of Canada (IOC), owned by Rio Tinto, and Champion Iron focus on premium-quality iron ore with a high iron content and low impurities. The country's strategic location provides logistical advantages for supplying European steelmakers, and its stable regulatory environment makes it an attractive destination for long-term investments in iron ore mining.

In this landscape, new projects are emerging in certain areas, in particular Africa, with the potential to change the geography of iron ore trade. The Simandou project in Guinea, a vast, untapped deposit, holds some of the highest-grade iron ore reserves in the world, estimated at around 1.5 billion tonnes (Rio Tinto, 2024[28]). If successfully developed, Simandou could disrupt the current market balance by introducing a new major supplier, partially reducing China’s dependence on Australia and Brazil. The project’s success depends on overcoming significant logistical and infrastructure hurdles, including the construction of a 600-kilometre railway and a deep-water port for exports. If these challenges are met, Simandou could diversify the global iron ore supply, intensify competition, and influence iron ore pricing dynamics over the coming decades.

Table 1. Top export destinations for Australian iron ores (2023)

Importer	Volumes (Mt)	Values (Bln Eur)
China	763.2	71.5
Japan	53.3	4.8
Korea	46.5	4.2
Chinese Taipei	13.4	1.3
Viet Nam	7.7	0.7
Indonesia	6.6	0.6
India	2.4	0.2
Malaysia	1.9	0.2

Source: Authors’ elaboration based on ISSB data.

Australian iron ore production is concentrated in the Pilbara, but with significant production elsewhere

Australia’s iron ore production is geographically concentrated, primarily in the Pilbara region of Western Australia (Figure 9). Hematite ores represent the majority of Australian resources (58%) but magnetite reserves are also significant (41%). Large magnetite production is in fact being proposed outside the Pilbara, particularly in South Australia (Table 2) which has significant deposits. Hematite ore is typically higher-grade than magnetite ore, with approximately 60% contained iron whereas magnetite ore has grades in the order of 30% contained iron. However, magnetite is often considered a more efficient product to beneficiate compared to hematite due to its physical and chemical properties despite typically having lower iron grades. Furthermore, magnetite’s magnetic properties make it easier to process through magnetic separation techniques, a highly efficient and cost-effective beneficiation method. In contrast, hematite, being non-magnetic, often requires gravity separation or flotation processes, which are more complex and energy-intensive.

Table 2. Australia's identified magnetite resources by Australian jurisdiction

State	Projects	EDR (Mt)	Subeconomic (Mt)	Inferred (Mt)	Total Resource (Mt)	Average grade
NSW	1	1,990	0	1,963	2,503	12%
NT	1	1	0	4.3	3.9	confidential
QLD	5	0	154	421	575	32%
SA	23	5,584	1,208	10,081	16,873	25%
TAS	4	388	1.7	158	543	52%
VIC	1	0	0	0.55	0.55	48%
WA	40	16,288	3,188	23,289	42,983	31%
Total	**75**	**24,251**	**4,552**	**35,917**	**64,720**	**33%**

Note: EDR=Economic Demonstrated Resources, Total Resource=EDR + Subeconomic Resources +Inferred Resources. NSW = New South Wales; NT = Northern Territory; QLD = Queensland; SA = South Australia; TAS = Tasmania; VIC = Victoria; WA = Western Australia. Average grade is prior to beneficiation and estimated by dividing total contained iron by total iron ore tonnage.
Source: Australia Minerals, Australian Magnetite Ore 2023 Factsheet.

Iron ore differs in quality and iron content, with only some qualities usable for DRI.

Hematite ores can also be upgraded through beneficiation processes, increasing their iron content and suitability for decarbonised ironmaking. Technologies such as pelletising, sintering, and agglomeration can enhance the usability of hematite for DRI production and other low-carbon steelmaking methods. These processes could allow hematite resources to remain relevant in the green transition, particularly if the industry prioritises value-added beneficiation to meet evolving market needs.

Availability of magnetite is a location factor for green iron production in Australia, but new ironmaking technologies may make hematite relevant too

Availability of iron ore for green iron production is a clear advantageous location factor for green iron production in Australia. This regards magnetite but the potential for hematite beneficiation means that iron ore type alone will not necessarily dictate the geography of green iron investments. Hematite beneficiation is particularly relevant in the short to medium term, as many of the major Australian iron ore companies operate on vast hematite resources. These large players have the financial capacity to drive early investments in low-carbon ironmaking technologies, potentially accelerating the transition. By improving beneficiation techniques, hematite could become more viable for use in DRI/HBI processes, strengthening Australia's position in the green iron value chain.

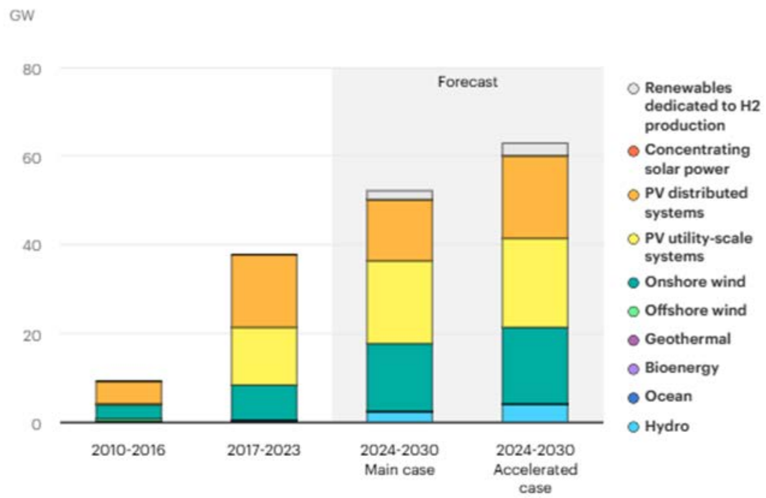
Improvements in the beneficiation of low-grade iron ores are progressing rapidly along with the development of new technologies. These include, for instance, the recent announcement of the so-called flash ironmaking technology, a process developed by Chinese researchers, capable of boosting ironmaking efficiency by up to 3,600 times (South East Asia Iron and Steel Institute, 2024[29]). While these technologies may offer an additional opportunity for Australian companies to greening and adding value to their iron ore production, they raise obvious considerations on whether an improved technology may change the low/high value added iron trade prospects for Australia. At the same time, given the size of both magnetite and hematite resources in Australia, there is likely room for both a magnetite-green iron production route and a hematite-benefication route, without resource availability being a constraining factor or raw material availability being leading to competition between the two routes.

Driver 2: Access to renewable energy

The availability of renewable energy is a key locational factor for green iron production, with renewable energy production expected to grow across regions

Between 2025 and 2030, global renewable capacity is set to grow from about 6 thousand GW to almost 10 thousand GW, reflecting a 74.5% increase. Asia's renewable capacity is projected to rise by 68% in 2025-30 period — one of the strongest growth rates worldwide, driven by continued industrial demand and policy support. Europe and the Americas will also see their capacity expand, although the most striking growth is observed in MENA, where renewable capacity is expected to more than double by 2030, from 68 GW in 2025 to 149 GW in 2030, suggesting a rapid acceleration in the region's renewable energy deployment. Australia's renewable energy capacity is also advancing fast: in 2030, the cumulative capacity of the country is estimated to reach 110 GW, well above current levels (63.5 GW) (see Figure 8).

Figure 8. Capacity growth by generation technology, Australia



Source: (IEA, 2024[30]).

The necessity of islanded renewable energy systems for green iron production means that renewable resource availability and energy system design become decisive location factors.

Australia is experiencing rapid growth in installed renewable energy capacity, with large-scale solar and wind projects increasingly populating the national landscape. However, the transition to green iron production poses a unique challenge. Unlike conventional manufacturing or grid-connected industries in southeastern Australia, prospective green iron projects in regions like the Pilbara will not be able to rely on the national electricity transmission network. In the absence of adequate grid infrastructure in the country, such projects will necessarily depend on islanded renewable energy systems—self-sufficient, off-grid power solutions that co-locate generation and demand.

This requirement introduces a distinctive set of challenges and opportunities from both economic and policy standpoints. On the opportunity side, co-locating renewable energy generation (e.g. solar and wind farms), hydrogen electrolysers, and downstream ironmaking facilities can provide highly integrated industrial ecosystems. These setups can deliver energy self-sufficiency, avoid reliance on long-distance grid connections, and support a phased development model aligned with demand growth and investment cycles. In effect, each project becomes a miniature, self-contained energy ecosystem capable of scaling over time.

Such systems also offer strategic benefits: they encourage industrial clustering in resource-rich areas and reduce exposure to national grid congestion or fluctuating electricity prices. Australia has a clear comparative advantage here, particularly in the Pilbara, where significant iron ore reserves coincide with some of the country's highest solar irradiance and wind potential. The co-location of mining and energy assets could significantly lower raw material transportation costs while also shortening supply chains for low-emission steel products (Wang et al., 2023[31]). This approach would also significantly reduce the costs associated with long-distance hydrogen transportation and extensive, long-term hydrogen storage.

Wang et al. (2023[31]) look at two distinct regions, the Pilbara and the Eyre region and find that the cost-optimal design of the system is largely driven by technology costs, plant operational constraints, and local renewable variability. The modelling results illustrate how an optimised mix of wind and solar can significantly reduce energy storage requirements and decrease the cost of green steel production overall.

However, the economic and technical barriers to islanded systems are substantial. Building stand-alone renewable and storage infrastructure — especially at the scale required for continuous iron and steel industrial operations — is significantly more expensive than leveraging an existing transmission network. Industrial processes such as DRI production and EAF steelmaking require consistent, high-quality power inputs. Managing intermittency in off-grid contexts thus requires oversized battery installations, hydrogen storage solutions, or backup generation — each of which adds to capital costs and operational complexity.

Moreover, the absence of a grid backbone means that each project must independently address issues such as system stability, power quality, and redundancy. This isolation results in lost economies of scale, as developers cannot share infrastructure or draw on balancing services provided by interconnected systems. The technical and financial risks are therefore higher for first movers, particularly in remote or climatically extreme environments.

