WORLD ECONOMIC FORUM

Unlocking Asia-Pacific as a First Mover: Australia's Green Iron Opportunity

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Preface

Noam Boussidan
Programme Head,
First Movers Coalition,
World Economic Forum

The First Movers Coalition (FMC) is the world's largest private-sector demand signal for deeply decarbonized industrial products. Currently encompassing seven "hard-to-abate" sectors responsible for 30% of global emissions, FMC counts more than 100 active members who have committed to $19 billion of clean demand per year, equating to 26 million tonnes of annual emission reductions by 2030.

The coalition also counts 14 governments as members, including the Australian Government. Regional engagement is a cornerstone of FMC's work, with workshops convened in India, Brazil, South Africa, the United States, Japan and Australia, and an upcoming session planned for East Asia in early 2026 to advance regional pathways for industrial decarbonization.

In August 2025, the FMC hosted a landmark two-day workshop in Adelaide to unlock Australia's potential as a first mover in green iron and position the Asia-Pacific region as a leader in clean industrial exports. The workshop, supported by Boundless Earth and co-hosted with Greenhouse, brought together more than 150 senior leaders from business, government, finance, philanthropy, academia and NGOs.

The workshop's timing was highly pertinent. A month earlier, Prime Minister Anthony Albanese met with China's President Xi Jinping where both sides agreed to establish a new policy dialogue on steel decarbonization. A few weeks after the workshop, the Australian Government announced its new climate target to reduce emissions by 62-70% by 2035.

Australia has compelling strategic, commercial and climate reasons to transform its iron ore industry into a global low-carbon leader. Green iron would help hedge against the risk of falling revenues from coal and gas – its other major export earners – as key markets in East Asia head towards net zero. It has the potential to double Australia's current iron ore export revenues. And it could abate up to 4% of global emissions by mid-century – four times Australia's emissions today.

But with low-carbon competitors crowding in and climate impacts mounting, the window is closing fast. The workshop highlighted the urgent opportunity for government and private sector to work towards securing financial close on one or two commercial-scale "Lighthouse" green iron projects by the end of 2027. As Australia pivots towards its new climate ambition and seeks to demonstrate leadership by COP31, this inspiring goal has the potential to position the country as a key global actor in the net-zero economy.

This report outlines pathways for public and private sector actors to seize the opportunities of green iron and overcome key challenges. Informed by the insights of workshop participants and wide-ranging research, it shows how Australia in partnership with the Asia-Pacific region can move towards a more prosperous, resilient and net-zero industrial future.

Executive summary

Australia has a choice – continue fuelling its carbon-intensive iron ore industry and risk it becoming a stranded asset, or embrace the "green iron" opportunity.

Urgent progress by 2030 is critical – the window of opportunity is closing

Australia supplies more than half the global trade in iron ore, the raw ingredient need to make steel – but the industry faces a turning point. As East Asia decarbonizes, demand is predicted to shift from raw ore to low-carbon "green iron." Iron ore exports earned AU$138 billion in 2024 – making it Australia's largest export earner (21% share). Converting ore into low-carbon direct reduced iron (DRI) with renewable energy and hydrogen could double this revenue to AU$250 billion a year, while offsetting the likely decline of Australia's other two biggest exports – coal and gas (14% and 10% share respectively).

Iron and steelmaking account for 7-9% of global emissions. Australia, with the world's largest iron ore reserves plus its significant potential for low-cost renewables and existing export infrastructure, could export enough green iron to abate up to 4% of world emissions – four times its own – with a 40% share of the market. There is no time to lose: Brazil, the US and the Middle East are racing ahead with subsidies and fast-track approvals to claim a larger share of the green metals market.

At a workshop on the green iron opportunity, organized by the World Economic Forum's First Movers Coalition (FMC) in Adelaide in August 2025, over 150 public, private and philanthropic participants highlighted the urgency for the government and industry to collaborate on boosting supply chain readiness and ensuring several "Lighthouse" green iron projects reach financial close by the end of 2027.

Transforming existing ores into low-carbon DRI requires major investment and risk-sharing

Australia's hematite ore dominates exports but requires costly beneficiation to suit DR processes. Magnetite ore is easier to convert into green iron, but is currently mined in small quantities. Workshop participants overwhelmingly backed hydrogen- rather than gas-based DRI or carbon capture.

More than 20 magnetite concentrate and pelletizing projects are proposed or operating, while innovators are piloting electro-winning. These technologies could allow Australia to export high-purity hot-briquetted iron (HBI) to Asian electric-arc furnaces to produce near-zero emission steel. The price tag ranges from $6-10 billion to build a commercial-scale green iron plant – but private capital will not invest without demonstrated market demand, policy certainty and government finance to share the risk.

Government and industry need to collaborate on funding, permitting and demand

Industry insiders at the workshop highlighted three key enablers to accelerate progress on Australia's green iron opportunity: scaled-up funding, streamlined permitting and more robust demand signals.

The government is ramping up financial support for its new Net Zero Plan, which targets a 62-70% emissions cut from 2005 levels by 2035. The Future Made in Australia Act allocates AU$22.7 billion for clean industries, including AU$1 billion for a Green Iron Investment Fund and AU$2.7 billion for the Hydrogen HeadStart programme, while an additional AU$5 billion has been earmarked for a Net Zero Fund to support low-emissions technologies. Participants urged the government to commit more concessional finance and incentives to help de-risk infrastructure development and bridge the green premium.

The workshop heard how hampered the industry is by onerous, bureaucratic permission procedures, leading to heavy delays in the rollout of essential renewable energy infrastructure, particularly in the iron-ore heartland of the Pilbara.

Robust demand signals were highlighted as critical to get the green iron industry on its feet. Government can play an important role with green procurement, but so too can industry by committing to long-term offtake agreements. Downstream companies in construction, automotive, aviation and consumer goods sectors play a key role in aggregating demand for near-zero emissions steel, including through platforms such as the FMC.

Green iron's credibility hinges on clean logistics

Leading mining companies have started to decarbonize their transportation, ordering battery-electric fleets of haul trucks and chartering dual-fuel bulk carriers that can operate on either bunker fuel or green alternatives. This could significantly reduce the emissions from shipping Australia's iron ore the 6,500 km from Pilbara to East Asia.

The government has agreed to create green shipping corridors with Korea and Singapore. Meanwhile, private sector companies are developing a green shipping corridor from Western Australia to East Asia specifically for iron ore. As part of this, Pilbara Ports' Clean Fuel Bunkering Hub aims to transition the bulk carriers calling at its ports to lower-carbon ammonia, which could reduce emissions by up to 94%. But more investment is needed in safe bunkering infrastructure for ammonia and methanol, as well as clearer regulations and workforce training.

The private sector also has a role to play in generating demand for low-carbon transportation. As well as its steel commitment, FMC aggregates commitments for near-zero emissions trucking and shipping from some of the world's largest companies.

Five priority actions for 2026–27

The strongest call from industry experts attending the FMC's workshop was to accelerate one or two Lighthouse green iron projects to financial close by the end of 2027 and achieve commercial operations before 2030. This ambition would match the scale of the opportunity and enable Australia to demonstrate climate leadership by COP31. Progress depends on five coordinated actions during FY2026-27:

1. **Expand supply-side incentives.** Current government funding is welcome but insufficient to transform Australia's most valuable export industry. Government could provide additional support in the form of grants, de-risking instruments and a green iron production tax credit, closing the cost gap with fossil iron.

2. **Boost public and private demand.** Government could mandate green procurement for 50% of the 8 Mt of steel needed for federal infrastructure by 2028. Private offtake can be ramped up by voluntary platforms (e.g. First Movers Coalition, RMI's Sustainable Steel Buyers Platform).

3. **Fast-track approvals for renewable energy.** Apply an "overriding public interest" test and one-window approvals to streamline permissions for the renewable energy and green hydrogen infrastructure essential to decarbonize Australia's iron ore industry.

4. **Certify what counts as green.** Ensure definitions of emissions limits, accounting standards and certification for green iron are aligned with international frameworks. Launch a credible book-and-claim system for traceable clean-commodity certificates.

5. **Strengthen regional trade partnerships.** Treat green iron as a two-way trade and investment opportunity that enables shared growth across Asia. Align on carbon pricing, certification and green corridor development to advance low-carbon iron and steel value chains.

1 Australia's strategic green iron opportunity

As key markets in East Asia decarbonize, Australia could hedge against falling coal demand and double iron ore export revenues by decarbonizing production.

1.1 Green iron could boost export revenues and hedge against declining coal and gas sales

> **The global shift to clean energy represents one of the biggest economic transformations since the Industrial Revolution – and it presents Australia with an enormous economic and jobs opportunity.**
>
> Prime Minister Anthony Albanese, 18 September 2025

Iron is central to Australia's economy – its principal export commodity is iron ore, consistently contributing over 25% of total energy export earnings.[1] In 2024, Australia exported 866 million tonnes, accounting for ~56% of the global trade in iron ore and earning AU$138 billion in export revenues.[2]

However, as the net-zero targets of major importers from Europe to Japan approach, global demand for green iron and steel is predicted to grow. As a result, the export value for Australia is shifting from raw ore to green iron. If Australia were to become a global leader in green iron, it could double the export revenues it earns to more than AU$250 billion per year.[3] More conservatively, in September the Australian Government's Treasury said that "export revenue from green commodity sectors is projected to reach $178 billion in 2050, provided there is effective coordination, strong ambition and steady technological progress".[4]

Green hydrogen offers another low-carbon export opportunity for Australia. Concerns around its safety and storage mean hydrogen is more viable as an "indirect export" – for example, when used domestically to convert iron ore into green iron or to produce low-carbon transport fuels, such as green methanol and ammonia.

Thermal and metallurgical coal are the nation's second-largest export, with ~360 Mt of trade volume generating ~AU$114 billion in 2023. But as with carbon-intensive iron ore, coal exports are increasingly exposed to global decarbonization and expected to face long-term decline. The International Energy Agency (IEA) projects global coal exports to fall at least 35% by 2040 and up to 80% by 2050 under current international climate commitments.

Green iron and green hydrogen derivatives offer Australia a strategic hedge against the decline of its coal and gas exports, plus a path towards industrial transition. Capturing even one-third of the green iron opportunity would more than replace the nation's falling thermal coal revenues, according to research by BCG specially commissioned for this workshop.[5]

BOX 1

Fast facts on Australia's green iron opportunity

- Australia is the world #1 exporter of iron ore, with 56% market share.
- Iron ore is Australia's biggest export earner, generating AU$138 billion in 2024 (21% share of exports), followed by coal (14% share) and natural gas (10% share).
- Australia's huge iron ore reserves (58 Gt, 31% of world reserves), low-cost renewables (82% by 2030 target), established infrastructure and export markets position it to lead the world in green commodity production.
- Iron and steel making emit >3.6 billion tonnes of CO_2/year – 7-9% of global emissions. Australian green iron exports could slash 4% off global emissions – 4x the country's own emissions.
- By embracing green iron, Australia could double its iron ore export revenues to >AU$ 250 billion/year.
- Failure to pivot to green iron could halve Australia's export revenues, as China (which buys 86% of its ore), South Korea and Japan pursue net zero and align carbon markets.

Sources: see endnote.[6]

1.2 Climate impacts strengthen case for decarbonization

The workshop opened with a powerful reminder from the keynote speaker that reaching net zero by 2050 would only stabilize, not reverse, current damage levels. Every decade since the 1950s has been warmer than the one before – and Australians are now feeling the impacts with increasing regularity:[7]

- In 2019-20, "Black Summer" bushfires killed 33 people, destroyed more than 3,000 homes and burned over 24 million hectares of land, costing the Australian economy an estimated $10 billion.
- In 2022, the people of the Northern Rivers region experienced record rainfall and floods that led to $3.5 billion in insured losses.
- In 2025, the Great Barrier Reef experienced its sixth mass bleaching in 10 years.
- In recent years, Australians have been forced to move location almost quarter of a million times due to climate-related disasters.[8]
- By 2050, more than 1.5 million Australians will live in areas at high risk of coastal flooding, with disaster costs projected to top AU$40 billion/year – even in a 1.5°C scenario.
- By the 2060s, up to 2.7 million working days could be lost each year to climate impacts.

At a global level, steelmakers need to halve emissions by 2050 to meet international climate goals, according to IEA.[9] The iron and steel industry accounts for ~7-9% of annual global anthropogenic CO_2 emissions, amounting to ~3.6 Gt (billion tonnes) of direct and indirect CO_2 emissions per year – more than any other heavy industry.[10]

The traditional blast furnace process to reduce iron ore to metallic iron accounts for roughly 70% of the CO_2 emitted during primary steel production.[11] So decarbonizing iron is vital to reduce steel's overall emissions. Various technologies exist, but all depend on large amounts of renewable energy.