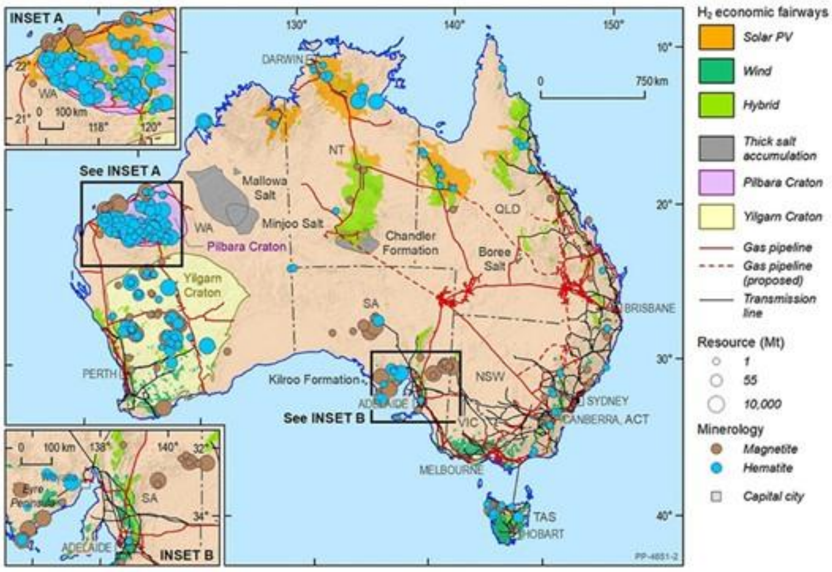
These dynamics suggest that green iron production in Australia is unlikely to be evenly distributed geographically. Rather, it will tend to concentrate in specific industrial precincts where conditions are favourable for the development of economically viable islanded energy systems. Areas like Port Hedland stand out as natural candidates. They combine proximity to iron ore deposits, export infrastructure, land availability, and renewable energy resources. The prospect of spatial concentration raises the case for targeted public investment in enabling infrastructure — shared desalination plants, hydrogen storage hubs, high-capacity microgrids, and port facilities — designed to lower barriers for industry entrants and accelerate scaling.

Natural gas can be a valid alternative for speeding up green iron investments in Australia but gas-based ironmaking can only be seen as a transitional pathway while the necessary infrastructure for green iron scales up

It must be considered that the cost-effective provision of necessary power in such zones remains a fundamental challenge. Unless long-duration storage technologies or hybrid generation systems become significantly more affordable, many green iron projects may face high marginal electricity costs. Natural gas is currently the most commercially mature reductant for supporting value-added ironmaking in Australia, particularly given the existing network of gas pipelines and the domestic availability of the resource. However, high domestic gas prices and potential supply constraints undermine its long-term viability (Nicholas, 2025[32]). Reliance on natural gas could also erode Australia's competitiveness in global green iron markets, particularly when compared to regions with access to cheaper gas or more advanced clean hydrogen infrastructure. Taken together, these factors position gas-based ironmaking in Australia only as a transitional pathway while the necessary infrastructure for green hydrogen scales up.

MENA, for instance, stands out for its strong projected hydrogen capacity, but its ability to translate this into green iron production will hinge on its capacity to fully integrate current gas-based infrastructure with large-scale green iron industrial facilities and supply chains (Basirat, 2024[24]). Europe, despite having lower dedicated hydrogen capacity, benefits from existing industrial clusters and policy frameworks that could ensure more efficient use of available resources.

Figure 9. Renewable potential, gas pipelines and iron ore deposits



Source: (Wang et al., 2023[31]).

Driver 3: Demand for green iron

Demand factors are a further important driver of green iron production, investment and trade

Demand developments in the wider steel market are a driver for (green) iron production, trade and investment. The ability of iron and steel producers to transition to green iron will crucially depend on whether demand factors will make iron intermediate products such as DRI and HBI a profitable alternative in the near future. These include demand considerations like the increasing role played by carbon-related trade measures and more broadly the proliferation of decarbonisation policies that will likely have an impact on DRI/HBI demand. But also wider demand considerations regarding the steel sector, which is clearly the most prominent iron using sector.

Box 2. Conceptualising the demand for green iron products

The demand for green iron will be closely linked to global steel consumption trends, which are shaped by broader economic and industrial dynamics. Economic growth, infrastructure development, and urbanisation drive steel demand, while structural shifts in industries such as construction, automotive, and manufacturing can influence long-term consumption patterns. Additionally, the increasing use of alternative materials, such as aluminium, may partially replace steel in certain applications, affecting the overall need for iron-based inputs. Any fluctuations in these factors will have direct implications for the scale and stability of demand for green iron.

The implementation of decarbonisation policies, including carbon pricing mechanisms, emissions reduction targets, and green public procurement policies will likely accelerate the transition to low-emission steelmaking. At the same time, consumer preferences and investor pressures are driving companies to align with sustainability goals, reinforcing the need for cleaner production inputs.

The expansion of EAF steelmaking represents another major factor influencing demand for green iron. EAF production relies primarily on scrap steel, but the availability and quality of scrap vary by region, leading to an increasing need for alternative iron inputs. As more steelmakers transition away from traditional coal-based ironmaking processes, the role of green iron in complementing scrap-based production is expected to grow.

Trade policy measures, which can also reflect the willingness of countries/industries to import green iron products, can also shape demand for green iron. Additionally, companies seeking to lower their scope 3 emissions -- those arising from their supply chains — may prioritise sourcing low-carbon iron inputs, reinforcing the role of green iron in global steel supply networks.

Finally, cost competitiveness will determine the viability of green iron relative to alternative sources. The affordability of renewable energy, production efficiency, and transportation costs will all impact pricing dynamics, influencing buyers' willingness to adopt green iron over conventional iron products. Furthermore, competition from other emerging green iron producers will contribute shaping global supply chains, as different regions position themselves as key suppliers.

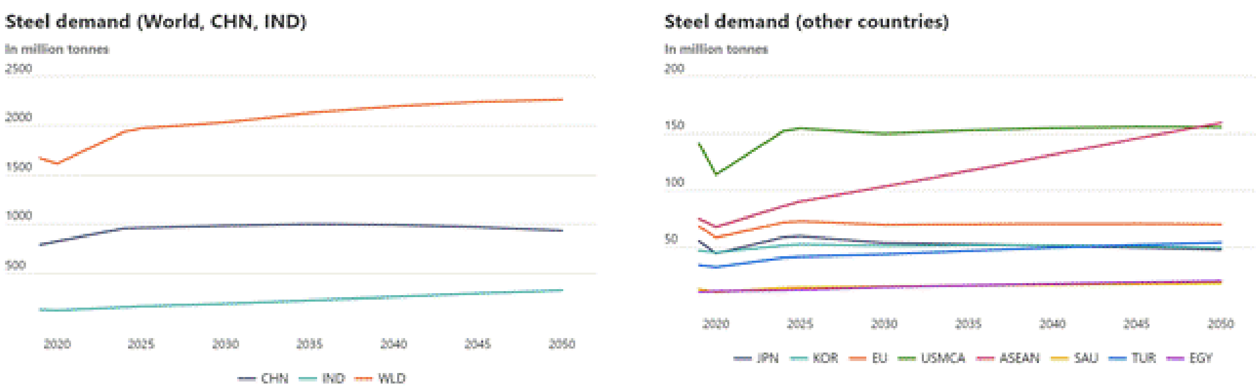
Demand developments for green iron in Australia and elsewhere depend on several factors: first, it is expected to be related to steel demand in key markets such as Japan and Korea

The dynamics of steel demand in the medium term, in particular in countries exposed to imports of iron products from Australia, provide a good basis for better understanding the future demand for iron intermediate products and, in turn, for green iron production and investments. Nearly all iron ore production and its main derivative products are used in the steel industry, making the prosperity of the iron sector intimately related to the global dynamics of the steel sector.[4]

OECD analysis shows that global demand for steel is projected to grow moderately or stay flat in the long term (OECD, 2025[33]). Regional heterogeneity exists across major steelmaking countries: China's demand is expected to peak before 2030 and then moderately decrease towards 2050. Demand for steel in other key Australian iron ore export destinations, such as Korea and Japan, is projected to remain stable or slightly decline in the longer term. Conversely, other important markets for Australian iron ore exports including India and ASEAN countries will face increasing demand for steel.

Given this scenario, the crucial question is how these demand configurations will translate into the uptake of low-carbon iron products such as DRI and HBI and in turn what share of this demand will prioritise green DRI/HBI products in the future. While markets like Korea and Japan are expected to maintain steady steel demand, the pace of their transition towards low-emission ironmaking technologies remains uncertain. At the same time, rising steel demand in India and ASEAN countries presents an opportunity for expanding the market for DRI/HBI.

Figure 10. Steel demain is expected to grow moderately in the long term



Note: Apparent steel consumption, projections from 2020 to 2050 in million tonnes. Selected economies.
Source: OECD calculations.

A growing share of steel demand will need to be near zero emissions to reach Paris objectives. Green iron will be one of the routes via which this greening of steel demand may take place, alongside others.

A growing share of steel demand will need to be near zero to reach Paris objectives. Therefore, the demand for green iron depends on steel decarbonisation efforts and policies, which help put a premium on DRI production and in turn on green iron

The demand for low-carbon iron intermediate products produced in Australia will be heavily influenced by the decarbonisation policies adopted in key export markets. As two of the largest importers of Australian iron ore, Japan and Korea are also potential importers of DRI/HBI if they accelerate their transition to low-carbon steelmaking. The extent to which Korea and Japan implement stringent carbon reduction policies—such as higher carbon pricing, stricter emissions targets for the steel sector, or direct incentives for low-carbon material sourcing—will be a critical factor in shaping demand for Australian-produced low-carbon iron. For example, in early 2025, Japan's Ministry of Economy, Trade and Industry (METI) introduced a subsidy of 50,000 yen (USD 330) for clean energy vehicles built with low-emission steel. A proliferation of such incentives could push Japanese steelmakers to look overseas for green HBI to feed their steelmaking operations (Russel, 2025[34]).

If these policies create strong incentives for steelmakers to replace traditional iron inputs with low-carbon alternatives, Australia's role as a supplier of green DRI/HBI could expand significantly. Conversely, if Korea and Japan opt for less ambitious decarbonisation pathways, prioritise alternative low-carbon technologies or would aim for greening iron production 'at home', demand for Australian low-carbon iron products may remain limited.

Beyond the direct policies of Korea and Japan, the further advancement of carbon border adjustment mechanisms in the regions that import steel from these two nations could further drive demand for low-carbon iron products from Australia. If major steel-consuming regions - such as the European Union (hereafter the EU) or the US - enforce stringent carbon border policies, export-oriented Korean and Japanese steelmakers will face growing pressure to decarbonise their supply chains to maintain access to these markets. This could create an indirect but powerful incentive for them to source low-carbon iron inputs, including green DRI/HBI from Australia, to ensure compliance with global carbon regulations and maintain their competitive position in export markets.