Australia has the potential to become a major player in the net-zero global economy. Its exports of green iron ore could mitigate the equivalent of ~4% of 2021 global emissions by mid-century (based on 40% global market share) – four times Australia's 1% share of the world's emissions.[12,13] Such a move would align closely with Australia's new 2035 climate goal, announced a month after the workshop, to reduce greenhouse gas emissions by 62-70% compared to 2005 levels.[14]

> **Climate change is causing severe and escalating damage, especially in Australia, which is among the most impacted developed nations; delays to 2060 or 2070 will lead to more severe and irreversible harm.**
>
> Keynote speaker

1.3 Australia's edge on the competition

Australia is uniquely positioned to embrace the green iron opportunity and reinforce its status as an economic and clean-tech superpower for several reasons:

- **Clean electricity generation and distribution:** Australia has potential to further utilize huge land areas, coupled with low seasonal weather variations, which offer world-leading opportunities to invest in large-scale, consistent, low-cost wind and solar power generation. The country has a national target to source 82% of its electricity from renewables by 2030. Cost projections per MWh are the most competitive in the world, outside the Middle East and North Africa.[15]
- **Large reserves of minerals** needing high-energy processing: in particular, Australia holds the world's largest reserves of iron ore – around 58 Gt of economic demonstrated resources (31% of the world's reserves).[16]
- **Established export infrastructure:** the country's existing ports, rail networks and bulk terminals are already optimized for iron ore exports. Regional export clusters, including Whyalla in South Australia and Pilbara in Western Australia, are beginning to co-locate green iron facilities near ports to reduce costs and emissions.
- **Proximity to Asian steel markets and value-add potential:** Australia already produces 35% of the world's iron ore, with established export corridors to East Asian buyers such as China, Japan and South Korea. These markets are looking to hit their emissions reduction goals and boost sustainable manufacturing, offering a valuable opportunity for Australia to transition into exports of green iron and zero-carbon fuels.
- **Emerging policy support:** Australia's federal government has launched several funds under its net-zero strategy and Future Made in Australia legislation, amounting to billions of dollars of support for the green iron and hydrogen industries (see Chapter 2.2).[17]

Where Australia has less of a competitive edge is in low-carbon steelmaking. Its production costs greatly exceed those of leading producers such as China; domestic demand is weak and the country lacks the cheap scrap metal needed to start decarbonizing its steel production.

The opportunity lies in utilizing new clean technologies to supply high-quality, green hot-briquetted iron (HBI) to existing Asian electric arc furnaces (EAFs), which can melt it using renewable energy into deeply decarbonized steel. Exporting high-value green iron, rather than duplicating downstream steel assets, offers Australia the fastest pathway to monetize its strategic edge in iron ore deposits and renewables.[18]

1.4 Urgency of opportunity requires action now

> **2030 is not far away – the window to act is open now! If we miss it, we lose more than market share, we lose trust, time and talent.**
>
> Workshop participant, synthesis discussion

A sense of urgency pervaded the Adelaide workshop, as global competition for clean decarbonized industrial products accelerates. According to one participant, Australia is in a race to compete with Brazil, Canada, the Middle East and US, all of which have the same opportunities as Australia. "If you look at Texas, then we're losing the race," he said, given their existing infrastructure, access to large power markets, hydrogen funding and federal incentives.

The next UN Climate Conference (COP30) in November would be an ideal venue to lock in new projects for Australia, especially if Adelaide wins the bid to host COP31 in 2026. By acting fast, Australia also has a chance to shape emerging global green steel standards and supply chains.

2 Green iron landscape in Australia

Participants voted firmly in favour of a green hydrogen DRI pathway – an approach backed by the government.

2.1 Australia's iron industry and low-carbon pathways

> **The creation of a green metals industry in Australia is not a "nice to have". It is absolutely essential to our national security.**
>
> Elizabeth Thurbon, workshop participant[19]

Australia's iron ore and steel sector status

Hematite and magnetite – a tale of two ores

Of Australia's 58 billion tonnes of "economically demonstrated resources" (EDR) of iron ore, hematite comprises 58%, while 41% is magnetite.[20] To date, however, most (95%) of the country's iron ore exports have been hematite, because it is considered high-grade in terms of iron content; in addition, it can be mined, crushed and screened with minimal processing before being fed into blast furnaces. This makes it cheap and fast to produce and export at scale.

Two-thirds of the country's hematite is found in the rocky ridges and plateaus of Pilbara in Western Australia (WA), where it is known as "direct shipping ore" (DSO).[21] Hematite DSO exports from Pilbara are among the lowest-cost iron ore operations in the world, due to the industry's huge operational scale, simple processing and efficient rail/port infrastructure.

Meanwhile, magnetite ore, while containing a higher percentage of natural iron content, is usually considered lower-grade in raw form due to the presence of impurities.[22] To make it commercial, it must be beneficiated, ground finely and magnetically separated into concentrate or pellets. This process requires expensive, energy-intensive processing plants, pushing up both capital and operating costs. Consequently, Australia's iron ore industry since the 1960s has been built around bulk hematite exports from WA.

However, Australia's vast and largely untapped magnetite reserves – historically uneconomical to mine and process – have become more attractive with the rise of direct reduction technology, where iron ore is reduced to metallic iron at temperatures below the metal's melting point. This process, which can use natural gas or hydrogen, avoids the need for highly-emitting coke-powered blast furnaces. Once magnetite has been processed into concentrated pellets, the result is a very high-purity, consistent feedstock that is more suitable for the direct reduced iron (DRI) process than hematite.

Gas-based DRI using magnetite concentrate is a long-established commercial pathway. However, processing Australia's abundant hematite ores into a state ready for DRI requires novel beneficiation and electric smelting furnaces (ESFs) that are still at pilot stage.[23]

Technology pathways towards green iron and steelmaking

The so-called "porous iron" that results from the DRI process needs to be further compressed into dense briquettes while hot (~650 °C). This creates hot briquetted iron, which is 90-94% Fe and ideal as a feedstock in the production of steel using EAFs. To compete in the global low-carbon steelmaking sector, the consensus among the Adelaide workshop participants was that Australia needs to move up the value chain from exporting raw iron ore to exporting DRI-processed green HBI.[24]

When both the DRI process and EAFs are powered by green hydrogen and renewable energy respectively, the result is near-zero emissions steel. However, this process requires a substantial amount of renewable energy. A lively debate arose during the workshop between those arguing for the need to leapfrog directly to green hydrogen-fuelled near-zero emissions DRI and those promoting gas as a phased transition fuel towards lower-emissions DRI (see Box 2).

BOX 2 | Gas vs. hydrogen – pros and cons of two pathways to lower-emission iron

Some participants maintained that using gas as a transitional fuel can rapidly reduce emissions, while infrastructure and renewable generation ramp up. Carefully structured contracts for gas supply can prevent long-term lock-in and support a staged decarbonization pathway that eventually integrates hydrogen and other renewables.

Others argued that if a green premium is being charged then the product must be truly green and trusted, i.e. near-zero or low-emissions in line with IEA definitions.[25] For green iron specifically, that points to iron made with renewable energy and green hydrogen rather than gas.

Using gas-based DRI/EAF results in ~1.4 tonnes of CO_2 per tonne of steel produced – about 35-40% less than the ~2.2 tonnes of CO_2/t released by the traditional coal/coke-based BF-BOF process.[26] But this is still far more CO_2 than production based on renewable power with inputs of either scrap steel or green iron.

The benchmark used by the First Movers Coalition for its steel commitment requires that near zero-emissions steel should emit less than 0.4 tonnes of CO_2-equivalent per tonne of crude steel produced, falling to just 0.05 tonnes of emissions if 100% of inputs are scrap steel.[27]

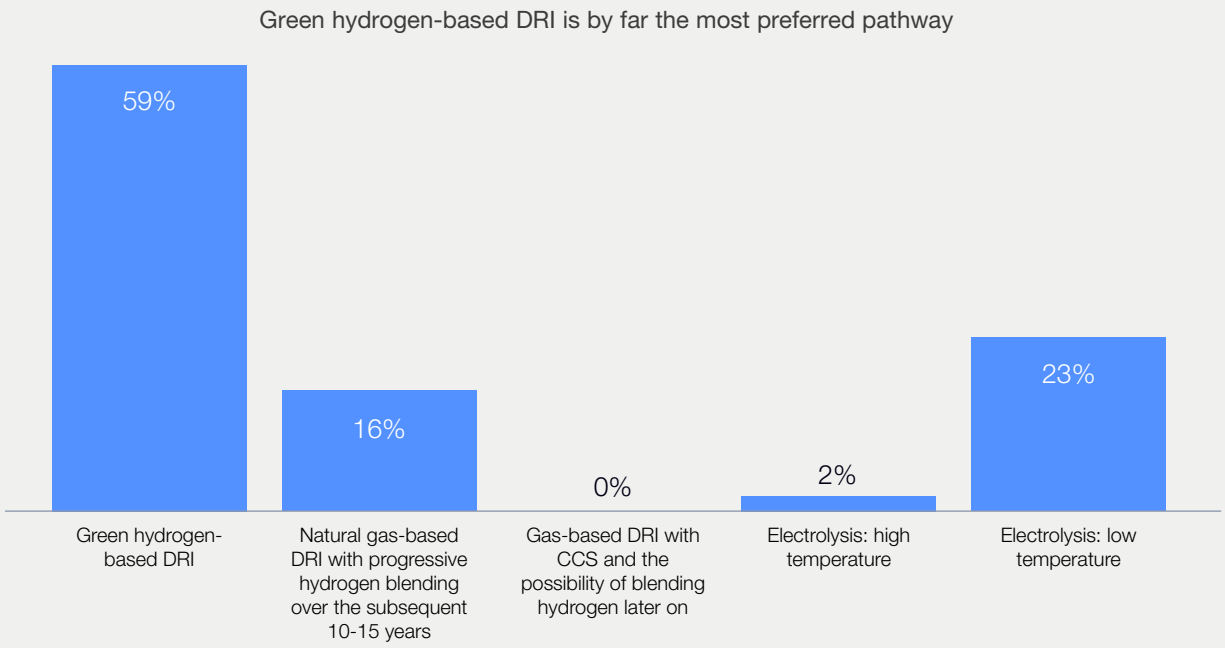
There are economic implications too. According to workshop participants, domestic gas in South Australia costs twice as much as in the US and three times more than in Qatar. Australia is in a race to compete with other countries for the green iron market, so there is no time to lock into gas. Informal polling among participants found a strong preference for green hydrogen-based DRI over gas-based DRI (see Figure 1).

A third pathway to green iron is electro-winning, which does not use coal, gas or hydrogen as a reducing agent. Instead, the ore is reduced at low temperatures through electrolysis, producing pure metallic iron directly with oxygen as the sole by-product – as long as the process is powered by renewables. This technology has a significant advantage: it works with many different grades of iron ores, but it is particularly well-suited to reducing hematite – Australia's main export.[28] It can also work with intermittent renewable power sources and the process is able to monetize waste ores already stockpiled.

Meanwhile, carbon capture and storage (CCS) has been touted as another way of reducing emissions from steelmaking in the short term. However, the application of CCS in steelmaking is not yet a proven or commercially viable technology, with Midrex (a company specializing in DRI) stating recently that "its practical use in steelmaking remains limited".[29]

An indicative poll of workshop participants, representing various groups of stakeholders (industry, government, civil society, academia), while not a statistically robust sample size, found that a clear majority (59%) prioritize green hydrogen-based DRI as the preferred technology for green ironmaking in Australia. A notable 23% of participants favoured low-temperature electrolysis (electro-winning), given its compatibility with intermittent renewables and diverse ore grades. Meanwhile 16% backed natural gas-based DRI with progressive hydrogen blending over 10-15 years. No-one supported gas-based DRI with CCS, and retrofitting carbon capture onto existing blast furnaces was seen as unviable by participants (see Figure 1).

FIGURE 1 **Preferred technology pathways to prioritize for green iron-making in Australia** (% workshop participants)



Notes: Survey of Adelaide workshop participants, August 2025. Indicative data only. Number of participants ("n") = 44. DRI = direct reduced iron, CCS = carbon capture & storage.

To produce direct reduced green iron, Australia either needs to invest in beneficiation and electric smelting of Pilbara's ubiquitous hematite; or it must ramp up mining of its DRI-preferred magnetite ore. Both pathways are valid.

With countries such as Brazil, Canada and Sweden already well-advanced down the DRI pathway, the Institute for Energy Economics and Financial Analysis (IEEFA) argues that "if it wants to remain competitive, Australia must focus on developing its magnetite iron ore sector," even though building the infrastructure to concentrate raw magnetite ore into high-grade pellets is likely to take "up to a decade".[30]

Clarity on the direction of the technology – and which options are commercially viable – is critical for investors on the supply side. However, on the demand side, buyers (including those associated with FMC and RMI) are technology-agnostic. The main criterion is that the product is authentically certified as near-zero emissions.