In addition, as argued by (Pollard and Buckley, 2024[6]), an Asian CBAM including major Asian partners and Australia would play a crucial role in shaping the investment decisions of Australian mining majors by:

- Sending a strong and predictable price signal that aligns with global decarbonisation trends: given Australia's historical reliance on fossil fuel exports, such a mechanism would encourage a shift toward low-carbon, value-added production in critical minerals and strategic metals.
- Providing the regulatory certainty needed to scale up these investments, fostering a more sustainable and competitive position in global markets while reducing exposure to carbon-intensive trade risks.
- Integrating embodied low-carbon incentives into exports: Australian iron ore producers like BHP and Rio Tinto would be increasingly incentivised to accelerate investments in greener mining operations and downstream processing.

Green iron will be one of various routes via which this greening of steel demand will take place

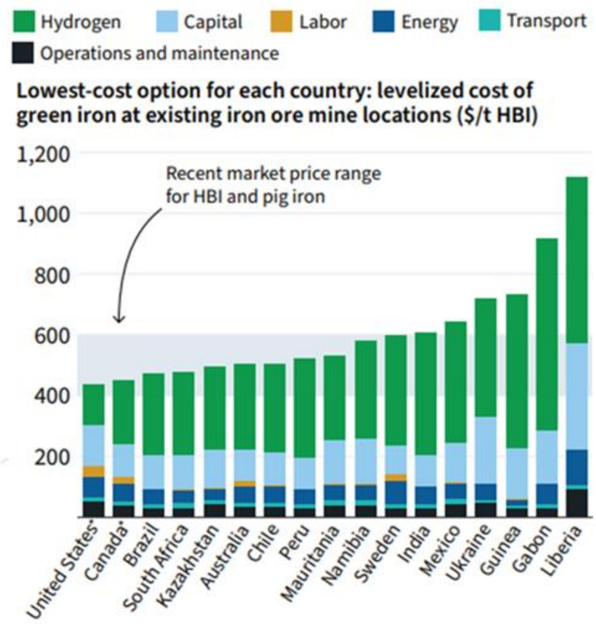
Beyond green iron, there are various alternatives that can be explored to decarbonise the steel industry. The most prominent one is a larger use of scrap into EAF furnaces to produce steel. Various net-zero scenarios for the steel sector indicate the share of scrap input in steel manufacturing increasing globally to around 45-50% by 2050 to comply with the goals of the Paris Agreement. According to the OECD, this share could be even higher depending on the deployment of new recycling technologies for scrap collection, sorting, and processing, as well as increasing economic incentives to recycle (OECD, 2024[35]). The extent to which the scrap route will affect green iron developments in Australia will mostly depend on the availability of scrap worldwide, which in turn depend on the ability of countries, which possess large inventories of this material, to make if available on international markets and the stringency of policy barriers to trade.

Transportation and logistics costs will also play a role in how green iron demand unfolds

Transportation costs may also play a role in determining green iron demand and production and trade patterns. These costs may both play a role as a component of the competitive position of Australia's green iron relative to other producing regions, as well as in relation to considerations for Australian firms to move towards the green space.

A first factor regards the share of transportation costs in the export price of Australian green iron compared to its competitors. Studies suggest that such costs are a relatively small component of total production costs and would not disadvantage Australian green iron producers (see Figure 11). This may in particular be the case for markets in the Asian region with well-developed trading relations with Australia and infrastructure for trade. In markets further away, such as in Europe, these cost factors may weigh heavier, providing an advantage for competitors from MENA for instance.

Figure 11. Transport costs are quote homogenous across potential green iron producing economies



Source: (Wilmoth et al., 2024[36])

Another factor influencing transportation economics is the difference in shipping costs between DRI/HBI and iron ore. While bulk iron ores, such as hematite and magnetite, are transported via standard dry bulk carriers with well-established logistics, shipping DRI and HBI is more expensive on a per-unit iron (Fe) content basis. This is because DRI and HBI require specialised container ships due to their reactivity and potential safety risks. Unlike iron ore, which is chemically stable and can be transported with minimal handling considerations, DRI is highly reactive towards oxygen and moisture, posing a risk of spontaneous combustion if not properly handled.

Beyond direct shipping costs, a successful transition to green iron trade requires investments in Australia's port and storage infrastructure. While Australia's iron ore export terminals are among the most efficient in the world, they are primarily designed for high-volume, low-value bulk handling. DRI/HBI, however, require specialised storage facilities to mitigate fire hazards and oxidation risks, as mentioned above. The current lack of dedicated infrastructure for handling these products at Australian ports poses a bottleneck for scaling up green iron exports. Investments will be needed in purpose-built storage areas with inert gas blanketing systems, controlled-atmosphere transport solutions, and updated safety protocols for loading and unloading (International Iron Metallics Association, 2019[37]). In addition, the relatively low volumes of DRI/HBI trade expected compared to usual iron ore trade may not necessarily be able to compensate the required investments in port infrastructure and logistics.

Finally, the broader trade infrastructure for green iron will need to evolve to support more sophisticated supply chain coordination. Unlike iron ore shipments, which follow well-established, high-frequency bulk transport routes, DRI/HBI exports will require more customised logistics solutions. This includes reevaluating the suitability of existing shipping routes, ensuring that receiving ports in key markets—such as Japan, Korea, and Southeast Asia more broadly - are equipped to handle these products safely and efficiently.

Driver 4: The policy settings

The global steel decarbonisation policy context

The global push for steel decarbonisation has gained momentum, with governments and industry players recognising the sector's role in meeting climate goals. Recent OECD research across 11 jurisdictions and 87 steel decarbonisation policies shows a gradual rise in such policies since 2000, with a sharp increase from 2018 (OECD, 2024[38]). Policymakers primarily rely on broad, non-technology-specific measures, while hydrogen-focused policies are the second most common, followed by policies towards energy efficiency and scrap. This reflects gradual but growing support for low-emission hydrogen-based steelmaking as the focus of policy momentum.

However, policies explicitly targeting green iron remain rare and geographically limited. One reason for this is that most general decarbonisation policies frame the transition within the larger push to reduce emissions across entire industrial sectors. This likely reflects two key structural factors:

- **Focus on upstream portions of the value chain over process-specific policies**: Many steel decarbonisation policies prioritise broader enabling factors such as renewable energy expansion or green hydrogen production. Since these inputs serve multiple industrial applications beyond just green iron, such as chemicals, transportation, governments tend to structure incentives around renewables and hydrogen rather than focusing narrowly on ironmaking itself. This indirect approach aims to create favourable conditions for multiple industries to decarbonise rather than prescribing solutions for specific subsectors.
- **The role of hydrogen policies in shaping green iron investment:** While Australia is the only economy with a dedicated policy focus on green iron, many countries worldwide have implemented policies covering hydrogen, and several of these explicitly target steel. As hydrogen-based steelmaking emerges as a key pathway for decarbonisation, these policies could serve as an important enabler of green iron in the future.

Australia's net-zero ambitions

The Australian federal government committed to achieving net zero emissions by 2050, an ambitious target for a nation historically reliant on fossil fuel exports. Australia is well placed to meet this goal, thanks to its abundant wind and solar resources, which position the country as a global leader in renewable energy potential. However, despite these advantages, as indicated in the 2023 OECD Economic Survey on Australia (OECD, 2023), further reforms are required to meet emission reduction goals. For instance, Australia has less than other countries moved forward to implement a carbon pricing system, which could further incentivise the transition to a low-carbon economy.

In pursuit of its net-zero emissions target by 2050, Australia has implemented the Safeguard Mechanism, a policy designed to limit greenhouse gas emissions from the nation's largest industrial facilities. [5] Established in 2016 and reformed in 2023, this mechanism sets legislated baselines - emission limits - for facilities emitting over 100,000 tonnes of CO_2 equivalent annually, encompassing sectors such as mining, oil and gas production, manufacturing, transport, and waste management. Facilities exceeding their baselines must manage excess emissions, through the purchase and surrender of Australian Carbon Credit Units (ACCUs), applications for multi-year monitoring periods, borrowing from future baselines or implementing on-site abatement strategies.

The mechanism allows facilities that reduce their emissions below their baseline to earn credits. Facilities that are both emissions-intensive and trade-exposed (trade-exposed, baseline adjusted (TEBA) facilities) are provided a reduced annual baseline reduction factor, from 4.9% Safeguard benchmark to 1% for TEBA facilities. TEBA facilities are also eligible to access the AUD 1.9 billion Powering the Regions Fund (PRF). Within the PRF, the Government will help trade-exposed Safeguard facilities invest in low emissions technology through the AUD 600 million Safeguard Transformation Stream. It will also support industries that provide essential inputs for renewable energy industries (including steel, cement, lime, aluminium and alumina) through the AUD 400 million Critical Inputs Fund (OECD, 2023[1]). Within this cap, companies purchase or receive allowances, which can be traded on the market.

The Safeguard Mechanism contrasts significantly with the EU's Emissions Trading System (ETS). The EU ETS operates as a cap-and-trade system, setting a total cap on emissions from facilities emitting more than 25,000 tonnes of CO_2-equivalent per year. Compared to the EU ETS, Australia's Safeguard Mechanism is less comprehensive in scope and lacks the same market-driven flexibility and scale. While the EU ETS imposes a direct economic cost on emissions through auctioning of allowances, the Safeguard Mechanism relies on setting declining baselines and offering companies options to purchase carbon credits, which may not generate the same financial pressure to innovate or reduce emissions.

Government green iron ambition

In recent years, the Australian government, on both federal and state levels, has put significant focus on green iron, most recently in its announcement of an AUD 1 billion Green Iron Investment Fund. Awareness of the economic opportunity that such a downstream industry could bring to multiple parts of the country reaches many different streams of government action and communications.

The federal government's recently passed Future Made in Australia (FMIA) agenda provides the policy framework for much of the country's green metal ambitions, and marks a turning point in the country's attitude towards industrial policy. While the FMIA plan targets manufacturing and industry in general, the focus on the green iron opportunity is overt, and the plan officially identifies green metals (production of low emissions iron, steel, alumina and aluminum) as one of the priority industries. In conjunction, the Australian federal government announced plans to invest in green metal production as part of the 2024-25 May Budget, after having published a consultation paper at the end of 2024 (Australian government, Department of Industry, Science and Resources, 2024[39]). The federal government has also put together a green metals expert panel to guide its strategy (Minister for Industry and Science, 2024[40]).

Two state governments also have clear and pronounced ambitions regarding green iron production. The South Australian government has a published green iron strategy, while Western Australian Government has a Renewable Hydrogen Strategy and Roadmap (released in 2019, updated in 2021 and refresh in 2024) that has a strong focus on producing green iron. The Western Australian government's Made in WA election commitment in 2025 is to work with industry on a Green Iron and Steel Action Plan to activate green and low emission downstream processing of WA iron ore.

The **South Australian** government has significant ambition and drive regarding green iron production. Since 2022, as part of its green iron and steel strategy, the state has established a highly supportive policy structure to boost its chances of successfully producing green iron in the areas around the Spencer Gulf.

The **Western Australian** economy and corresponding policy landscape is unique, with policy support for green iron production less specifically developed than its ambitions in green hydrogen production. The State Agreements, established between the Western Australia government and mining companies operating there, oblige the companies to research and develop secondary processing facilities within the state where possible, often through the requirement to establish a metallised agglomerate plant. Historically, State Agreement companies have deferred secondary obligations due to a cited lack of economic viability. However, State Agreements also enable companies to seek approval to offset their secondary processing requirements through an alternative project that represents approximately equivalent value to its secondary processing obligations. This can act as an incentive for companies to establish green iron production facilities in Western Australia as a means of meeting their secondary processing obligations through an alternative project.

The Western Australian government is supportive of ambitions in green iron production and is investing in green steel manufacturing in various parts of the state: the Pilbara, the Mid-West, and in and around Collie. Nevertheless, the business structure and favourable market conditions faced by the iron ore mining companies that are active in the Pilbara are such that a significant shift to green iron production is ljkely to require collaboration with a range of partners, including companies from abroad.

Both the federal and state governments are undertaking further specific policy measures to support green iron. At the time of writing this report, following the recent placement of the Whyalla steel mill and related assets into administration, the federal and South Australian governments announced a comprehensive investment package worth AUD 2.4 billion to save Whyalla Steelworks, support local jobs and encourage investment into Australian made iron and steel (Prime Minister of Australia, 2025[41]). The package includes AUD 384 million to fund its operations during administration, AUD 1.9 billion for upgrades and new infrastructure (including the AUD 500 million mentioned above from the Green Iron Investment Fund), as well as AUD 100 million immediate support for the local community (Pollard and Buckley, 2025[42]).

In the related press release, the government emphasised the strategic importance of Whyalla steel plant for future green steel production, which provides an indication of the government's ambition in this regard. The decision was accompanied by an announcement from the federal government of a Green Iron Investment Fund worth AUD 1 billion to support early mover green iron projects. Up to AUD 500 million from this fund has been earmarked for the Whyalla steelworks transformation, while the other half remains open for both existing facilities wanting to transition into green iron production, and newcomers (Prime Minister of Australia, 2025[43]).

In the context of the FMIA framework, the AUD 750 million Innovation Fund will provide grants for the deployment of innovative technologies and facilities linked directly to priority industries, of which green iron is identified through the green metals prioritisation (Department of Industry Science and Resources, 2025[44]). Similarly, the National Reconstruction Fund (NRF) will provide finance in the form of debt, equity and guarantees to drive Australian-based investments in a number of priority areas. Up to AUD 5 billion of the NRF has been earmarked for investment in low-emissions technologies, with a further AUD 1 billion set aside for value adding in resources. The FMIA package has also expanded the scope of the existing National Interest Account to provide additional avenues for financing projects deemed of high national interest, including in green metals.

Additionally, the federal government has provided AUD 39 million to the HILT-CRC to fund research and development into technologies that de-risk decarbonisation in iron and steelmaking, including a number of research projects relating to DRI and beneficiation technologies.

The **South Australian** government committed AUD 50 million towards the installation of a low-emission electric arc furnace at Whyalla Steelworks and increased capacity, accompanied by AUD 63.2 million from the federal government. However, this support has been superseded by the announcement of a AUD 2.4 billion package from the federal and state governments. In parallel, the state government opened an Expression of Interest process to support their ambitions for a 2.5 Mtpa hydrogen-based direct reduction iron plant in South Australia by 2030 or earlier. The EoI will allow the government to compare the viability of prospective projects and evaluate risks and opportunities, and proceed with a commercial study that will determine specialised industrial precincts accompanied by strategic planning to de-risk green iron investments.

The **Western Australian** government has established a AUD 1 billion dollar Strategic Industries Fund to unlock Western Australia's strategic industrial areas (SIAs) and pave the way for WA to become a global clean energy powerhouse. The recently released Made in Western Australia plan has identified the Boodarie Strategic Industrial Area, located in the Pilbara, as a Green Iron Hub, which will help inform precinct planning for this SIA.

The Western Australian government is actively supporting green energy and metals opportunities. The state government aims to ensure there is a coordinated approach to deliver green iron and steel projects with enabling infrastructure. Other prospective areas include Collie and the Mid West, which has significant renewable energy potential, and is subject to interest from multiple companies with aspirations to product green and low emissions metals. For example, a high voltage transmission line connecting the Oakajee to the Southwest Interconnected System (SWIS) will be needed for the implementation of any green iron projects in the area.

The Western Australian government also provided AUD 75 million for the Neosmelt Project (BlueScope, Rio Tinto and BHP), AUD 15 million for the Port Hedland Iron Project (POSCO) and AUD 2 million to Christmas Creek Green Iron Demonstration Plant (Fortescue) in order to support development of enabling infrastructure and technology learnings that may spill over to other companies.

Government support and tax incentives for hydrogen and renewable energy

Federal level

Public investment and incentives for renewable hydrogen production and renewable energy generation, which are key enablers of green iron production, have gained momentum recently in Australia in the 2024 Federal budget and through the FMIA framework.

Energy-related policies are largely established at a state level in Australia, but there are some broader federal policies helping coordinate a transition to more renewables. The creation of Renewable Energy Zones, for example, is a key way for the federal government to coordinate the development of hotspots for renewable energy generation, and is particularly useful for industry. The Powering Australia plan includes key targets and strategies to boost renewable energy generation, while the National Hydrogen Strategy sets out the country's plan to become a major global player in hydrogen production by 2030 (Department of Climate Change, Energy, the Environment and Water, 2024[45]).

The Hydrogen Production Tax Incentive (HPTI) introduced by the federal government in the 2024-2025 budget marks a significant change in the country's industrial policy approach. The HPTI will be delivered through Australia's tax system as a refundable tax offset, providing an AUD 2 incentive per kilogram of renewable hydrogen to eligible producers for up to 10 years, between 1 July 2027 and 30 June 2040.

In parallel, AUD 4 billion was announced by the federal government in the form of the Hydrogen Headstart program, to provide support for large-scale renewable hydrogen projects through competitive hydrogen production contracts. The program uses a competitive process to select large Australian-based projects, focusing on those producing hydrogen or derivates from renewable energy. Selected projects will receive the funding as a production credit, valued at the difference between the production cost and that of the prevailing market price. Producers that receive the HPTI and are awarded contracts under the Headstart program receive reduced effective credits from the Headstart program.

South Australia

The government of South Australia has been pursuing ambitious renewable energy targets since 2008.

Their current electricity mix is almost 80% renewables, and they aim to achieve 100% by 2027. A current pipeline of more than 55 projects could add a further 15.3 GW of renewable energy to help them achieve their target. South Australia has a concrete advantage in their development of renewable energy compared to Western Australia, for example, in their connection to the National Electricity Market.

South Australia was also the first state to seriously explore green hydrogen opportunities, and clearly included hydrogen as a key part of its energy transition plan as early as 2016.

The state government announced investment of more than AUD 500 million in new hydrogen projects according to their hydrogen strategy, however some of this support has been redirected to the salvage package for the Whyalla steelworks. Other hydrogen support includes:

- AGIG Hydrogen Park South Australia: an AUD 14.5 million demonstration project comprising a 1.25 MW electrolyser at the Tonsley Innovation District
- Hydrogen Hub at Port Bonython: a multi-user export precinct support by AUD 100 million from state and federal governments (and industry a further AUD 40 million), and proposed projects representing around AUD 13 billion investment, with potential for 1.8 Mtpa of hydrogen by 2030.

Western Australia

Western Australia has had high ambitions for hydrogen production for a number of years and explicitly aims to become the country's largest exporter of hydrogen products.

The state's Renewable Hydrogen Strategy 2024–2030 outlines its vision to establish an offtake agreement for green hydrogen export by 2030 and secure significant investment in supporting infrastructure to commence large-scale production. The strategy also includes a target that a project is approved for large scale use of renewable hydrogen in green metals or green ammonia by 2028 and WA is prioritising the highest impact end-uses of renewable hydrogen in hard-to-abate sectors. To achieve these aims, the state plans to:

- Invest in infrastructure and activation of hydrogen hubs in Kwinana, and the Pilbara, South West and the Mid West region.
- Target financial support for selected projects
- Accelerate project approvals and enhance social license.

The Western Australian government is strengthening international partnerships by exploring renewable energy supply chain operations with existing and new trade partners.

A trilateral international study between the Western Australian government, Port of Rotterdam and the German Federal Minister for Education and Research is exploring ways to fast-track hydrogen and/or ammonia exports from Oakajee in the Mid-West. Memoranda of understanding (MoUs) to promote collaboration have been signed between the state government and the Japan Bank for International Cooperation on minerals, energy and natural resources and the Japan Oil, Gas and Metals National Corporation on energy and decarbonisation and Republic of Korea's Ministry of Trade, Industry and Energy

(MOTIE) regarding clean energy development and minerals. An MOU was signed between Pilbara Ports Authority and Japan's Port of Himeji on hydrogen and ammonia.

Box 3. Assessing governments' hydrogen strategies and policies for steel decarbonisation

The OECD recently analysed government hydrogen policies across 18 jurisdictions to assess their role in supporting green hydrogen adoption and steel sector decarbonisation (OECD, 2025[5]). The study covered regions including North and Latin America, the EU, Other Europe, CIS, MENA, and Asia-Pacific.

All 18 jurisdictions have national hydrogen strategies, which take a broad, cross-sectoral approach rather than focusing on specific industries. In many circumstances, these policies identify hydrogen production and pricing targets for 2030 and 2050, positioning hydrogen as a key pillar of their decarbonisation plans.

Seventeen of the 18 jurisdictions explicitly mention the steel industry in their hydrogen strategies, signalling interest in hydrogen-based steelmaking. However, only 56% - including Australia, Brazil, Canada, Germany, India, Indonesia, Japan, Korea, Malaysia, UAE, the UK, and the US - specifically reference hydrogen-based iron technologies. The remaining 44% do not detail the role of hydrogen in steel production, highlighting a gap in strategic clarity.

Most national hydrogen strategies prioritise supply-side conditions such as infrastructure, investment, and production capacity, alongside just transition measures and trade considerations. On trade, the focus is on international cooperation, market access, and maintaining a level playing field. Some countries emphasise hydrogen exports, leveraging their renewable energy resources to gain a first-mover advantage in the global market.