Green iron pilot projects and capacity

Existing magnetite iron ore facilities

Australia's magnetite iron ore sector has developed over the past two decades and currently features a handful of major facilities capable of delivering large-scale ore concentrate and pellets ready for DRI production (see Figure 2 and Table 1):[31]

Iron Bridge (Pilbara, WA): Fortescue's first magnetite mining operation, which (unlike its hematite operations) produces a wet magnetite concentrate that is transported via a 135 km specialist slurry pipeline to Port Hedland. In June 2025, the company applied for permission to build a 2.1 GW wind farm and a 220 kV transmission line to support the decarbonization of this operation.[32,33]

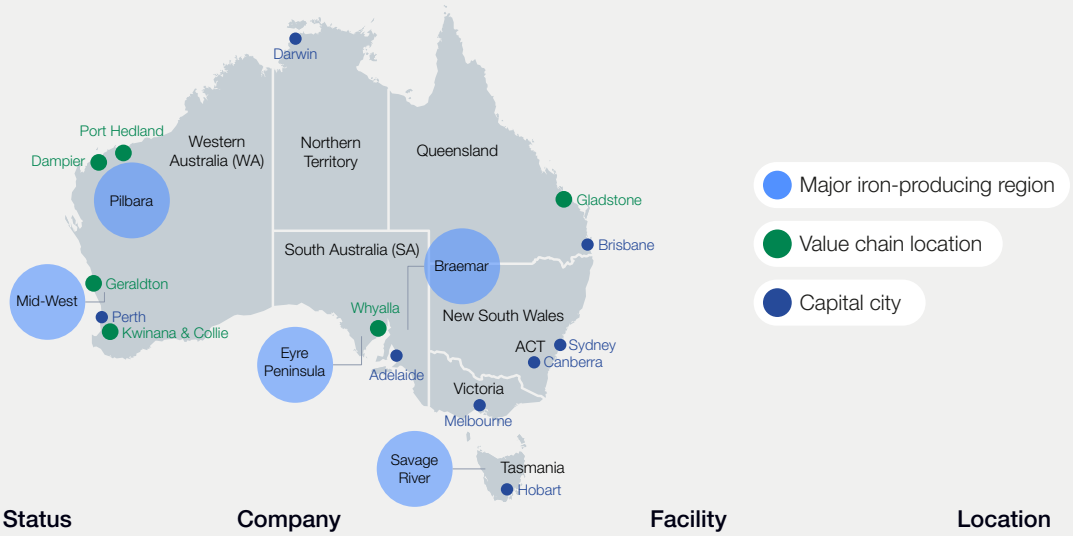
Sino Iron-Cape Preston (Pilbara, WA): Commissioned in 2013, this CITIC Pacific Mining facility has a designed capacity of 24 Mtpa magnetite concentrate. The project cost a reported $12 billion – far over budget – and was thought to have delivered around 14 Mt in 2024.

Karara (Mid West): This plant shipped its first magnetite concentrate in 2013 and has a current capacity of 8 Mtpa. Plans to expand to 37 Mtpa have not yet materialized.

SIMEC Mining (SA): This facility in South Australia's Middleback Ranges has been mining 2.2 Mt of magnetite to produce 1.3 Mtpa of pellets for use at Whyalla Steelworks. The company's plan to expand production to 15 Mtpa of DR-grade concentrate rests on the future of Whyalla, currently in administration.

Savage River (Tas): This is Australia's oldest operating iron ore concentrate facility, located in Tasmania. Annual magnetite pellet capacity is 2.6 Mt.

FIGURE 2 | **Australia's iron value chain: today and tomorrow**



Product	Status	Company	Facility	Location	Capacity (Mtpa)
Concentrate	Operating	Northern Iron	Warrego Mine	Northern Territory	1.2
Concentrate	Operating	Fortescue	Iron Bridge	Pilbara, WA	22
Concentrate	Operating	CITIC Pacific Mining	Sino Iron	Pilbara, WA	24
Concentrate	Operating	Karara Mining	Karara	Mid-West, WA	8
Concentrate	Operating	SIMEC Mining	Middleback Ranges	Eyre Peninsula, SA	2.2
Concentrate	Operating	Grange Resources	Savage River Concentration	Tasmania	2.85
Pellet	Operating	Grange Resources	Savage River Pelletizing	Tasmania	2.6
Pellet	Operating	GFG Alliance (under administration)	Whyalla Pelletizing	Eyre Peninsula, SA	1.3
Concentrate	Proposed	Magnetite Mines	Razorback	Braemar, SA	5
Concentrate	Proposed	Lincoln Minerals	Fusion Project	Eyre Peninsula, SA	3
Concentrate	Proposed	Iron Road	Central Eyre Iron Project (CEIP)	Eyre Peninsula, SA	12
Concentrate	Proposed	Atlas Iron (Part of Hancock Prospecting)	Ridley Magnetite Project	Pilbara, WA	3
Concentrate	Proposed	SIMEC Mining	Middleback Ranges (expansion)	Eyre Peninsula, SA	7
Pellet	Proposed	POSCO (Port Hedland Iron)	PHI Pelletizing	Pilbara, WA	3.5
Pellet	Proposed	Progressive Green Solutions (PGS)	Mid-West Green Pellets & Green Iron Pelletizing	Mid-West, WA	7
DRI/HBI	Proposed	POSCO (Port Hedland Iron)	PHI HBI	Pilbara, WA	2
DRI/HBI	Proposed	GFG Alliance	Whyalla Steelworks	Eyre Peninsula, SA	1.8
DRI/HBI	Proposed	Green Steel WA	Mid-West DRI	Mid-West, WA	2.5
DRI/HBI	Proposed	Progressive Green Solutions (PGS)	Mid-West Green Pellets & Green Iron HBI	Mid-West, WA	2.5
DRI/HBI	Proposed	Greensteel Australia	South Australia Project	South Australia	1.2
DRI/HBI (Pilot)	Proposed	Calix	Zesty Green Iron	Victoria	0.03
DRI/HBI (Pilot)	Proposed	Fortescue	Green Metal Project, Christmas Creek	Pilbara, WA	0.0015
DRI/HBI (Pilot)	Proposed	BlueScope, BPH and Rio Tinto	NeoSmelt	Kwinana, WA	0.04
DRI/HBI (Pilot)	Proposed	Rio Tinto	BioIron	Perth, WA	0.008

Notes: ACT = Australian Capital Territory, HBI = hot briquetted iron, Mtpa = million tonnes per annum. Concentrate and pellets are largely produced using magnetite iron ore.

Source: Institute for Energy Economics and Financial Analysis (IEEFA), with additional analysis by BCG.[34]

Pipeline magnetite iron ore projects

Australia has sufficient iron ore concentrate to begin green pelletized iron ore, but considerably more supply will be needed to realize its green iron ambitions. Experience shows that developing new facilities to produce iron ore concentrate and pellets can take at least a decade, suggesting that projects initiated today will not be ready for DRI production until the mid-2030s. Participants at the workshop highlighted the onerous government permitting process as a major delaying factor.

Projects in the pipeline for Australia and the region are summarized in Figure 2 and Table 1. Proposed magnetite concentrate facilities include:

- **Razorback (SA):** Magnetite Mines, targeting 5-10 Mtpa of DR-grade concentrate, working on final investment decision (FID).
- **Fusion Project (Eyre Peninsula, SA):** Lincoln Materials, targeting 3-6 Mtpa of DR-grade concentrate.
- **Central Eyre Iron Project (Eyre Peninsula, SA):** Iron Road, targeting 12 Mtpa of DR-grade concentrate.
- **Ridley Magnetite Project (Pilbara, WA):** Hancock Prospecting, targeting up to 16 Mtpa of DR-grade concentrate.
- **Middleback Ranges – expansion (SA):** SIMEC Mining, currently operating at 2+ Mtpa, upgrading to 7 Mtpa by 2028 and 15 Mtpa in phase 2.

The roles that green iron hubs and Lighthouse projects could play in enabling the more rapid and widespread development of Australia's green iron industry are discussed further in Chapter 4.4.

BOX 3

Novel green iron technologies and pilots

Fortescue: its hematite-based Green Iron Metal Project is starting at lab-scale, progressing to a technical demonstration plant at the company's Green Energy Hub at Christmas Creek, Pilbara (WA). It will use green hydrogen to reduce the ore and an electric smelting furnace (ESF) to produce 1,500 tonnes of high-purity green iron metal per year. Both the hydrogen plant and the ESF are partly powered by solar panels, but will be fully renewable by 2030.[35]

Calix: specializes in low-emissions mineral and metal production. Based in Bachhus Marsh, Victoria, Calix is now piloting its new "Zesty" green iron/zero-emission steel technology, using various Australian ores. To succeed, the project requires access to flexible electricity and sufficient green hydrogen.

Progressive Green Solutions: developing a green iron plant in Geraldton (Mid-West, WA) that aims to deliver phase one capacity of 7 Mtpa of green iron and 2.5 Mtpa of green hydrogen by 2029.

Electra: a US start-up, based in Boulder, Colorado, it trialling its electro-winning (non-DRI, non-hydrogen option) process that can use the whole range of Australian ores as feedstock, including those with <55% iron content. A demonstration plant is under construction and will be able to operate with intermittent renewable energy sources.[36]

Some of these novel clean technologies and projects – alongside other progressive entries – have been listed in the First Movers Coalition First Suppliers Hub – an open-source global repository of innovative and emerging products needed to decarbonize the world by 2050.[37]

TABLE 1 | **Green iron projects announced in Australia since 2022**

Non-exhaustive

Company/Consortium	Location	Project	Status
Whyalla steelworks (under administration)	Eyre Peninsula, SA	H_2-DRI (1.8 Mt) and EAF as part of AU$2.4 bn transition package; AU$500 m earmarked from the Green Iron Fund	FEED; FID targeted 2025; AU$2.4 bn state–federal package
Greensteel of WA	Collie, WA	450 kt low-emissions rebar using locally sourced scrap	FEED completed; received regulatory approvals; construction in 2025; early operations planned in 2027
BlueScope + BHP + Rio Tinto, NeoSmelt	Kwinana, WA	Pilot ESF fed with H_2-DRI pellets	WA grant AU$75 m and ARENA AU$19.8 m FEED; FID 2026
POSCO, Port Hedland HBI	Port Hedland, WA	2 Mt HBI plant and pellet plant	Received state environmental approval in August 2025
Fortescue, Iron Bridge	Pilbara, WA	DR-grade magnetite mine/ concentrator	Capex AU$5.9 bn; expects to ship 10–12 Mt by FY26, nameplate capacity of 22 Mt reached by FY28
Fortescue, Green Iron Metal	Pilbara, WA	Hematite-based green iron; H_2 reduction + ESF, demo designed for 1,500 t/y	Lab-scale underway, technical demo plant progressing, partly solar-powered, fully renewable by 2030
Calix, Zesty	Bacchus Marsh, Victoria	Pilot of zero-emission steel tech using Australian ores	Pilot running; needs flexible electricity & green H_2, data on capacity/timing n.a.
Progressive Green Solutions	Geraldton, WA	Green iron plant targeting 7 Mtpa green iron + 2.5 Mtpa green H_2	In development, phase-1 target 2029
Electra	USA - Boulder, Colorado	Electrowinning (non-DRI, non-H_2) process able to use ores incl. <55% Fe. Using Australian ores.	Demonstration plant under construction, data on capacity/ timing n.a.

Notes: EAF = electric arc furnace, ESF = electric smelting furnace, FEED = front-end engineering design, FID = final investment decision, ARENA = Australian Renewable Energy Agency.

Source: BCG, 2025.

2.2 Federal and state policies and strategies supporting green industrial transformation

Federal policies, incentives and agencies

Climate change legislation and industrial strategy

Under Prime Minister Albanese's government, Australia has significantly upgraded its climate-related legislation and sector transition strategies. In September 2025, the government announced its latest Net Zero Plan, with a new target to reduce emissions to 62-70% below 2005 levels by 2035. This represents a significant step up from its previous 2030 target to reduce emissions by 43%.[38]

The strategy includes six sector emissions reduction plans for electricity and energy, agriculture and land, the built environment, industry, resources and transport. The government's target in the energy sector is to reach 82% of renewable electricity generation by 2030. Meanwhile, its industry sector plan highlights the significant opportunities to kickstart new industries in green iron and green hydrogen.[39]

> **Transitioning to net zero is fundamentally disrupting the global iron and steel industry. Many decarbonisation technologies would decouple iron making from steel making processes. This could see iron making becoming positioned close to locations that are rich in renewables resources and able to competitively produce renewable hydrogen, with decarbonised iron exported to steel making locations.**
>
> Government of Australia, Industry Sector Plan: September 2025

Future Made in Australia Act 2024

In May 2024, Prime Minister Anthony Albanese announced his government's new Future Made in Australia agenda: "Our plan will maximise the economic and industrial benefits of the international move to net zero and secure Australia's place in a changing global economic and strategic landscape."[40] Foundational to this vision is Australia's ambition to become a "renewable energy superpower".[41] The Future Made in Australia Act prioritizes federal support for net-zero industries where Australia will have a comparative advantage and commits AU$22.7 billion over the next decade to boost Australia's green industrial sector.[42]

Federal support for the production of green iron and green hydrogen is summarized in Box 4. For more details, see Chapter 4.2.

BOX 4 **Australian government funding for green iron and hydrogen – summary**

Future Made in Australia Innovation Fund: AU$750 million available as grants to innovative green metal projects, administered by the Australian Renewable Energy Agency (ARENA).[43]

Green Iron Investment Fund: AU$1 billion of grants to de-risk first movers and anchor private investment. Half is earmarked to transform Whyalla Steelworks; half is for projects looking to operationalize by March 2031.[44]

Hydrogen HeadStart Program:~AU$2.7 billion available for renewable/green hydrogen and derivatives (e.g. green ammonia, methanol).[45]

Hydrogen production tax incentive: AU$2/kg of renewable hydrogen produced between 2028 and 2040.