Comparison with other regions

Despite the commitment of Australian authorities in mobilising investments to enable a shift into green iron production (including the recent investment package for Whyalla steelworks), other economies appear to be making larger and financial commitments toward decarbonising the steel industry and supporting investments in the green iron space.

EU policy aims to lower the cost of green hydrogen and green electricity. If this is achieved, H2-DRI could become a competitive route for steelmaking in many EU economies.

Over recent years, the EU committed large resources for supporting the decarbonisation of existing steelmaking companies. Most of these projects focus on the transition to hydrogen-based EAF-DRI processes.

Within the EU, multiple steel producing economies as well as the EU itself have implemented policies to support the development of H2-DRI, usually as an integrated part of the steelmaking process as opposed to DRI/HBI as an exportable product. With the main concern about H2-DRI viability in some EU countries being the availability of renewable energy for sufficient hydrogen generation, and the costs of the latter, these policies usually take the form of grants for green hydrogen projects. The European Commission has approved around EUR 13 billion of support measures ranging from grants to conditional payment mechanisms to support the decarbonisation of the European steel industry.

The EU hydrogen strategy aims to produce 10 Mtpa of green hydrogen domestically and import an equivalent amount by 2030, supporting its broader industrial decarbonisation goals. To accelerate this transition, the EU has approved two waves of Important Projects of Common European Interest (IPCEIs), totalling EUR 6.9 billion in public funding across 72 green hydrogen projects (Hydrogeneurope, 2024[46]). Additionally, the EU Innovation Fund, expected to provide EUR 40 billion between 2020-30, is financing key initiatives like the HYBRIT project, which received EUR €143 million to advance hydrogen-based ironmaking. The Swedish government also supported the project significantly, with a grant of SEK 3.1 billion for the demonstration plant in Gällivare from the Swedish Energy Agency's Industriklivet program (HYBRIT Development, 2023[47]).

Regulatory frameworks are also evolving, with the Hydrogen and Decarbonised Gas Market Package (Directive (EU) 2024/1788 and Regulation (EU) 2024/1789) establishing new rules for hydrogen infrastructure, renewable gas integration, and energy security, set for transposition by mid-2026. Despite these efforts, policy and market uncertainty remain challenges. ArcelorMittal has delayed final investment decisions on several H2-DRI steel projects, citing insufficient policy support, high energy costs, and market volatility, highlighting the ongoing need for stronger incentives to drive Europe's green steel transition (ArcelorMittal, 2024[48]).

In the MENA region, several countries have initiated financing support and tax incentives to promote green iron production, primarily through the development of green hydrogen projects.

In Egypt, the government approved a comprehensive incentive package in early 2024, including tax credits of 33%-55%, VAT exemptions on equipment and materials, and waivers on taxes, contracts, and land registration fees—an aggressive policy to attract investment into green hydrogen production (Martin, 2024[49]).

Oman's hydrogen development is heavily state-backed, primarily facilitated through Hydrom, a government-owned entity overseeing hydrogen investments. Hydrom has secured USD 20 billion in green hydrogen agreements, with two major Dhofar projects valued USD 11 billion as part of the national strategy (Oman Observor, 2024[50]).

Saudi Arabia is making some of the world's largest hydrogen investments, targeting 2.9 Mtpa by 2030 and 4 Mtpa by 2035, primarily for export to Europe as ammonia or HBI (Basirat and Nicholas, 2023[51]). The Public Investment Fund (PIF) has committed USD 10 billion through its Energy Solutions Company (ESC) to scale low-carbon hydrogen production. Meanwhile, Aramco, the state-owned oil company, acquired a 50% stake in a blue hydrogen producer, expanding its role in developing a low-carbon hydrogen network. To mobilise funding, Saudi Arabia introduced its Green Financing Framework (GFF) in March 2024, designed to attract capital for greenas projects, including hydrogen initiatives.

Identifying offtakers and fostering partnerships

A key element of green iron policy is identifying offtakers and developing partnerships. Australia is actively engaging in partnerships at both government-to-government (G2G) and government-to-business (G2B) levels, particularly in investment acquisition for green iron and related industries. These efforts are policy-supported and align with Australia's broader climate strategy, though they are somewhat less focused on economic diplomacy compared to other nations. In addition to governmental efforts, non-governmental organisations (NGOs) play a unique role in Australia's green iron sector, including international outreach—an approach that is less common in other countries.

Beyond diplomacy, trade policy developments outside of Australia are increasingly relevant, with key questions surrounding whether other nations will accommodate green iron imports under carbon border mechanisms or apply traditional trade remedy measures. In December 2024, Australia and Korea signed a Green Economy Partnership with green metals as a focus area alongside critical minerals and green hydrogen (Government of Australia, 2024[52]).

While Australia is widely regarded as a strategic partner in various critical minerals strategies, few such frameworks emphasise iron ore, iron, or other raw materials for steel production. An exception is Canada, which has integrated these resources into its national strategy. This distinction highlights a potential gap in international policy focus on sustainable steel supply chains, despite growing global interest in decarbonising steel.

In September 2024, Australia and Germany expanded their collaboration in energy and climate initiatives by signing a Joint Declaration of Intent to negotiate a EUR 400 million bilateral funding mechanism under Germany's H2Global auction scheme. This agreement, equally funded by both governments, aims to establish new green hydrogen supply chains, facilitating the export of renewable hydrogen from Australia to Germany and other European markets. The partnership seeks to promote the development of renewable hydrogen infrastructure, support the decarbonisation of industries, and enhance energy security for both nations.

Furthermore, the University of New South Wales (UNSW) is leading the SuSteelAG project, a collaboration between the Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW) and the German Federal Ministry of Education and Research (BMBF) (UNSW, 2024[53]). This initiative aims to explore the feasibility of creating a sustainable green iron and steel value chain between Australia and Germany. By working with German institutions, Australia gains access to new hydrogen technologies.

More generally on critical minerals, the EU and Australia have recently strengthened their partnership by signing a strategic agreement aimed at enhancing cooperation in critical raw materials, including iron ore. This agreement focuses on securing sustainable and resilient supply chains for essential minerals vital to both parties' economic and technological advancements. Key components of the partnership include collaborative research and innovation initiatives, investment in mining and processing infrastructure, and the development of environmentally responsible extraction and processing techniques.

The India-Australia Green Steel Research Partnership, launched concurrently with funding of AUD 10.4 million, is dedicated to reducing greenhouse gas emissions in steel production (CSIRO, 2023[54]). Given India's position as the world's second-largest steel producer, this partnership seeks to develop innovative technologies and processes to decarbonise the steel industry, contributing to global climate change mitigation efforts. These initiatives are part of the broader India Economic Strategy to 2035, reflecting a shared commitment to environmentally responsible practices and sustainable development.

Australia’s international partnerships in the iron and steel sector have predominantly focused on forging robust research and collaboration agreements that aim to build a sustainable green iron and steel value chain.

These partnerships often centre on advancing low-emission technologies, with a particular emphasis on iron and hydrogen as key product components. However, while significant efforts are directed toward innovation and technology development, there is comparatively little emphasis on establishing concrete trading relationships. Notably, cooperation agreements with potential clients for green iron in Japan are limited, highlighting a strategic gap between technological advancement and the creation of comprehensive market linkages for sustainable iron products.

Comparison with other regions

Australia has yet to secure strong offtake commitments from major global steel producers or industrial offtakers. While some proposed projects have been announced, the lack of structured international partnerships and long-term supply agreements raises concerns about market access and investment viability. While some governments have begun establishing export agreements with other regions, overall efforts in this direction still appear to be in their early stages.

Saudi Arabia, for instance, has been active in fostering partnerships with companies overseas for potential future green hydrogen exports, usually through the country’s Public Investment Fund (PIF). In 2023, the PIF alongside state-owned Aramco signed a shareholders’ agreement with China Baowu (with shares split 25-25-50, respectively) to build a 1.5 Mtpa steel plant in Saudi Arabia’s Ras al-Khair Industrial City featuring a H2-ready DRI-EAF plant that will commence operations using natural gas (Basirat and Nicholas, 2023[51]).

In the UAE, Masdar is partnering with Emirates Steel Arkan to produce steel using green hydrogen (Fuel Cells Works, 2022[55]). Further, Emirates Steel announced a new project to produce green iron in Abu Dhabi in collaboration with Japanese partners with the project currently in the feasibility study phase and commercial production expected in 2027 (Emirates News Agency, 2024[56]).

At COP28 in 2023 Brazil and the United Kingdom signed an MoU to identify sources of international assistance with decarbonisation of the Brazilian industrial sector through the Hub for Industrial Decarbonization in Brazil (HDIB) (Presidencia da Republica (Brazil), 2023[57]).

Interestingly, in 2023 the Japanese government, through its Nippon Export and Investment Insurance (NEXI), has recently signed a MoU with ITOCHU Corporation (ITOCHU) and CSN Mineração with the aim of securing stable production and supply to Japanese companies of high-grade iron ore pellets produced by CSN Mineração's pellet feed production plant.[6]

Approvals processes

The **South Australian** government has been innovative and ambitious in making approval processes for green projects, including renewable energy generation, simpler and faster. Their "one window to government" policy, written into the *Hydrogen and Renewable Energy Act 2023*, is designed to attract investment for and speed up the concurrent development of renewable energy, hydrogen, mining and green iron by reducing the number of steps and interlocutors that investors need to engage with before development is approved by government.

One of the main policy actions the **Western Australian** government is taking to support green iron projects is the development of the Green Energy Approvals Initiative, establishment of the Coordinator General role and recently legislating changes to the Environmental Protection Act in 2024. The aim of these reforms is to strengthen the environmental approvals system, speed up approvals and secure major projects.

Transportation and energy infrastructure

Infrastructure is a key policy challenge from energy grid to port facilities. Whilst Australia has well-established infrastructure for iron ore production and exports, it is not yet certain if these are suitable for green iron exports because the prime locations for green iron and suitable-grade iron ore mining are not identical. This is less of a challenge in other countries where locations for high grade iron ore exports and green iron exports overlap, as in the case of Brazil. Additionally, Australia has unique infrastructure challenges as a result of the following characteristics relative to other geographies: great distances, patchworked energy grids, and high labour costs.

The South Australian government is investigating a common use infrastructure approach that could enable multiple proponents to partly share road, rail, telecommunications, power and water in the Whyalla area. The federal government is also trying to foster public investment in infrastructure in promising areas with a common use approach, but there are different considerations to be made in different areas, with the Pilbara being a particularly special case. Some small companies are joining together in a consortium approach.

The Western Australian government has applied policy measures to encourage the creation of common use infrastructure (particular for energy transmission) in the Pilbara that could unlock green iron opportunities. For example, through the Pilbara Energy Transmission Plan, it launched an Expression of Interest procedure for renewable energy transmission projects in the Pilbara, with winning candidates to be rewarded Priority Project status and support accessing Western Australia's AUD 3 billion allocation of the federal Rewiring the Nation fund.

The water supply in Western Australia is controlled by a state-owned entity, which may open up certain policy options when it comes to supporting electrolysis in strategic areas. In contrast, the electricity grid in the Pilbara is not connected to the National Energy Market, instead it is covered by smaller grids privately controlled by mining companies, limiting the state's near- and mid-term capacity to support renewable energy availability there. The development at Lumsden Point port in the Pilbara, to enable the import of wind turbine blades, and the coordination of the energy transmission through Pilbara Energy Transformation Plan, aim to accelerate the transition to renewable energy in the Pilbara.

Comparison with other regions

Australia appears to be the only country actively coordinating investments in infrastructure specifically aimed at fostering green iron developments. In contrast, while most other nations have yet to align their infrastructure investments with green iron objectives, Brazil stands out as an exception. The Brazilian government is making significant investments in the development of new port facilities, which are expected to enhance iron production and facilitate trade.[7]

In October 2024, Bahia Mineração (Bamin) - an integrated mining and logistics project that comprises the high-grade Pedra de Ferro iron ore mine - received priority for a R 4.6 billion (USD 904 million) loan from the public Merchant Marine Fund (with favourable terms, including a long repayment schedule). This funding will among other things be used towards the R 1.3 billion Ilhéus port terminal which was featured in the Growth Acceleration Program (PAC) relaunch. President Lula himself has urged swift completion of the port, aiming for inauguration before the end of 2026 (Mason, 2024[58]).

Since 2022, the EU Commission has been promoting 'IPCEI Hy2Use' (cross-border hydrogen projects that entail a high level of technological or financial risk and benefit the entire EU) to support the construction of hydrogen-related infrastructure. The programme particularly supports large-scale electrolysers and transport infrastructure for the production, storage and transportation of green hydrogen (European Commission, 2022[59]).

Labour and skills

In the green iron space, Australia's labour situation is unique, because instead of replacing existing ironmaking they would be largely developing this workforce from scratch. Additionally, there are particular geographic challenges in Australia, where potential hotspots for green iron production do not always overlap with existing towns and pools of labour.

The mining sector in Australia, in many areas but particularly in the Pilbara, relies heavily on the Fly In Fly Out (FIFO) system in which the company pays for and organises the transfer of workers to mining sites via aircraft. While this system is very costly, it is estimated in some areas to nevertheless be significantly cheaper for the company than employing staff in residential positions. In 2012 (when real estate was significantly cheaper across Australia), Fortescue estimated that converting 330 workers at its Port Hedland facility from FIFO to residential roles would have cost them an extra AUD 33 million per year (Crosse, 2023[60]). The significant costs of both a FIFO system and building residential positions will likely pose a major challenge for green iron production in isolated areas in the short or medium term, especially given smaller profit margins compared to the resource sector. For this reason, building and supporting a stable labour supply is a key consideration for policymakers in Australia aiming to support green iron production, and the strategic location of production sites relative to existing towns appears to be a major consideration for investors.

Within the context of the FMIA framework, the Australian **federal government** takes a strong role compared to other countries regarding policies to support the availability of skills and labour necessary for green industry. The Energy Industry Jobs Plan, implemented by the Net Zero Economy Authority, will support workers to transition from closing fossil fuel plants to new jobs in the net zero economy. The federal government announced in May 2024 AUD 91.0 million in funding over five years to support the development of skills necessary for the transition to Net Zero. The main policies involved are the following:

- AUD 50 million capital and equipment investment fund for facility upgrades to expand renewable energy training capacity;
- AUD 30 million to turbocharge the renewable energy teacher, trainer and assessor workforce;
- Establishing advocacy and promotional work for renewable energy careers;
- Support for small and medium businesses taking on renewable energy, construction and manufacturing apprentices;
- A preliminary study on using Australia's international education sector to tackle critical skills shortages through work integrated learning and apprenticeships;
- Adjusted settings of the New Energy Apprenticeships Program which supports apprentices needed for renewable energy jobs;
- The National Hydrogen Technology Skills Training Centre is being established in partnership with the Victorian Government to promote hydrogen workforce development, supported by AUD 10 million in 2025-26;
- To encourage skills in renewable energy, the federal government has partnered with state governments to provide a number of free places in renewable energy courses (among other in-demand areas) as part of the "fee-free TAFE" programme;
- The federal government aims to establish Regional Workforce Transition Plans which will outline the employment and skills supports that are available in each region, and inform people about how to gain skills or apply for new opportunities in renewable energy jobs.

The state government of **South Australia** has also implemented policies to supporting the development of skills necessary for green iron production, in particular through a technical college located in Port Augusta. The **Western Australia** Government is investing in skills development to support the energy transition through the Made in WA plan and the development of a Clean Energy National Centre of Excellence (AUD 70.5 million joint federal/state investment) and a Pilbara Based Clean Energy Training and Research Centre (investment through the AUD 140 million Pilbara Hydrogen Hub, a joint federal/state investment).

Comparison with other regions

On the level of the EU, labour questions are prominent when structural changes to the steel industry are on the horizon because the industry employs around 330,000 people in the EU and supports a further 1.6 million jobs in related sectors. The EU's Just Transition Mechanism (JTM) aims to support industries, workers and regions who are most affected by the green transition. It provides funding for up- and reskilling of workers as well as job search assistance, with a total budget throughout 2021-2027 of EUR 19.3 billion (European Commission[61]).

4 Wrapping up and policy considerations

Australia combines strong assets to make the country an important player in the emerging green iron market: a vast potential of iron ore, favourable conditions for boosting renewable energy and hydrogen production and a supportive policy environment, including a broadly shared focus on green iron production as part of Australia's wider industrial policy and national and global decarbonisation efforts. At the same time, there are significant challenges, both domestically and internationally. 'At home', for the considerable ambitions to be realised, policy efforts to enable and incentivise green iron efforts would need to be intensified and executed in a pragmatic and coordinated way across levels of government, in particular in relation to renewable energy and hydrogen availability and infrastructure. This intensification could also include more emphasis on 'carrots', stepping up direct support for consortia of companies entering the green iron space, including foreign investors. But such support measures directly focused on companies should be treated with care. They are not likely to be successful by themselves and would need to be combined with measures that further incentivise actors along the steel value chain. Moreover, it is unlikely that Australia would match the size of policy support offered at other potential green iron locations.

Challenges also exist abroad. A successful green iron strategy in Australia would likely require investment from steel companies outside Australia. While various examples exist of foreign investors exploring the green iron space in Australia, such investment would need to be scaled up and move beyond feasibility stage. This requires effective investment acquisition strategies by both federal and state governments and the strengthening of partnerships with potential investors in Australian green iron production. While Australia has strong relations with countries in the region and an active diplomatic outreach to countries such as Japan, Korea and ASEAN, such efforts could be more concretely tailored to finding customers for green iron, next to enhancing cooperation on decarbonisation and climate. Since uncertainties about demand for Australian green iron in Europe or elsewhere may even be larger, it is important for Australia's green iron strategy to be both ambitious in finding customers as well as realistic. The gap between projections and expectations on the growth of Australian green iron production and expected demand developments currently seems large.

The analysis leads to the following considerations for policy:

a) **Continue and further strengthen the policy focus on green iron**: Australia offers strong advantages for green iron production. It is important for these to be approached with ambition and pragmatism, focusing on those areas where progress is most needed such as ensuring demand for, as well as domestic and foreign investment in, green iron production.

b) **Scale up private investment in a targeted way:** The opportunity in the green iron market is substantial, but Australia's current level of private investment is insufficient to grow a competitive industry. Countries in the MENA region, Europe and Brazil are advancing rapidly, securing funding and infrastructure at a scale that could make them dominant suppliers of green iron in the future. It is important for Australia to accelerate investment in green iron production and hydrogen infrastructure to play a pivotal role in this market. This includes expanding financial incentives, de-risking private investment, and fostering industry-led innovation to position Australian green iron competitively on the global stage. Further, financial support is likely to be more effective if targeted towards a smaller number of well-positioned projects. This is because the required capital is high, and if funds are spread out too thinly, it is possible that no projects will have the critical mass of investment to succeed.

c) **Ensure customer demand to drive investment confidence:** For green iron investments to succeed, they must be backed by clear market demand and long-term commitments from buyers. The global steel industry is undergoing a major geographical realignment, and Australia risks losing ground if it does not align its production capacity with future demand centres. It is important for the government and industry to continue to actively engage with global steelmakers and major industrial offtakers to secure export shares, sending strong signals to investors. Future customers will likely be more receptive to economic diplomacy than to climate diplomacy.

d) **Accompany investors and emerging players administratively and through coordination of infrastructure**: Foreign investors and actors will most likely be necessary for a future Australian green iron industry. A more active approach in bringing these actors in and accompanying them through approvals processes may be needed.

e) **Prepare the ground for green iron to be truly green:** It is likely that natural gas will have a transitional role to play in many green iron projects as hydrogen projects take longer to get off the ground. Nevertheless, it is essential to note that while DRI made using natural gas is lower in emissions than the blast furnace route, it is not a near-zero carbon product, in contrast to H2-DRI. To avoid locking the industry into natural gas usage, the government can make their support contingent on projects being hydrogen-ready (including in regard to their location) and requiring assurances from recipients that they are actively pursuing a transition to green hydrogen as soon as is feasible.

f) **Drive forward the green iron and steel conversation internationally:** As discussed, green iron demand is partly contingent on global decarbonisation efforts including for example carbon pricing and green steel standards. The Australian federal government can help move these forward by being a leader in this area.

g) **Scale up renewable energy generation in key areas:** The necessity of islanded renewable energy systems for green iron production means that renewable resource availability and energy system design become decisive location factors. Only regions where it is economically viable to set up large-scale, off-grid renewable systems will be able to support competitive green iron production. Policymakers must recognise this shift and proactively identify and support the development of these green industrial zones. This includes providing regulatory certainty, targeted infrastructure investment, and long-term planning aligned with Australia's broader decarbonisation and export goals. Choosing key areas with high green iron potential and committing to ensuring the necessary renewable energy generation is built there would provide energy security to investors— green hydrogen plants require renewable energy generation, not renewables potential.

h) **Incentivise value-adding in the Pilbara:** Iron ore producers in the Pilbara currently have too comfortable a business model to take any risks in moving towards green iron production, other than Fortescue who have not yet illustrated how they plan to scale up their Christmas Creek demonstration plant. Iron ore producers will likely not change course unless there are both carrots and sticks from government.

i) **Ensure an effective and efficient multilevel governance approach:** In Australia, both the federal government and state governments are active in the green iron space. Some states, such as South Australia, can be considered frontrunners in this area with relevant lessons being learnt for other states. It is important that policies towards green iron are well coordinated across government levels to ensure effective and efficient outcomes.