Net Zero Fund: AU$5 billion available under the National Reconstruction Fund (NRF) to support low-emissions technologies (e.g. green metals, batteries, hydrogen value chains).[46]

Clean Energy Finance Corporation (CEFC): AU$32.5 billion available as concessional debt or equity to de-risk projects decarbonizing energy generation and heavy industry.

Role of export markets and certification

Workshop participants highlighted that – given the lack of domestic demand for green iron and steel – Australia's export strategy is critical to the long-term success of the industry. However, they noted that the country lacks a holistic industrial strategy that connects its nascent green hydrogen and green iron industries with its export corridors, especially to China Japan and Korea. For a more detailed analysis of Australia's green iron export opportunity, see Chapter 4.5.

Participants also called on the government to ensure its green metals strategy aligns clearly with international certification frameworks, such as those produced by the International Standards Organization (ISO). This is discussed in more detail in Chapter 4.3.

State-level policies and leadership

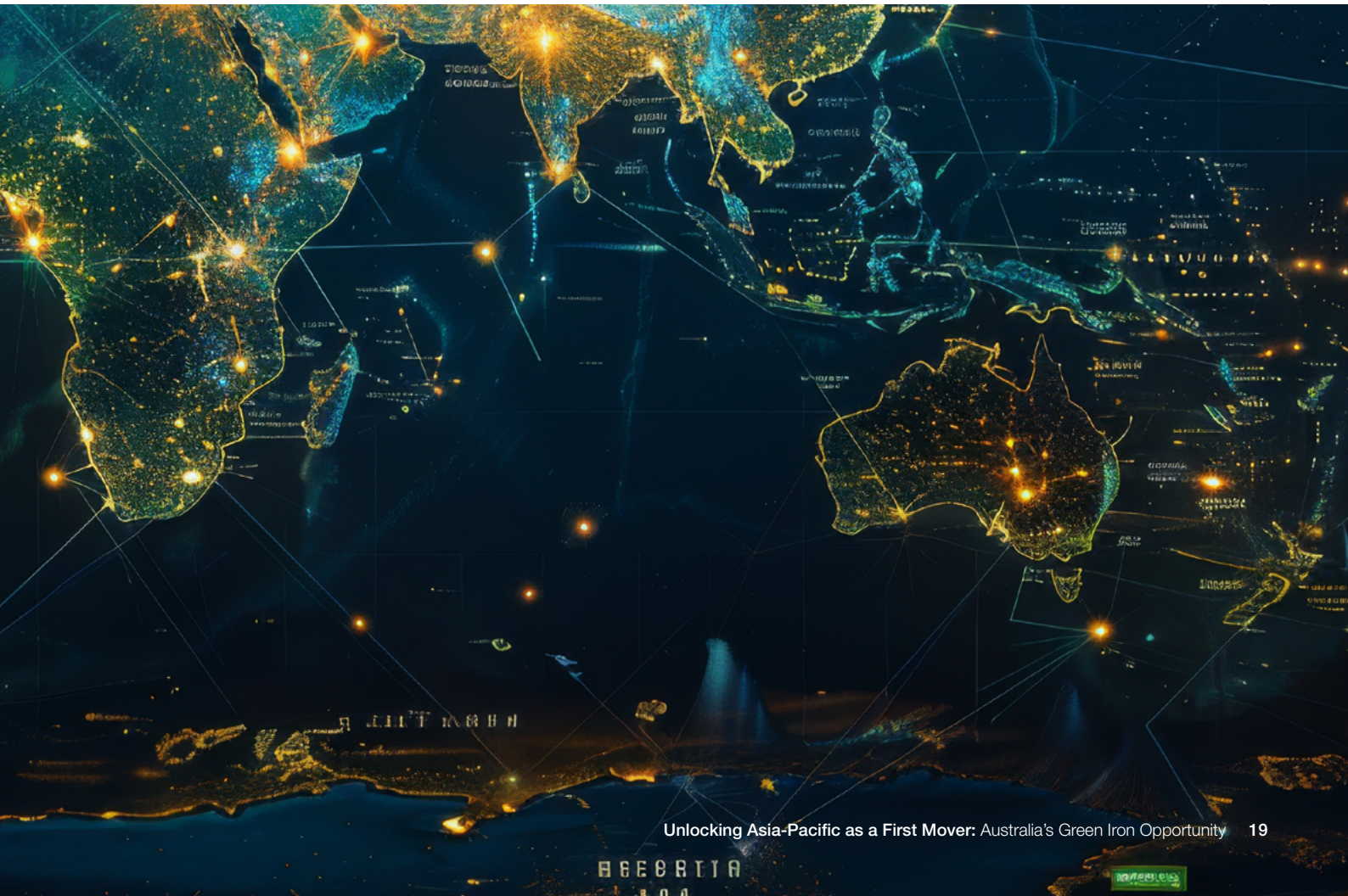
The Government of South Australia has made green iron a top priority, publishing its *Green iron and steel strategy* in June 2024.[47] In February 2025, it announced a AU$2.4 billion package, co-funded with the Australian Government, to support Whyalla Steelworks, which would be a critical player in future green steel manufacturing. This complements an earlier investment, announced in 2023 by the state and federal governments to provide AU$100 million of funding for Port Bonthyon Hydrogen Hub, near Whyalla, to develop export-scale green hydrogen and ammonia production.[48]

SA's electricity mix is currently 74% renewables and the government is targeting 100% by 2027.[49] The state has also created a streamlined legislative framework for accelerating the development of solar and wind power, hydrogen production and green industries. Its "one window to government" model enables rapid approvals from renewables through to green iron production and export.[50] "South Australia is green iron-ready now, with sensible policies," said one participant.

In September 2025, the Government of Western Australia introduced a State Development Bill that would streamline permissions for renewable energy and green iron production, given the delays to the rollout of the Pilbara Energy Transition Plan's shared-used transmission infrastructure.[51] As part of its 2024-25 budget, the government announced AU$500 million of investment in the state's strategic industrial areas (SIAs) to "pave the way for WA to become a global clean energy powerhouse".[52]

In Queensland, the state government announced in February 2025 that it would not commit the planned-for AU$1 billion of funding to support the Central Queensland Hydrogen Project, which had been expected to start operations from 2029 and export green hydrogen and ammonia from Gladstone port to Singapore and Japan.[53]

> **We must … ensure that Western Australia is ready to seize the big opportunities in front of us […] to support our major trading partners to decarbonise by producing critical minerals and clean downstream products like green iron.**
>
> Roger Cook, Premier and Minister for State and Industry Development, Western Australia



3 Enabling the green iron supply chain through decarbonized transport

Exporting Australia's iron ore to East Asian markets 6,500 km away emits ~10 Mt of CO_2e a year – decarbonizing this transport is critical for green iron's credibility.

3.1 The scale of the challenge and the opportunity

Transporting a bulk commodity such as iron ore involves heavy assets, including mega-trucks to shift the commodity from mine to plant, railways to convey export-quality ore to ports and – for Australia's export-bound iron ore – colossal 1,000-ft Newcastlemax bulk carriers to ship it the ~6,500 km from Pilbara to East Asia. International shipping and heavy-duty trucking in particular remain high-emitting sectors, given their ongoing dependence on fossil fuel power.

In 2024, Australia exported over 860 million tonnes of iron ore to East Asia, mainly China (see Box 5). Analysis published in August 2025 by the Australian National University and Curtin University estimates that shipping Australia's iron ore to China accounts for ~10.8% of the lifecycle emissions (2.05 tCO_2/t) of crude steel manufactured in China from Australian ore using the traditional BF-BOF process.[54]

Challenges for the supply chain include both the technological and economic feasibility of near-zero emissions transportation capable of transporting millions of tonnes of ore; and the regional policy-related challenges of creating green corridors with the supporting infrastructure necessary to decarbonize both road and sea transport.

> **Australia is often seen as the "end of the corridor" geographically — but with stronger coordination and visibility, that position could become a strategic advantage.**
>
> Lauran Huefner, Chief Executive Officer, South Australian Hydrogen Hubs

BOX 5 **Western Australia's iron ore exports and global comparisons – fast facts (2023)**

Global iron ore suppliers:

- Western Australia (WA): 949 million tonnes (38% of global supply)
- Brazil: 440 million tonnes
- China: 280 million tonnes
- India: 270 million tonnes
- Russia: 88 million tonnes

Top destinations for iron ore exported from WA:

Chinese mainland: 747 million tonnes (85% of WA export volumes)

Japan, South Korea and Taiwan, China: 115 million tonnes (13% of WA export volumes)

Rest of the world: 20 million tonnes (2% of WA export volumes)

Source: Government of Western Australia.[55]

Decarbonizing the road and sea transport of Australia's iron ore offers the opportunity not only to deliver green iron that is "truly green", but also to generate demand for the broader decarbonization of the whole transportation sector, including deployment of zero-emissions trucks and the clean fuel/electricity production and infrastructure needed to support them.

Decarbonizing transportation would also provide a supply-side option for the growing number of buyers and cargo owners concerned enough about their scope 3 emissions to include low-carbon transport options in their procurement criteria. While such demand is nascent among iron ore buyers, there have been clear demand signals for zero-emissions maritime freight from consumer goods companies, for example through the launch of the First Movers Coalition in 2021. In the same year, the Cargo Owners for Zero Emission Vessels (coZEV) published their 2040 ambition statement, in which nearly 30 signatories supported the transition to ZE solutions for international shipping on a 1.5°C-aligned trajectory. This work is now being carried forward by the Zero Emission Maritime Buyers Alliance (ZEMBA), which is considering expanding its focus beyond container shipping to cargo.[56]

However, transitioning to new fuels will require major new infrastructure at ports and depots to accommodate various fuel types – whether ammonia, biofuel and methanol for ships, or biofuel, electricity and hydrogen for trucks. Types of ships and trucks, along with their fuel compatibility, will influence these infrastructure needs – particularly at ports that export from Australia as well as those importing from East Asia.

3.2 Trucking – batteries, biofuels and hydrogen all in the mix

Heavy-duty trucks in Australia are responsible for ~20 million tonnes of CO_2e emissions each year, representing over one-fifth of all the country's transport-related emissions in 2022.[57] This estimate does not include emissions from off-road mining vehicles, which represent a substantial additional source. For example, a 240-tonne haul truck commonly used in iron ore operations consumes approximately 200 litres of diesel per hour, underscoring the significant carbon intensity of mining logistics.

BHP, an Australian mining and metals multinational, has reported that about 40% of its operational GHG emissions comes from using diesel fuels, in both haul trucks and mining equipment. Decarbonizing heavy-duty haulage fleets is therefore a growing priority for mining companies. A portfolio approach is emerging to maximize emission reductions as the technology and infrastructure ramp up.

Battery-electric vehicles (BEVs) already work well and are therefore a near-term choice more favoured by the industry to fully decarbonize iron ore haulage. The great majority of zero-emission trucks operating on Australia's roads – numbering ~200-250 vehicles in early 2024 – are battery-electric. Sales of low- and zero-emission trucks in Australia in 2023 were ~1% of all new truck sales, again mostly BEVs – an increase of nearly 400% on 2022 figures.[58]

The main constraint with BEVs is grid capacity at truck depots – according to one participant, connections are unpredictable, costly and slow. Industry also faces competition for electricity from other uses: for example, Australia's bus industry alone needs 100 TWh of generation per year to decarbonize – equivalent to the country's entire renewable energy generation in 2024.[59]

Fortescue – one of Australia's top-three iron ore mining companies and a founding member of the First Movers Coalition – reported direct emissions totalling 2.72 Mt CO_2e in 2024. Most of this came from the diesel burned by its haul trucks, trains and ships – plus the gas burned to generate power at its mining sites. Fortescue's aim is to completely decarbonize its operations by 2030 – including BEVs charged by renewables, green ammonia for shipping and clean hydrogen for power generation (see Box 6).

BOX 6 Battery-electric trucking – Fortescue leads the way

During New York Climate Week in late September 2025, Andrew Forrest, Executive Chairman and Founder of FMC member Fortescue, signed agreements with some of the world's leading manufacturers of BEVs, solar and wind technology, and heavy mining equipment, to enable it to fully electrify its Pilbara operations by 2030. Among other deals, the company committed to buy 300-400 battery-electric 240-tonne haul trucks from Chinese manufacturer XCMG, with deliveries phased from 2028-2030.

This order builds on the previous world record order that Forrest signed for 360 similar-sized haul trucks placed with German-Swiss company Liebherr in September 2024, which are powered by a zero-emission battery developed by Fortescue Zero, the company's technology arm.

Together with investments in renewable power, these orders will transform the company's entire truck fleet in Pilbara to zero-emissions, in line with Forrest's declared corporate goal to reach "real zero" – rather than just net zero – by 2030. Forrest hailed this series of global agreements as "practical alliances that prove heavy industry can follow a new path – one where profits rise as emissions fall".

Sources: see endnote.[60,61]

Hydrogen haulage is a nascent technology, with just a handful of hydrogen-powered trucks on Australia's roads. While total cost of ownership (TCO) is better than for diesel vehicles, it currently lags behind the cost efficiency of BEVs. Trials continue along two tracks – H_2 injection into modified internal combustion engines (ICE) and hydrogen fuel-cell electric platforms, with pilots expected between now and 2030. The injection route (H_2-ICE) is considered to have more potential in Australia, as the hot temperatures found in Pilbara reduce the operating efficiency of fuel cells. Nevertheless, hydrogen fuel-cells still hold promise for longer routes.

Policy reforms could accelerate the transition from diesel to low-carbon trucking. Australia's Grattan Institute, for example, has suggested the government tighten its Safeguard Mechanism, which would raise the cost for diesel trucks and improve the TCO for BEVs in comparison.[62] Meanwhile, the Australia Institute has proposed phasing out the government's Fuel Tax Credit (FTC), which refunded over AU$3 billion to Australia's mining sector in diesel excise in 2020-21.[63]

As a transition solution, HVO – a renewable diesel produced by hydrotreating waste vegetable oils and fats – is seen by some as an effective bridging fuel. It can be used as a drop-in replacement for regular diesel without modifying engines or infrastructure. Life-cycle emissions can be 60-95% lower than fossil diesel, depending on the type of feedstock used – although this is not sufficiently near-zero emissions to clear the bar for FMC inclusion.[64]

Furthermore, HVO supply is niche in Asia and government help is needed to reduce the significant green premium. Large-scale uptake is also constrained by feedstock availability, limiting the technology's ability to fully decarbonize the industry.

In 2023, BHP trialled HVO in its trucks and equipment in Yandi, Western Australia, as part of its goal to reduce operational emissions by at least 30% by 2030.[65]

In early 2025, Rio Tinto trialled use of 10 million litres of renewable diesel, across its network of ports, railways and mines in Western Australia. The renewable diesel, made from used cooking oil, is mixed in a 20% blend with fossil diesel.

According to Rio Tinto Managing Director Rail, Port and Core Services Richard Cohen said: "Diesel makes up about 70% of the total carbon emissions from our Pilbara iron ore operations. While electrification is the ultimate longer-term solution for repowering the majority of our fleet, we're also exploring biofuels as a complementary and nearer-term solution."[66]

3.3 Shipping – hydrogen-derived fuels hold promise to cut emissions

At sea, every bulk carrier, fully loaded with 200,000 tonnes of ore, will emit roughly 1,500 to 1,750 tonnes of CO_2 (not including methane or N_2O) on its 6,500 km loaded leg from Western Australia to China. Assuming a total of roughly 800 million tonnes of annual iron ore exports to China, Japan and South Korea, this would require approximately 4,000 voyages by bulk carrier. Based on this calculation, shipping's carbon emissions for the loaded leg total ~6-7 Mt CO_2/year, rising to ~10-12 Mt for the round trip.[67]

However, things are changing. In 2023, the International Maritime Organization (IMO) committed to a net-zero emissions target for international shipping "by or around 2050". Various decarbonization technologies are already in use to replace the dirty bunker fuel that currently powers the world's international shipping fleet.

Industry momentum is gathering behind ammonia and methanol – which become near-zero emissions when produced using green hydrogen. Several methanol dual-fuel bulk carriers are already on order – these operate initially on bunker fuel but can switch without major retrofitting onto green methanol as soon as it is available. However, methanol dual-fuel bulk carriers are yet to carry iron ore on the Australia-China route, largely because of the lack of methanol bunkering at Pilbara's ports in WA.

Meanwhile, Australian mining companies are moving ahead on ammonia-fuelled bulk carriers (see Box 7), encouraged by Pilbara Ports' strategic decision to create a Clean Fuel Bunkering Hub focused on using clean ammonia to power the bulk export vessels departing the Pilbara (see next section).

BOX 7 | **BHP and Fortescue – first movers in decarbonizing bulk carriers**

In July 2024, Fortescue signed an MoU with COSCO – a Chinese state-owned maritime shipping company – to jointly build a green shipping fuel supply chain. The agreement would see the companies exploring the construction and deployment of green ammonia-fuelled vessels to transport iron ore and other minerals from Australia to China.[68]

In July 2025, mining multinational BHP contracted to charter two ammonia dual-fuel Newcastlemax bulk carriers from COSCO, scheduled to enter service in 2028. BHP has announced these ships could cut GHG emissions by 50-95% per voyage if powered by low- to zero-carbon ammonia.[69] The contracts form part of BHP's commitment as a member of the First Movers Coalition to ensure that by 2030, 10% of its products to customers will be shipped using zero-GHG emissions fuels.

At the same time, Australia could emerge as a key global producer of alternative fuels for the shipping industry. One participant highlighted that the country looks well-placed to manufacture green ammonia, given its existing fuel production capacity, pipeline infrastructure, export readiness and emerging government commitments to green hydrogen production. While book-and-claim options were discussed, there was also a push during the workshop to focus on building out robust physical supply chains.

Sounding a cautionary note, some argued that – given the long lead-time required to scale up green fuel manufacture, safety infrastructure and regulations in collaboration with governments and port authorities – deep-sea shipping needs transition fuels now, such as LNG and biodiesel, to bridge the gap. Some LNG dual-fuel Newcastlemaxes are already in service on the WA-China route, chartered by BHP. Emission reductions range from 10-30% depending on methane management. Marine biofuels are also being trialled on the same route by Rio Tinto.

Participants voiced uncertainty around future green fuel standards and costs – risks that act as a significant constraint on investment. The workshop called for clearer government policies and financial instruments, including subsidies and co-investment, to de-risk private investment in green shipping and fuel transitions.

3.4 Green trucking and shipping corridors require regional collaboration

Participants at the Adelaide workshop highlighted that alignment of infrastructure to accelerate both green shipping and green trucking is essential to avoid the risk of stranded assets. Gaps in logistics or coordination will undermine the wider credibility of green iron. A comprehensive solution could have a major impact not just on Australia or the region, but globally – given that 60% of the world's iron ore trade is shipped across Asia-Pacific.

Green trucking corridors

Australia's commitment to expanding electric vehicle (EV) infrastructure has accelerated, with the federal government and private sector investing heavily in charging solutions. As of mid-2024, there were almost 3,000 public EV charging stations across the country, including more than 1,000 fast-charging sites – a 90% increase year-on-year.[70]

The government's Driving the Nation Fund – announced in 2022 with AU$500 million of funding – is boosting Australia's shift to electric vehicles (EVs) in several ways. In 2025, it will channel AU$99.3 million to support a national rollout of EV charging infrastructure, as well as supporting hydrogen refuelling infrastructure and investment in EV fleets. The government is partnering with the National Roads and Motorists' Association (NRMA) to deliver a "backbone" national EV charging network. There will be over 100 charging stations on key highway routes across Australia at an average interval of 150 kms, connecting all capital cities.[71]

Meanwhile, ARENA is tasked with delivering the Driving the Nation Program, which supports the development of a network of charging infrastructure and the deployment of battery-electric trucks along key freight corridors in Australia, as outlined in its report *Electrifying Road Freight*.[72] In November 2024, ARENA made AU$100 million available under this programme for initiatives to support charging and uptake of heavy BEVs.

On the hydrogen front, Australia is developing an East Coast Hydrogen Highway, following an MoU signed in 2022 between the governments of New South Wales, Victoria and Queensland to establish a network of hydrogen refuelling stations on key freight routes such as the Hume, Pacific and Newell Highways.[73]

Green shipping corridors

Australia is advancing shipping decarbonization through green corridor initiatives linking the Pilbara to East Asia (see Figure 3). These corridors are effectively stable trade routes with green fuel supply chains. A task force led by Pilbara Ports, BHP, Rio Tinto and the Global Maritime Forum is designing a Clean Fuel Bunkering Hub with ammonia bunkering hubs at Dampier and Port Hedland. Transitioning the bulk carriers that visit Pilbara Ports to lower-carbon ammonia (not green ammonia) could reduce emissions by up to 94%, cutting them to less than 560,000 tonnes per year.[74] Such public-private initiatives from the government and leading mining companies are important to send both demand and supply signals to shipping companies to encourage them to commit to low-carbon vessels.

In September 2024, Dampier Port conducted the world's first ship-to-ship transfer of ammonia, involving ~2,700 tonnes of ammonia.[75] This was significant step forwards, given the major safety concerns around handling this toxic and corrosive fuel. Apart from developing a commercially viable product – it is therefore also critical to invest in safe bunkering infrastructure, regulation and workforce training – a point that was emphasized by participants during the workshop in Adelaide.

One major shipping line attending the workshop also voiced concern around safety issues with shipping freshly reduced iron – whether via the DRI or HBI route. The iron is highly reactive – it can re-oxidize itself, consuming oxygen and generating heat which in turn can start fires or create dangerous hypoxic environments for crew. The re-oxidized iron can also react with (sea) water to create hydrogen gas, bringing a risk of explosion in confined holds. Consequently, the IMO's rules treat DRI/HBI as hazardous bulk cargo with tight carriage rules.[76] Solving this issue requires further testing and documentation to redefine the product in IMO's classification.

FIGURE 3 **Iron ore exports and green shipping corridors from Western Australia to East Asia**

Source: Government of Western Australia (2023 data).[77]

The workshop heard that a key outcome of these efforts is to align stakeholders to commit to decarbonization timelines and to harmonize regulation and infrastructure across ports. In such a highly commoditized industry, with limited willingness to pay a green premium, the initial demand signal from a large player commissioning ammonia-fuelled vessels can be very impactful, sparking port authorities into thinking about investments in bunkering infrastructure.

Australia has also signed MoUs with Singapore (2024) and South Korea (2025) to establish green shipping corridors supporting ammonia and hydrogen, with pilots from 2025 and first operations by 2029 (see Chapter 4.5). International regulation is adding momentum, but has stalled: following the unanimous adoption of the 2023 IMO Strategy on Reduction of Greenhouse Gas Emissions in April 2025, the IMO provisionally approved a Net-Zero Framework with a global fuel standard and a carbon pricing mechanism. The planned adoption in October 2025 ended in a vote that resulted in a one-year postponement of the decision, leaving many questions open. Solid regional or international regulatory certainty would strengthen the case for investing in green-fuel infrastructure and zero-emission vessels on key routes to Singapore, Japan and Korea.[78]

Participants discussed options for bilateral cooperation, with India and Singapore in particular, to support clean fuel exports. By exporting its green hydrogen advantage in the form of derivatives, such as low-carbon iron ore and ammonia produced with green hydrogen, Australia has an opportunity to help decarbonize not only its own economy but the economies of partner countries in Asia as well.

4 Cross-cutting enablers and collaboration platforms

Without clear demand signals from the market, Australia's green iron industry will not take off. Government and private sector must collaborate closely to stimulate this demand.

> **Australia stands at a pivotal moment in its economic history. As the global economy rapidly decarbonises, an unprecedented opportunity has emerged for Australia to transform from a conventional, low value-added commodity exporter into a global leader in value-added clean commodities. This is not just an environmental imperative—it represents Australia's most significant economic and geostrategic opportunity in generations.**
>
> Elizabeth Thurbon and Oliver Yates, Asia-Pacific Development, Diplomacy & Defence Dialogue

This chapter examines the roles that various cross-cutting enablers can play to overcome the barriers and bottlenecks facing Australia's green iron industry and accelerate its development. These include:

- **Finance enablers:** both public and private sector, such as increasing demand signals and offtake, clean commodity trading instruments and blended finance to de-risk investments.
- **Policy enablers:** including government measures to improve affordability of green power, expedited permissions, internationally-aligned certification, social licence and skills development.
- **Infrastructure enablers:** the role of green iron hubs, industrial clusters and Lighthouse projects in accelerating transition through shared infrastructure and inspirational examples.
- **Regional enablers:** such as government collaboration with Asian partners to boost regional low-carbon trade, green export corridors and alignment of carbon pricing mechanisms.