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Annex A. List of stakeholders consulted

For the purpose of this case study, virtual and in person meetings were held with over 100 stakeholders in Australia. This included the kick-off meeting for the project on 10 October, where 53 people attended, and the mission to Australia between 25-29 November 2024. Furthermore, a questionnaire was shared with stakeholders providing further information for the study.

The authors are grateful to all stakeholders for sharing information and views on green iron developments. The findings in this study do not necessarily reflect the views of stakeholders and are the responsibility of the authors and the OECD.

Table A A.1. Mission programme

City and dates (2024)	Entities met with
Canberra (25-26 November)	Federal government CSIRO ANU Geoscience Australia Companies and other stakeholders
Adelaide (27 November)	South Australian government HILT CRC Companies and other stakeholders
Perth (28-29 November)	Western Australian government MRIWA Companies and other stakeholders

List of stakeholders

Organisation	**Name**
AMP Energy	Thys Kint, Daniel Kim
Australian Manufacturing Workers' Union	Darcy Gunning, Mark Dean
Australian National University	Jorrit Gosens, Frank Jotzo, John Pye, Fiona Beck, Emma Aisbeth, Annette Zou, Hina Aslam
Australian Steel Institute	David Varcoe, Michael Dawson
Australian Trade and Investment Commission	James Hetherington
BHP	Lily Smith, Ben Ellis
Bluescope	Gretta Stephens, Anna Matsyek, Michael Freislich

Chamber of Minerals & Energy of Western Australia	Linh Nguyen, Adrienne LaBombard, Aaron Walker
Chandran Thinc	Chandran Vigneswaran
Climate Energy Finance	Pollard, Buckley
Climate Change Authority	Louisa Esdaile
Climate KIC Australia	Jason Nielsen
Climate Works	Tomasso Pretto, Kylie Turner
CSIRO	Keith Vining, Adrien Guiraud, Warren Flentje
Curtin University	Helen Cabalu
Department of Climate Change, Energy, the Environment and Water	Bronte Annear, Will Zou, Michael Bartlett
Department for Energy and Mining SA	Saindhav Tamhane, Peter Natrass,
DEMIRS	Joe Wyder, Tim Bateman
Department for Foreign Affairs and Trade	Andrew Jacenko, Nathan Bartlett, James Turner
Department of Industry, Science and Resources	Trent Macri, Belinda Morris, Renee Chilton, Jyothi Gali
Department of Jobs, Tourism, Science and Innovation WA (JTSI)	Katie Cook, Kirstin Berger
Dragoman	David Heard
Fortescue	Tom Parkinson
Geoscience Australia	Andrew Feitz, Kristina Anastasi
GFG Alliance	Alannah MacTiernan, Wayne Harris, Chris Smyth
Green Steel WA	Azlan Ho, Don Johnston, Raj Aggarwal
Greenpeace Australia Pacific	Geoff Bice
HILT-CRC	Jenny Selway, Jordan Parham
Hancock Prospecting	Brian Macdonald
I2I Global	Darren J Godwell

Iron Road	Larry Ingle, Glen Chipman
J2 Advisory	James Choi
Low Carbon Australia	Tristy Fairfield
Magnetite Mines	Lachlan Mackenzie, Gemma Brosnan, Tim Dobson
Mineral research Institute Western Australia	Nicole Roocke, David Trotter
Monash University	Changlong Wang, Stuart Walsh
Mission Possible Partnership	Rachel Howard
Paran Climate Consultancy	Anna Song
Parliament of Western Australia	Jessica Shaw
Pilbara Development Commission	Darren Leitch
Port of Newcastle/University of technology Sydney	Roy Green
Remap Research	James Boven
Rio Tinto	Michael Buckley
Smart Energy Council	Joanna Kay
Springmount Advisory	Rowan Moorey. Tom Quinn
Sunrise Project	Mark Wakeham
Superpower Institute	Ross Garnaut, Baethan Mullen, Chris McMahen
UniSA	Al Rainnie
University of Adelaide	Joanna Kay
University of New South Wales	Rob Dickinson
World Wildlife Fund	Nicole Wyche
Zen Energy	Anthony Garnaut, Geoff Titus

Annex B. Approach to the case study

This annex discusses in detail the approach taken in the case study. It includes a literature review, followed by an explanation of the methodology used in analysing green iron markets.

An evolving literature on green iron, in particular in Australia

3. Although still at an initial stage, there is a growing body of research on developments in green iron markets, in particular the relocation of green iron production in a climate context (Vogl, Ahman and Nilsson (2018[62]) Gielen et al. (2020[63]) Wilmoth et al. (2024[64]) Verpoort (2024[65]) Samadi et al. (2023[66]) Lopez et al. (2023[67]) Trollip et al. (Trollip, McCall and Bataille, 2022[68]), Devlin et al. (2023[69]) Pimm et al. (2021[70]) Witecka et al. (2023[71]) Rosner et al. (2023[72]) IEEFA (2024[73]), Renewable Energy Institute (2023[74]) Bilici et al. (2024[75]) Devlin et al (2022[76]) Bataille et al. (2024[77]), Karkare and Medinilla (2024[78]), Algers and Bataille (2025[79]). The studies mostly find that green iron production and exports/imports are expected to become a cost effective and central element of steel decarbonisation pathways and supply chains in the near future and that low renewable electricity prices constitute the key driver for green iron production locations and trade, next to favourable policy settings.

4. Among this emerging literature, developments in Australia have by far received the most attention, including through a flurry of reports and papers by universities, think tanks, civil society organisations and industry organisations in Australia itself during 2024. In part, these papers were produced in response to a consultation launched by the Australian Department of Industry, Science and Resources in May 2024 , which called on stakeholders to reflect on green metal opportunities in Australia in line with the industrial policy initiative “A Future made in Australia” launched in April 2024 (Government of Australia, 2025[80]). The Australian Government also commissioned further research, such as a feasibility study by the University of New South Wales on green metals exports from Australia to Germany (Daiyan et al., 2024[8]). The Australian Renewable Energy Agency (ARENA), in cooperation with the Australian National University, CSIRO, and others, also launched a green iron research project in 2024 (ARENA, 2024[81]). Geoscience Australia developed the Green Steel Economic Fairways Mapper as a resource to assess different geographies according to their suitability for green steel/iron production (Haynes et al., 2024[82]) and published research on green iron related supply chain options between Australia and Japan (Wang et al., 2024[83]).

5. State governments, in particularly South Australia, played a role as well in commissioning research (for instance Wang et al. (2024[84])) as well as in launching an expression of interest (EoI) on green iron in June 2024, inviting parties across the steel value chain to come forward with proposals (Government of South Australia, 2024[85]). In Western Australia, the Mineral Research Institute of Western Australia plays a central role in green iron research, for instance through its analysis of five green steel pathways in Western Australia, three of which focus on green iron (Mineral Research Institute of Western Australia, 2023[86]), with a new study on green iron forthcoming.

6. Various Australian universities have set up research programmes on green iron, including Monash University (see for instance Wang et al. (2023[31])), the University of New South Wales (Daiyan et al., 2024[8]), the University of Western Australia (Rhee et al., 2024[87]), the Australian National University and the University of Adelaide. In part, this research was also developed under the umbrella of the Heavy

Industry Low-carbon Transition Cooperative Research Centre (HILT-CRC), a collaborative venture that brings together industries, researchers, and government organisations on decarbonisation (Heavy Industry Low-carbon Transition Cooperative Research Centre, 2025[88]), which includes various dedicated research projects on green iron and iron ore.

7. Various think tanks and civil society organisations also prepared green iron reports. The Superpower Institute, an influential not-for-profit organisation "dedicated to helping Australia seize the extraordinary economic opportunities of the post-carbon world" produced a report (Finighan, 2024[7]), that focuses on the new energy trade, and how renewable energy availability in Australia helps pave the way for low carbon intermediate good exports ('embedded green energy') from Australia, including green iron. A more recent report by the Superpower institute sets out a comprehensive strategy for establishing Australia as a global leader in green iron production, outlining the economic case, policy actions, and investment priorities needed to unlock industrial decarbonisation and capture new export opportunities (The Superpower Institute, 2025[89]).

8. A study by WWF Australia (Bowen and Wyche, 2024[90]) maps economic opportunities for Australia in green iron production and exports and explores how this can contribute to wider steel decarbonisation efforts in Asian steel producing economies. The study also includes recommendations for policy. (WWF/Deloitte, 2025[91]) argues that it is imperative that the Australian Government positions itself for a rapid transition to green steel-making and that Australia's economic opportunities from green iron will be determined by the pace of renewable deployment and the scale-up of Asian carbon pricing. A further WWF study looks at green iron developments in South Australia (WWF and Low Carbon Australia, 2024[92]).

9. A report prepared for Greenpeace Australia Pacific (Springmount Advisory, 2024[10]) analyses the potential for green iron production in Western Australia, suggesting three interconnected scenarios starting with green iron production for local steel markets, to then move to exports to Japan, Korea and Chinese Taipei and the People's Republic of China (hereafter China).

10. A report by Climate Energy Finance (Pollard and Buckley, 2024[6]) suggests that as an early mover in green iron production, Australia could generate AUD 174 billion in Australian exports from value-added iron, and provides policy recommendations to realise this, with an emphasis on policy efforts to strengthen linkages with other economies. The Institute for Energy Economics and Financial Analysis (IEEFA) produced various reports on the topic, (Basirat and Nicolas, 2024[93]) showing both the potential of green iron for Australia as well as the challenges it faces given competition from other countries. A report by Springmount Advisory (Springmount Advisory, 2024[10]) formulates 10 requirements for scaling export-oriented green iron production in Western Australia, including through the establishment of an Australasian Green Iron Corporation. A further study by Accenture (Accenture, 2023[94]) analyses opportunities for Australia in clean exports, including green iron.

11. Finally, various companies and industry organisations have launched or commissioned research on green iron, in part in response to the federal consultation mentioned before and South Australia's expression of interest[1]. For instance, a study undertaken by Mandala (Mandala, 2024[95]) for the Chamber of Minerals and Energy Western Australia (CME) underlines green iron opportunities, but also the need for enhanced policy action to realise this.