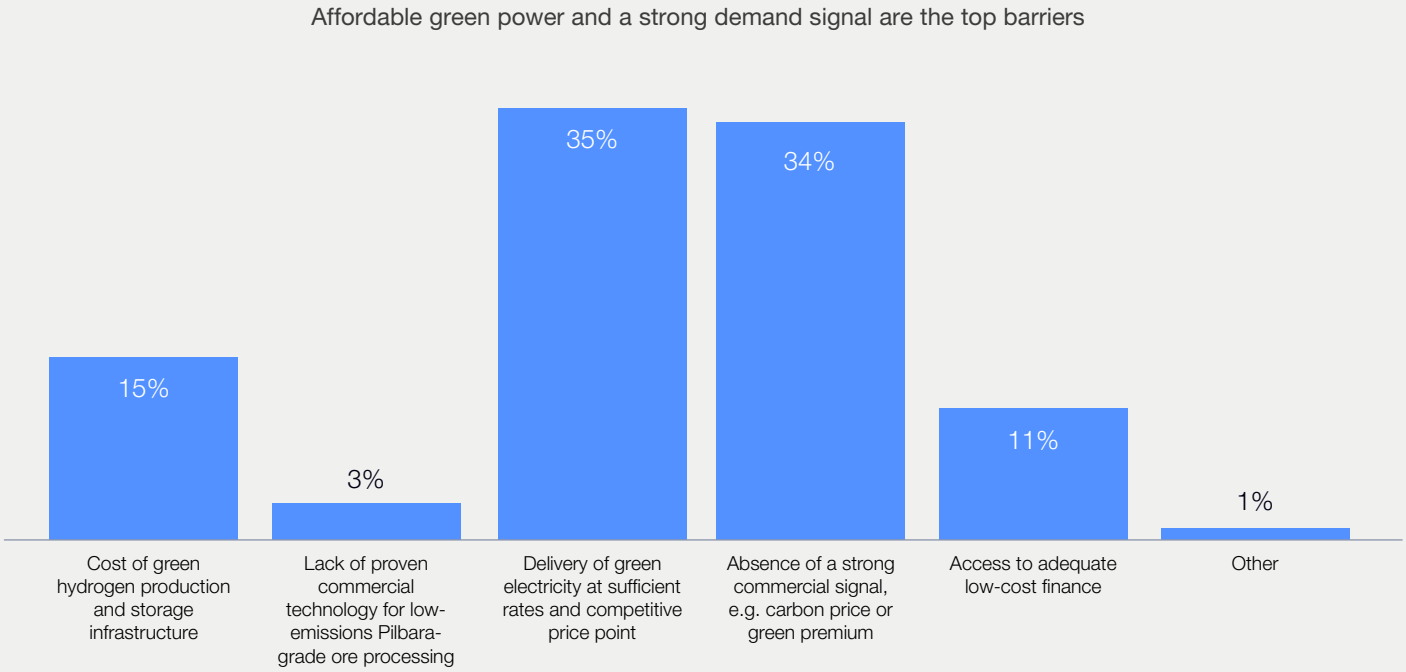
4.1 Barriers and bottlenecks facing Australia's green iron industry

Australia's supply- and demand-side challenges are well understood and were a major focus of discussions at the workshop. An indicative survey of participants revealed the following barriers to accelerating green iron in Australia (see Figure 4):

- Delivery of green electricity at sufficient rates and competitive price point (35%)
- Absence of a strong commercial signal, e.g. carbon price or green premium (34%)
- Cost of green hydrogen production and storage infrastructure (15%)
- Access to adequate low-cost finance (11%)
- Lack of proven commercial technology for low-emissions Pilbara grade ore processing (3%)

This chapter analyses these barriers in greater depth, through the lenses of finance, policy and infrastructure enablers.

FIGURE 4 **The biggest hurdles to scaling-up green iron-making in Australia**
(% workshop participants)



Notes: Survey of Adelaide workshop participants, August 2025. Indicative data only (n = 71).

4.2 Finance enablers

> **Demand-side clarity is everything right now. If we want capital to flow and projects to move, we need stronger demand signals — through government procurement, buyer platforms, and trade partnerships. Without that, we're flying blind.**
>
> Workshop participant, synthesis discussion

Making the numbers work in terms of commercial viability is probably the greatest of all barriers to decarbonizing the iron and steel sector in Australia. The top-four barriers in Figure 4 above all relate to the cost of inputs, such as green electricity and hydrogen, and the cost of finance related to the high green premium and weak demand signal. There are many moving parts, both on the demand and supply sides.

This section addresses some of the finance levers – both public and private-sector – needed to boost demand and make green iron and fuels investable. These include:

- Market-based offtake and demand aggregation
- Clean commodity trading instruments, credits and production tax incentives
- Government-backed concessional finance and guarantees
- Philanthropy and first-loss capital

These levers need to be deployed simultaneously – by government, corporates, financiers and philanthropies – to give Australia's green iron industry a chance of displacing long-established, fossil-powered incumbents.

Boosting demand through market-based offtake and procurement

> **Offtake agreements are the cornerstone of investor confidence.**
>
> Workshop lead convenor

International platforms to aggregate private sector demand

Without clear demand signals from the market – in the form of secure long-term offtake agreements – a $6-10 billion green iron plant will struggle to achieve bankability or reach final investment decision (FID). Demand signals from individual market players for deeply decarbonized industrial products need to be aggregated to start moving the markets. Several global platforms have successfully demonstrated this is possible.

The World Economic Forum's First Movers Coalition (FMC) is the world's largest private demand signal for near-zero emissions steel (see Box 8).

BOX 8 First Movers Coalition – the world's largest private demand signal for low-carbon steel

FMC's steel commitment: "At least 10% (by volume) of all our steel purchased per year will be near-zero emissions (as per FMC definition) by 2030."

FMC criteria: Near-zero emissions steel production should emit less than 0.4 tonnes of CO_2-equivalent per tonne of crude steel produced.[79]

FMC's global Near-Zero Steel 2030 Challenge: this resulted in boosting initial near-zero steel demand by 3 million tonnes from 2023-24, based on early voluntary market signals.[80] The initiative also challenged iron and steel makers and technology innovators to share details of their near-zero projects to boost visibility of partnering opportunities and provide impetus for further demand aggregation.

In September 2024, RMI's Sustainable Steel Buyers Platform (SSBP) – comprising buyers from the manufacturing, construction and technology sectors – launched an RFP process in North America to aggregate demand for at least 1 million tonnes of near-zero emissions steel per year by 2028. SSBP aims to make clean steel projects more investable by connecting producers directly to end-use buyers.[81] RMI, in collaboration with Mission Possible Partnership (MPP), is planning to launch a similar SSBP in Asia-Pacific.

Value chain initiatives to absorb green premium

Absorbing the higher cost of green products within the downstream value chain is a key requirement for producers and upstream offtakers. Using green steel in a dishwasher, for example, would increase the price of the appliance by just $3 – "nothing in the bigger picture of the cost of a dishwasher", said one participant. Customer-facing retailers may therefore be able to absorb some of the green premium within their pricing strategies. Automotive and construction sectors have indicated they are willing to absorb a premium for low-emission materials, especially in high-profile infrastructure projects.

A study by BCG into the willingness to pay among automotive and white goods sectors found that the premiums low-carbon goods can command are unevenly distributed, with downstream players benefitting while upstream players bear most of the decarbonization costs. The study concluded: "An ecosystem approach is needed to interconnect value chain players so that green premiums, often collected by OEMs, can flow upstream to suppliers and producers."[82]

Other actors also have a key role to play:

- **Governments:** specifying green procurement targets to underwrite green iron projects, promoting clean commodity credits and incentives (see below).
- **Mining companies:** committing to new technologies (e.g. battery-electric and H_2-ICE trucks, ammonia dual-fuel bulk carriers).
- **Port authorities:** investing in new bunkering facilities and safety measures needed for low-carbon shipping fuels.
- **Export markets:** demonstrating commitment to green iron, green transport corridors and the infrastructure and common standards required to make these a reality.

Clean commodity trading instruments

Several participants at the workshop regarded the creation of an Australian Clean Commodities Trading Initiative (CCTI) as a "strategic imperative". It would use government-backed offtake contracts to guarantee early buyers for green iron, ammonia, steel or SAF, separating the physical commodity from its "clean" attributes.[83] These attributes become tradable clean commodity credits – innovation credits that mandate cleaner production and reward first movers. By absorbing regulatory risk and providing price certainty, the CCTI would make projects financeable, mobilize private capital and create a secondary market for credits, thereby stimulating demand and driving innovation.

The concept requires credible standards and life-cycle accounting to facilitate certification and tracking of clean commodities. Trade in those commodities is then boosted by attaching a recognized, fungible certificate or credit that proves the product meets environmental benchmarks. This reassures buyers in different countries that a tonne of "green ammonia" or "green HBI" carries a verified level of low-carbon attributes (see Box 9).

Examples of such instruments include: book-and-claim systems (see Chapter 4.3) and the EU's Carbon Border Adjustment Mechanism or CBAM (see Box 11).

Proponents argue that CCTI-backed long-term offtake agreements for green iron and steel can bridge the green premium and make the transition economically viable while markets for green steel get established. This would make a decisive difference to plants such as the Whyalla Steelworks, by creating the revenue certainty its new owners and financial backers need to commit to major capital investments in green technologies.

The Australian government – along with others in the region such as Japan and Singapore — has initiated various instruments to boost domestic and international trade in low-carbon commodities and power, including a guarantee of origin scheme and a hydrogen production tax incentive (see Box 9).

BOX 9 **Australian government's Guarantee of Origin (GO) scheme**

This voluntary scheme was passed into law in late 2024, as part of the Future Made in Australia legislation. It aims to attract investment in low-carbon products and power by encouraging businesses to apply for "product GO certificates" or "renewable energy (REGO) certificates", which detail emissions intensity and low-carbon attributes. Initially covering renewables and hydrogen, the scheme will expand to cover liquid fuels, green metals and renewable gases. Certification provides buyers and consumers with confidence that products are certified against objective and credible standards.

Sources: see endnote.[84]

Bridging the green premium with carbon pricing or production incentives

There were strong calls from workshop participants to address the "elephant in the room" – the substantial gap in production cost between Australian green iron and the widespread carbon-intensive iron available on the global market. One of the keynote speakers, a senior Australian economist, argued strongly in favour of introducing carbon pricing. Failing that, he said the government should provide a tax credit to produce green iron, to simulate the effect of a carbon price.

While described as "politically volatile" by some, most industry representatives and financiers at the workshop broadly supported the idea of a green iron tax credit. There are precedents, including the existing hydrogen production tax incentive (set at AU$2 per kg) and the critical minerals production tax incentive, due to provide a refundable tax offset of 10% on eligible costs from 1 July 2027.[85]

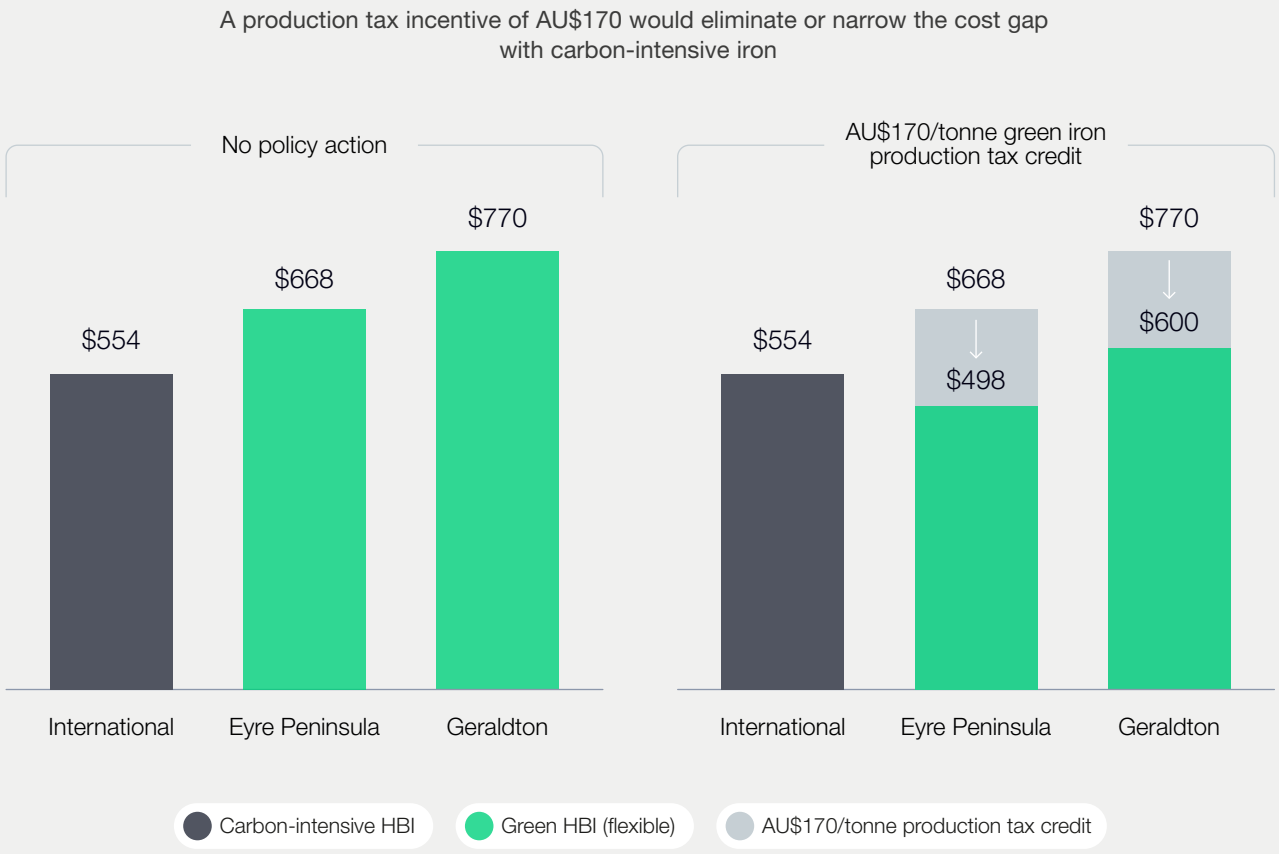
Either approach – whether taxing carbon-intensive production or incentivizing low-carbon alternatives – would perform two vital roles:

- Reflect the external cost of emissions in production economics.
- Level the playing field between green technologies and carbon-intensive alternatives.

In its May 2025 report, *A Green Iron plan for Australia*, The Superpower Institute – a Melbourne-based thinktank – puts a price on a possible production tax credit. The institute notes that the value of any tax credit should mirror the anticipated EU carbon price in 2030 of $155/tonne, resulting from implementation of the CBAM. It then estimates the minimum cost of green HBI (flexible) produced in South Australia's Eyre Peninsula at $668/tonne, compared to the average production cost of $554/tonne for international carbon-intensive HBI. From this data, the report concludes: "A green iron production tax credit worth $170, including the value of the existing hydrogen production tax incentive (HPTI), would have a very similar effect to a carbon price." Such a measure would "narrow or eliminate cost gaps and expand the number of locations where green iron producers can compete in the international market" (see Figure 5).

Europe's CBAM is beginning to change the rules of the game. One suggestion aired at the workshop was for the Australian Government to start lobbying at international forums to put a global price on carbon or at least to promote the idea of a regional CBAM, to align carbon pricing across Asia and extend Europe's low-carbon ambition into the region. This idea is discussed in more detail below (see Chapter 4.5).

FIGURE 5 **The Superpower Institute's green iron production tax incentive proposal**



Source: The Superpower Institute, 2025.[86]

Blended finance and the role of government in de-risking investment

Superfunds and private investors remain cautious of nascent, capital-intensive green technologies, especially given inflationary pressures, equity market volatility and the wide range of market, project, technology and regulatory risks associated with such projects.[87] Commercial lenders are equally hesitant to take on the combined "project-on-project" risks of investing in new low-carbon mining and green iron processing plants that in turn depend on the successful delivery of renewable energy projects to supply them low-carbon power.

Without visible offtake contracts and bankable infrastructure, high-risk projects like green steel or hydrogen production are difficult for most commercial financiers to invest in or lend to. Even with offtake agreements, early-stage technologies still need to prove they can deliver credible, affordable supply – and that requires patient, concessional capital.

Consequently, government agencies, development finance institutions (DFIs), multilateral development banks (MDBs) and philanthropies play a critical role in providing the blended finance and risk-tolerant capital needed to bridge the "valley of death that needs to be fixed," as one workshop participant put it. Participants insisted that the government's financial backing in particular – whether through grants, concessional loans, tax credits, procurement contracts, underwriting or support for shared infrastructure – is essential to unlock the strategic investor equity and commercial capital needed to fund these capital-intensive projects.

One of the keynote speakers said the government should provide first movers with grants covering 30% of their capital to reflect the value of the "positive externalities" of their pioneering innovations.

While early-stage funding from government provides a solid basis, some participants pointed to gaps in later-stage equity for project construction. They highlighted how the US Inflation Reduction Act (IRA) illustrates that rapid deployment of concessional capital can catalyse market development.

Swift state support is a priority. Green iron industry representatives at the workshop called for government funds to be deployed within the next two years, with clear priorities on transparency, emissions thresholds and risk mitigation through milestone-based payments.

The following sections summarize the relevant government agencies and funds that help de-risk the production of green iron, renewables and green hydrogen, much of it falling under the Future Made in Australia agenda introduced in Chapter 2.2.

Government agencies and funds supporting green iron

Australian Renewable Energy Agency (ARENA) – AU$3.2 billion available to support the commercialization of net-zero technologies, including the AU$1.7 billion Future Made in Australia Innovation Fund, which is directing resources towards green metal projects (AU$750 million), clean energy technology manufacturing (AU$500 million) and low-carbon liquid fuels (AU$250 million).[88]

Clean Energy Finance Corporation (CEFC) – AU$32.5 billion available as concessional debt or equity to de-risk projects decarbonizing energy generation and heavy industry, including green steel and hydrogen (see Box 10).

Green Iron Investment Fund (GIIF) – AU$1 billion of grant funds. This aims "to boost green iron manufacturing and supply chains by supporting early mover green iron projects and unlocking private investment at scale," said Prime Minister Albanese, when launching the fund in February 2025.[89] Up to AU$500 million has been earmarked for the transformation of Whyalla Steelworks in South Australia, shoring up local jobs and helping with the energy transition. The remainder is available as grants to both existing facilities and greenfield projects that can demonstrate a pathway to commercial-scale green iron production by March 2031.[90]

Net Zero Fund – AU$5 billion: a new fund, formed in September 2025, to refocus concessional finance from the National Reconstruction Fund "to support major investments by large industrial facilities in decarbonisation and energy efficiency, and scale up manufacturing low emissions technologies", including green metals, batteries and hydrogen value chains.[91,92]

These government agencies work in concert with each other. For example, ARENA supports early-stage R&D and pilot projects to prove technological feasibility, CEFC provides finance to scale-up feasible projects to commercial bankability, while GIIF can help cover capital costs to establish commercial-scale manufacturing facilities. The new Net Zero Fund also aims to dovetail its financing initiatives with those of CEFC.

Nevertheless, given the huge cost of new green iron production plants, participants said additional grant funding would be needed from government to lower capital costs – as part of, or preferably on top of, the existing Green Iron Investment Fund, which they said is unlikely to be sufficient.

BOX 10 Clean energy finance corporation (CEFC)

The clean energy finance corporation (CEFC) is Australia's government-owned green investment bank, with a mission to invest in clean energy generation, low-carbon fuels including green hydrogen and the decarbonization of hard-to-abate industries, such as the iron and steel sector.

It has a reported investment capacity of AU$32.5 billion, which it disburses as both concessional debt (e.g. lower interest rates, longer tenor, flexible repayment terms) and as concessional equity (e.g. lower preferred returns, subordinated equity). This enables CEFC to de-risk early-stage projects and crowd-in private sector finance for first-of-a-kind and higher risk projects.

In the six months to December 2024, CEFC made investment commitments of AU$1.1 billion, which leveraged a total transaction value of AU$6.3 billion. "This is a strong indication of the level of market interest in a diverse range of clean energy investment opportunities," said the corporation's CEO.

Source: see endnote.[93]

Green hydrogen support and funding

In 2024, the government launched its revised hydrogen strategy to accelerate the production, domestic use and export of green hydrogen. The strategy is underpinned by the following incentives:[94]

Hydrogen Headstart Program:
~AU$2.7 billion is still available from this AU$4 billion fund. Its aim is to provide revenue support for large-scale "first mover" projects in renewable/green hydrogen and derivatives (e.g. ammonia, methanol).[95] Funding is provided to successful projects as a credit to cover the commercial gap between the cost of producing renewable hydrogen and its market price.

Hydrogen production tax incentive (HPTI):
AU$2 per kg of clean/renewable hydrogen produced between 2028 and 2040 – at an estimated medium-term cost of AU$6.7 billion.[96] Certification via the GO scheme is required to access this incentive and projects must meet an emissions intensity of ≤ 0.6 kg CO_2e/kg H_2.

Fortescue executive chairman Andrew Forrest called the announcement of the HPTI a "historic moment", adding: "This incentive will fast-track the development of a green iron industry in Australia."[97]

Regional Hydrogen Hubs Program:
over AU$500 million available to co-fund regional hydrogen infrastructure in up to seven hydrogen hubs across the country.

Other existing federal and state support

- **Renewables:** Solar Sunshot Program and Battery Breakthrough Initiative – AU$1.5 billion to strengthen battery and solar panel supply chains. National Energy Transformation Partnership – a framework for the federal and state governments to collaborate on transforming energy systems to net zero by 2050, with a target to reach 82% renewable electricity by 2030. The partnership prioritizes First Nations engagement and energy system reliability improvements.[98]

- **Skills development:** ~AU$600 million to bolster skills development in the clean energy, construction and manufacturing sectors (see Appendix).[99]

- **Planning support:** AU$168 million to support faster planning approval decisions for renewable energy projects of national significance.

- **South Australia:** the government has published a green iron and steel strategy, and streamlined approvals for projects in renewables, hydrogen and green iron. It is co-funded two major projects with Canberra: AU$2.4 billion to support Whyalla Steelworks and AU$100 million to develop nearby Port Bonthyon into an export-scale production and export hub for green hydrogen and ammonia.[100]

- **Western Australia:** the government has announced AU$500 million for strategic industrial areas to help WA become a "global clean energy powerhouse". In September 2025 it presented a State Development Bill to streamline the approvals process, which has hampered the rollout of energy transition infrastructure in the Pilbara.

Additional government support required

Participants proposed a range of additional measures the Australian Government could take to boost the development of the green iron industry:

Contracts for difference (CfDs)[101] – these could be adopted by the government as long-term contracts to pay a minimum strike price for green commodities, in effect creating "quasi-offtake agreements" that guarantee a revenue floor for producers and provide investors with the necessary confidence to proceed. In the medium to long term, importing countries could further underwrite production through their own CfDs. They could be structured at the level of either hydrogen input or green iron output.

Government guarantees – a particularly efficient way to mobilize private capital, as they provide investors with confidence while posing a potentially minimal burden on the government's budget. They can help developers mitigate key risks in three ways:

- Debt guarantees, where the government backs loans for producers, helping lower interest rates.

- Offtake guarantees, where the government guarantees offtake at a minimum price (closely linking to CfDs).

- Technology guarantees, where the government compensates investors for potential underperformance of production assets.

Export credit – the Australian Government could provide direct loans to foreign buyers of green iron, or loan guarantees to banks financing export deals, providing often crucial support to developers. Participants raised the possibility of Export Finance Australia playing this role.

Philanthropy's roles

First-loss capital

Philanthropic capital can take risks that others are unable to, by testing innovative, early-stage ideas that are too uncertain for public funding or commercial investment. When philanthropies provide first-loss capital to absorb the initial downside risk, it gives confidence to other investors to come in at scale.

First-loss capital not only absorbs risk, it also changes the risk/return equation for everyone else. By taking the riskiest tranche, philanthropic dollars can lower the cost of capital for commercial investors, unlocking multiples of additional financing.

When philanthropy backs a first-of-a-kind project, this also has a signalling effect in the market, conveying confidence in the concept, giving projects legitimacy and helping attract later-stage capital.

Another advantage of philanthropic capital is its agility and flexibility, since it is not bound by market returns or lengthy budgeting processes – in turn allowing project proponents to work with speed and flexibility.

Convening and agenda setting

Philanthropy can play a key role in convening unlikely allies, leveraging its neutral platform to bring together stakeholders across sectors and industries. In Australia, philanthropy is helping shape the agenda around the green industrial transition, while building momentum and wider political and market support. This role can extend to supporting policy design and market-building efforts essential to scaling-up emerging green industries.

4.3 Policy enablers

> **The role of government is to coordinate, accelerate and de-risk, not just at the federal level, but also local and international. We need joined-up action to make clean industry a reality.**
>
> Sam Crafter, State Lead, Whyalla Steelworks Industrial Transformation, Government of South Australia

Investors in transition technologies want credible pathways to net zero and visibility on how projects can progress on time and budget. Workshop participants spoke of the need for consistent, long-term policy commitment, beyond electoral cycles, to enable investment to flow into the sector.

This section summarizes policy enablers critical to making Australia's future green industries more investable, including:

- Improving access to affordable renewable power and hydrogen
- Expedited permissions and infrastructure approvals
- Clarity on green standards, certification and "book-and-claim"
- Engaging with local communities and boosting skills development

Improving access to affordable renewables and hydrogen

The availability of abundant, low-cost renewable electricity and green hydrogen were identified by participants as one of the top challenges to developing Australia's green iron sector (see Figure 4).

South Australia leads the way in renewables. Its grid already runs on 70-75% wind and solar power and the state is on track to hit 100% renewable electricity by 2027. SA is also well advanced on hydrogen, having invested heavily in a AU$600 million hydrogen project to support steelworks and power generation.

In Western Australia, decarbonizing Pilbara's mining operations, which account for ~80% of Australia's iron ore exports, would require 5-7 GW of firmed renewable capacity.[102] Yet the proportion of renewables in WA's energy mix is nearer 2% and total installed capacity for mining operations is just 0.2 GW. Mining companies are planning to add 3-4 GW of renewable capacity by 2030. In June 2025, for example, Fortescue applied for permission to build a 2.1 GW wind farm and a 220 kV transmission line to support decarbonization work at its Iron Bridge magnetite mine in Pilbara, WA.