12. Although the various reports produced differ in focus and methodology, they all lead to similar conclusions. First, they all point at the considerable opportunities for Australia in moving towards green iron production and exports. Second, they underline the need for policy efforts to be intensified, in particular with respect to renewable energy production, hydrogen and trade but also direct support for companies. Third, the studies almost all combine an economic and an emission reduction perspective on Australia's green iron opportunities, both 'at home' and abroad, taking the view that such business and climate

[1] See for instance ZEN Energy (2025[97]).

objectives are well-aligned. Fourth, with a few exceptions, they take a supply side perspective, focusing on opportunities and challenges in Australia itself, and less on the global market and policy environment in which these opportunities would need to take shape.

Approach and methodology for the case study

13. The added value of this case study on Australia does not lie in providing insights on green iron developments in Australia itself, which has been well-documented in the various studies discussed. Rather, this case study aims to put developments in Australia in an international perspective, not only benchmarking these Australian policies and market developments against developments elsewhere, but also zooming in on (necessary) linkages of Australia with other countries that are essential for the green iron developments in Australia to succeed.

14. With international benchmarking and linkages perspective in mind, the approach taken in this case study is outlined below. Developments in green iron production, investment and trade are approached as the result of strategies and actions undertaken by companies across the steel value chain in terms of their investments, purchases and sales, technology choices and partnerships. The case study focuses on three types of companies in this respect:

- **Iron ore miners and producers**: These companies traditionally produce and export direct shipping ore to various markets. In the green iron space, they have different options. They may continue exporting ores or start iron ore beneficiation to make their products more suitable for DRI exports, or other technology routes to make iron ore more suitable for steel decarbonisation. Upstream producers may focus on establishing DRI/HBI production themselves and seek markets to sell green iron, or seek partnerships with offtakers in steel production (and/or jointly invest) to produce DRI/HBI there.
- **Steel companies**: (Integrated) steel companies may consider transforming their BF into DRI themselves, continuing to buy/import ore. Alternatively, they may opt for buying green iron on the market from Australia or elsewhere or enter into partnerships (or invest) in DRI production elsewhere. In other words, they may opt for 'make' at home, 'make' abroad via foreign direct investment, partnerships, joint ventures or simply buy and import.
- **Emerging players**: These are typically younger companies that may own a specific technology that is conducive for green iron production. Such companies, often in partnership, will likely seek opportunities to be first-of-a-kind movers in emerging green iron production regions, leveraging technological comparative advantages from that of existing production pathways. They may also license their technologies to others.

15. The approach taken in this case study postulates that the strategies of these three archetypes do not take place in a vacuum but are driven by four main elements:

- **Raw material availability**: Green iron production requires access to iron ore of relevant quality and price for green iron making. Companies may take advantage of developing green iron production in proximity to suitable green iron resources or at locations where imports of green iron ore are feasible at competitive costs.
- **Renewable energy**: Green iron production requires access to sufficient and competitively priced supply of renewable energy. As the emerging literature shows, such availability of renewable energy is a key factor in location decisions by companies on green iron production. Countries/companies may also opt for importing renewable energy, for instance in the form of

hydrogen, but it is widely considered that seaborne hydrogen will not be cost-competitive due to losses in energy at the points of liquification and re-gassification.

- **Demand considerations**: Green iron production requires sufficient current and future demand for green iron, as well as the necessary infrastructure to transport green iron to customers. A key factor within company strategies towards green iron production and its location is therefore the question if and where customers can be found for the green iron produced.
- **Policy setting**: The literature clearly shows that green iron production requires a supportive policy environment. However, countries at different positions along the steel value chain may take different policy approaches and may compete to attract green iron production and/or directly or indirectly favour or discourage green iron imports, exports and investment. Company choices on the location of green iron production are influenced by this variety in policy settings across countries.

Each of these four elements is crucial for better understanding the strategies companies undertake in the green iron space and the future directions of green iron production and trade globally. The paper will discuss green iron production and trade and the company strategies underlying this, as well as the four factors that drive this, from an Australian perspective, against the background of how these developments work out globally.

Annex C. The Australian green iron ecosystem

Table 3. A mapping of the Australian green iron ecosystem

	Green iron ambition	Raw material availability	Renewable energy	Demand
Iron ore producers				
BHP		Hematite: Current production of 300 Mtpa. Goal of 330 Mtpa with planned expansions. Magnetite: No production	Goal of 550 MW of wind, solar, and battery storage in the Pilbara for electrification of mining operations.	For export, mainly to China.
Fortescue	☑	Hematite: Current production of 200 Mtpa. Magnetite: Current production of 1.6 Mt per quarter concentrate. Goal of 22 Mtpa by end 2025.	Current production of 60 MW through solar farm at the Chichester Hub powering the Christmas Creek and Cloudbreak mining operations. Goal of 190 MW solar farm at the Cloudbreak mine to decarbonise mining operations, and a Green Energy Hub at Christmas Creek with green hydrogen generated on-site (current electrolyser is 1.4 MW). Goal of additional 2-3 GW of renewable energy and battery storage by 2030.	Iron ore is exported mainly to China. Customers not yet identified for green iron but this would include the domestic market.
Hancock Prospecting		Hematite: Current production of 107 Mtpa. Goal of for 129 Mtpa total. Magnetite: No current production. Goal of 12 Mtpa with Bevan Project (51% owner).	No disclosed projects.	For export, mainly to China.
Rio Tinto		Hematite: Current production of 331 Mtpa. Goal of 400 Mtpa in the coming years. Magnetite: No production.	Goal of 80 MW solar farm near Karratha; two 100 MW solar farms and 200 MWh Battery Storage in the Pilbara.	For export, mainly to China.
Steel companies				
Bluescope	[2]	Hematite: Currently purchase mostly from Rio Tinto Pilbara operations.	Current purchase agreement with the 174.9 MWp Finley Solar Farm in NSW.	Steel produced within Australia is predominantly

[2] Bluescope is not significantly focused on green iron production but is partnering with BHP and Rio Tinto to build an Electric Smelting Furnace (ESF) Pilot Plant in Kwinana to produce 30-40,000 tonnes of DRI (initially using natural gas with announced intentions to transition to green hydrogen) with the goal of demonstrating the suitability of Australian hematite ores in a DRI-ESF process.

				consumed domestically
Liberty Primary Metals Australia **(information relates to before Whyalla steelworks and related assets put into administration in February 2025)**	☑	Hematite: GFG Alliance owns SIMEC Mining which supplied Whyalla Steelworks. Magnetite: Current production of 2.3 Mtpa. Goal of 7.5 Mtpa.	Current assets: 15-year power purchase agreement for 15 MW with the 128 MW Numurkah Solar Farm in Victoria. Planned: a proposed 280 MW solar farm near Whyalla; a planned 100 MW battery project in South Australia; conversion of the Iron Duchess mine into a 90 MW pumped hydro energy storage facility; Government-owned Whyalla Green Hydrogen Hub with 250 MW electrolyser, a 200 MW hydrogen-fueled power station, and a 100-tonne renewable hydrogen storage facility.	For domestic sale and export to Asian and European countries
POSCO	☑	Hematite: 25% stake in Hancock Prospecting Roy Hill mining operation, producing 60 Mtpa of iron ore, 16 of which are supplied to POSCO. The Port Hedland Iron project (PHI) will use beneficiated magnetite concentrate from Pilbara mining operations	Partnership with ENGIE for a pre-feasibility study for a green hydrogen plant.	Most of For use in Korean steelmaking operations
Emerging players				
Green Steel WA	☑	Magnetite: No current production. Goal of integrated magnetite mines purchase in the Mid-West of WA.	Partnership with POSCO and ENGIE on a pre-feasibility study for a renewable hydrogen project in the Pilbara.	For domestic sale and export to Thailand
Green Iron SA (consortium)	☑	Magnetite: No current production. Planned 5 Mtpa with the Razorback Iron Ore Project..	No disclosed projects.	For domestic and export
Iron Road (consortium)	☑	Magnetite: No current production. Goal of 24 Mtpa.	Planned: partnered with Amp Energy to develop hydrogen production within the 1,207-hectare Cape Hardy Industrial Port Precinct which aims to establish up to 5 GW of renewable energy capacity over the next decade. Partnership with Vestas exploring the integration of wind power to supply green electricity for the CEIP.	For domestic and export
PGS	☑	Hematite: No current	No disclosed projects.	For export

		production. Goal of purchasing mines in Karara to supply the plant once beneficiated on site.		

Sources: https://www.bhp.com/what-we-do/products/iron-ore ; https://metals.fortescue.com/en/articles/fortescue-s-iron-bridge-magnetite-project-marks-first-ore-into-processing-plant ; https://www.hancockprospecting.com.au/projects/mining/ ; https://www.riotinto.com/en/news/releases/2024/rio-tinto-releases-fourth-quarter-production-results ; https://reneweconomy.com.au/bhp-plans-550mw-of-wind-solar-and-storage-as-pilbara-mines-go-electric ; https://www.riotinto.com/news/stories/pilbara-renewables ; https://neoen.com/en/news/2018/neoen-franchit-le-cap-du-gigawatt-en-australiegigawatt-milestone-passed-for-neoen-in-australia-after-numurkah-solar-farm-reaches-financial-close ; https://www.pv-magazine.com/2019/05/14/guptas-280-mw-cultana-solar-farm-waved-through-in-australia ; https://www.gfgalliance.com/about-us/energy/ ; https://arena.gov.au/news/south-australias-iron-duchess-mine-given-new-life-90mw-pumped-hydro-plant/ ;

End notes

[1] "Green iron" refers to iron production achieved through reduction/beneficiation methods (mainly H2 - reduced DRI/HBI) that utilise renewable energy resources as main primary input.

[2] In India, DRI projects appear to be mostly coal-based.

[3] According to the worldsteel 2023 ranking (Worldsteel, 2023[96]).

[4] According to EUROFER, 98 per cent of global iron ore production is consumed by the steel industry (EUROFER, 2013[98]).

[5] See (Government of Australia, 2025[101]). Under the reformed Safeguard Mechanism, these baselines are set to decline by 4.9% each year through to 2030, aligning with Australia's commitment to reduce emissions by 43% below 2005 levels by 2030 and to achieve net-zero emissions by 2050. Facilities that exceed their baselines are required to manage their excess emissions, which can involve measures such as purchasing carbon credits or investing in emissions reduction technologies.

[6] See (Nippon Export and Investment Insurance, 2024[99]).

[7] See (DatamarNews, 2024[100]).