It plans to more than double its investment within the next 12 months.[103]

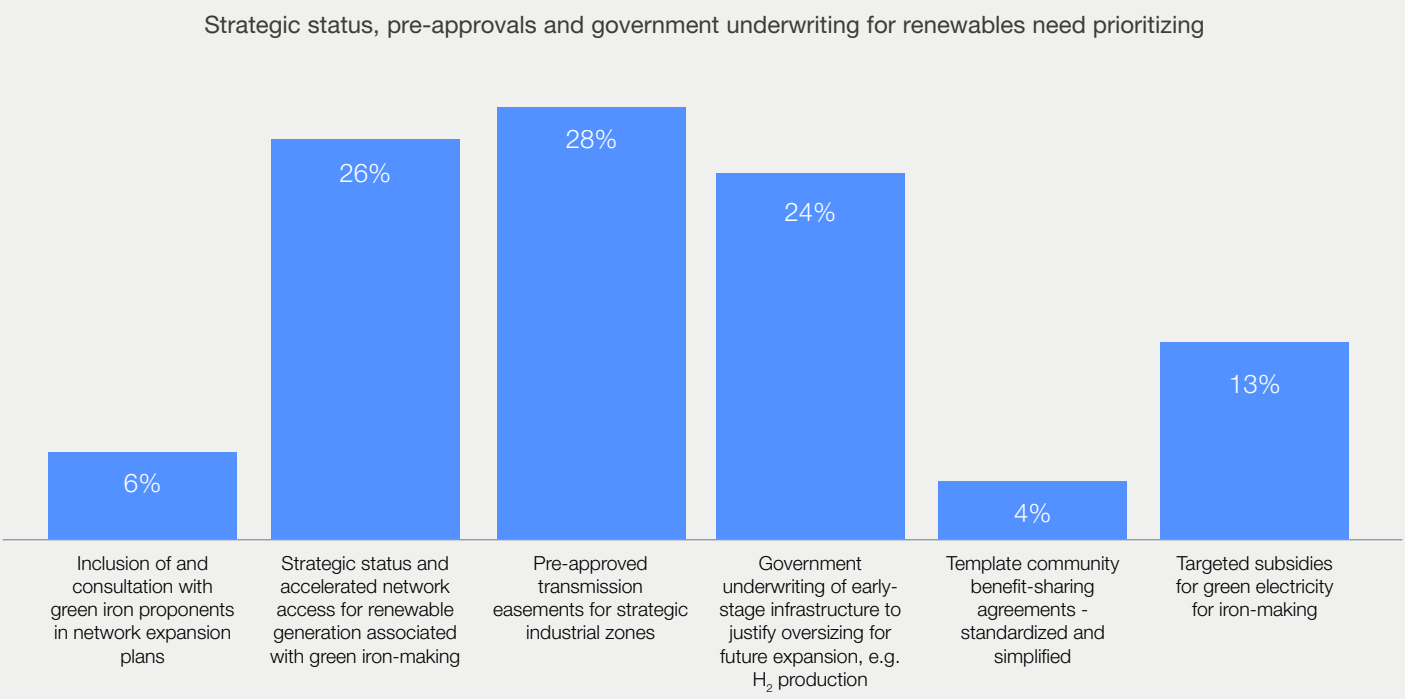
Expansion of WA's grid and the planned build-out of Pilbara's renewable infrastructure are mired in bureaucratic delays.[104] The proposed Australian Renewable Energy Hub (AREH), located 250 km east of Port Hedland, has seen setbacks, including BP's withdrawal from the project in July 2025. Should it proceed, the AU$30 billion project is targeting a full-scale operating capacity of 26 GW of wind and solar generation, plus ~1.6 million tonnes of renewables-based hydrogen production per year.

Investment in renewables infrastructure becomes more viable when projects can connect to wholesale electricity markets, enabling them to raise revenues by selling into the market during times of excess wind or solar power generation. Most projects can trade electricity with either the South-West Interconnected System or the National Electricity Market. However, given its remote location, Pilbara's local grid lacks access to the wholesale market, ruling out that flexible, cost-effective option.

Green iron projects must be viewed holistically to manage costs effectively. For instance, sourcing power under third-party PPAs often increases electricity prices, making the final product less competitive. The workshop dug deeper into how best to accelerate access to sufficient green electricity and produced the following solutions (see Figure 6):

- Pre-approved transmission easements for strategic industrial zones (28%)
- Strategic status and accelerated network access for renewable generation associated with green iron-making (26%)
- Government underwriting of early-stage infrastructure to justify oversizing for future expansion, e.g. H_2 production (24%)
- Targeted subsidies for green electricity for iron-making (13%)

FIGURE 6 **Options that would most accelerate access to sufficient green electricity** (% workshop participants)



Notes: Survey of Adelaide workshop participants, August 2025. Indicative data only (n = 54).

Expedited permissions and infrastructure approvals

As reflected in the delayed rollout of Pilbara's shared electricity transmission infrastructure above, participants cited the time and complexity involved in permissions and approvals as a key barrier to progress in developing infrastructure – in turn undermining investor confidence. Delays in approvals for large-scale wind and solar projects in New South Wales are also well-documented.

"One-window" licensing

Permissions are primarily a state government's responsibility, although they can be overruled by federal ministries in exceptional circumstances. A simpler, swifter, more streamlined approvals process is needed at state level, for example via a "single window" model.

There are promising signs. In South Australia, the government has embraced a "one window to government" approach, in which the licensing agency (e.g. Department for Energy and Mining), acts as the central point of coordination.[106]

In Western Australia, the government introduced legislation in September 2025 to streamline permitting processes for renewable energy generation, green iron and manufacturing projects. Some permitting power will be delegated to a co-ordinator general, who will work across agencies to support priority projects. WA government's aim is to reduce the state's reliance on coal faster than any other Australian state.[107]

Clarity on green standards, certification and "book-and-claim"

Aligning domestic low-carbon principles with export markets

Trust is critical to the fledgling green iron industry. Participants identified third-party verification and international alignment of standards as the most critical mechanisms to build trust in early offtake agreements. Lack of consistency around existing standards and certifications for green steel is an ongoing challenge. Buyers are not clear which methodologies are being used to make "green claims" or what kinds of data these claims rest on. In the post-fossil economic model, getting the definition of "green" right is foundational.

Clarity on this would help Australia export green iron to markets in Europe and East Asia. It is equally vital for investors. Previous polling highlighted that >80% of financiers felt "green iron" cannot be produced with fossil fuels – including gas. This reflects the poll of workshop participants that found just 16% backed natural gas-based DRI compared to 59% supporting green hydrogen-based DRI (see Figure 1). So proving the credibility of the low-carbon pathway matters.

There is no shortage of principles developed by, among others, the International Standards Organization (ISO), Responsible Steel and World Steel. The challenge is a lack of consistency and interoperability across standards, for example on system boundaries for different product-level caluclations.

Australian National University (ANU) has identified eight principles to guide the design of frameworks for tracking greenhouse gas (GHG) emissions in products and their supply chains, including iron and steel, known as the Embedded Emissions Accounting (EEA) principles. This work contributes to Australia's efforts to align domestic and international climate and trade policies, including initiatives such as the Guarantee of Origin scheme.[108]

Meanwhile, energy feedstocks have not received much scrutiny in green certification frameworks. One solution voiced in the workshop was to move scrutiny of electricity production to hourly or half-hourly accounting.

Book-and-claim models

By decoupling environmental attributes from physical commodities, a producer can generate tradeable certificates for each tonne of clean commodity, while buyers can "book and claim" them even if the molecules don't physically move.

This idea formed a major recommendation in a recent report by The Superpower Institute, which encouraged the government to create a green hydrogen (GH_2) certificate scheme so that producers of GH_2 could earn certificates to trade with green iron producers anywhere in Australia. The report maintained that "iron produced with natural gas could be recognised as 'green' iron production when equivalent green hydrogen certificates are purchased and surrendered".[109]

Participants at the workshop noted that export buyers interested in green attributes generally ask for full traceability of emissions, regardless of the accounting model. A lively debate then ensued on the best models. Proponents of the book-and-claim approach argued it could unlock bankable offtake. The government or another anchor buyer could contract for the clean attribute while the physical iron sells into conventional markets, helping overcome the green premium and lower financing costs through a viable offtaker.

Others were more cautious, pointing out that book-and-claim is complicated, requiring additional carbon accounting knowledge and middlemen such as loggers of certificates. This makes it more expensive, more difficult to track and more likely to be viewed as greenwashing. They argued that credits should be tightly tied to *physical* green iron production and use, adding that generic offsets should not be passed off as steel sector decarbonization. One solution proposed was to use "attribute separation with guardrails" to close the bankability gap.

Engaging with local communities and boosting skills development

> **Securing and realising the benefits of First Nations peoples' participation in the emerging new economy serves to secure a flourishing net zero Australia… Even today, our people experience energy poverty and energy reliability issues unknown by most other Australians. For Australia to have a just transition, this must be addressed.**
>
> First Nations Clean Energy and Climate Change Advisory Committee[110]

Ensuring projects deliver tangible benefits for communities and land custodians

Workshop participants argued strongly in favour of co-developing projects with Traditional Owners to improve the chances of long-term success and social licence. Equally, they warned about the risks of community fatigue and opposition associated with failing to build trust among First Nations and local communities. Local concerns range from land-use conflicts and water availability to impacts on health and the environment – as well as ensuring that projects deliver tangible local benefits such as improved infrastructure, education and jobs.

Heavy industrialization around Whyalla, for example, has met with local community opposition, due to potential impacts on sensitive coastal ecosystems. In Queensland, communities raised concerns about investment associated with Hydrogen Park Gladstone impacting the future of local healthcare, housing and liveability.[111]

Recommendations from an earlier workshop held by Greenhouse in Gladstone include the need for a regional coordinating body to address community fatigue, mistrust and expectations around tangible benefits accruing from new industrial investment

There is often strong local support for green iron projects and the local jobs, enhanced skills and economic development they can deliver; but the benefits must be equitably shared. Trust must be built and maintained – and this in turn rests on community engagement that is early, deep and continuous. As one participant reflected: "community trust must be earned every day".

In South Australia, the government passed its Hydrogen and Renewable Energy Act in 2023 to ensure such projects would be "developed in a socially and environmentally sustainable manner that responsibly addresses Native Title rights and Aboriginal interests".[112]

Meanwhile in December 2024, the federal government published its First Nations Clean Energy Strategy (2024-2030), which calls for meaningful negotiation and sincere partnerships "to maximize the enormous, nation-wide potential for First Nations peoples to benefit from the clean energy transformation".[113]

Skills development and the just transition

Green industrial development is fundamentally a "people problem", said one participant. Successful deployment requires attention to local communities, jobs, workforce skills and industrial relations. Automation and capital-intensive projects alone are insufficient – human capital, social impact and community support are crucial for sustainable long-term outcomes. Community benefit-sharing agreements need to be standardized and simplified, to ensure just transition goals.

Current shortages in technical talent – such as metallurgists, hydrogen engineers, process operators – are a constraint. Without dedicated training, green iron projects may be delayed even if capital is in place. In its 2024-25 budget, the government committed ~AU$600 million to developing clean energy skills as part of its Future Made in Australia (FMiA) agenda (see Appendix).[114]

4.4 Infrastructure enablers

> **Infrastructure is the gatekeeper to everything else.**
> Workshop participant

Shared infrastructure and industrial clusters based around green iron hubs can maximize economies of scale and proximity to generate momentum for the industry. Securing financial close on the first Lighthouse green iron projects by the end of 2027 was highlighted as a powerful way to increase confidence and unlock further investments.

Industrial clusters and "net zero industrial precincts"

Projects cannot be seen in isolation: infrastructure must be planned holistically. A green iron or steel facility requires upstream renewable energy, hydrogen production, desalination, water purification, transport infrastructure, port access and workforce development. Addressing these needs collectively, with government coordination, can reduce financial and operational risks and make projects feasible for institutional investors.

The workshop addressed the role of industrial clusters and hubs in attracting and centralizing the investment and talent needed to develop innovative technologies, successful pilots and skilled workforces. Industrial clusters can also take a systemic approach to integrating different sectors – including energy, industrial infrastructure, trucking and shipping – to activate a more sustainable, interconnected value chain.

Regional export clusters such as Whyalla and Pilbara are already co-locating green industrial facilities near ports to reduce costs and emissions. In a recent report, Climateworks Centre highlighted that Gladstone, Queensland and regions like it could benefit from pursuing collective industrial decarbonization within a "net zero industrial precinct" (NZIP) approach, where industrial actors and government agencies coordinate to implement technological, economic and policy solutions that reduce investment costs and risks associated with secure renewable energy and competitive low-carbon production.[115] "Working to reduce emissions of a whole NZIP, rather than one company at a time, could set regions up for success," it said.

Potential green iron hubs

The Superpower Institute has modelled five potential green iron hubs – one in SA, three in WA and one in Queensland. Selection is based on proximity to renewable energy and iron ore – or to ports which can handle shipping of ore for processing – as well as connections to wholesale electricity markets (see Table 2). The workshop discussed some of these options.

TABLE 2 | **Potential green iron hubs and their characteristics**

Location	Connected to wholesale electricity market	Capital cost multiplier[1]	Type of iron ore	Processing[2]
Eyre Peninsula (South Australia)	YES	1.08	Eyre Peninsula DR-grade magnetite	— Pelletization of ore for inflexible technology
Pilbara (Western Australia)	NO	1.34	Pilbara lower-grade hematite	— Pelletization of ore for inflexible technology — DRI processed in electric smelting furnace for both flexible and inflexible technologies
Kwinana (Western Australia)	YES	1.12	Pilbara lower-grade hematite	— Pelletization of ore for inflexible technology — DRI processed in electric smelting furnace for both flexible and inflexible technologies
Geraldton (Western Australia)	YES	1.24	Central WA DR-grade magnetite	— Pelletization of ore for inflexible technology
Gladstone (Queensland)	YES	1.11	Pilbara lower-grade hematite	— Pelletization of ore for inflexible technology — DRI processed in electric smelting furnace for both flexible and inflexible technologies

Notes: 1. Each location has a "capital cost multiplier" to capture local building and operating costs.
2. "Inflexible" technology requires a continuous supply of green hydrogen or natural gas to reduce ore to iron. "Flexible" technology can ramp production up and down, according to variable sources of energy.

Source: The Superpower Institute, 2025.[116]

Eyre Peninsula and the Whyalla Steelworks, South Australia

SA's Eyre Peninsula emerged as a frontrunner in TSI's analysis, with potential to produce the cheapest green iron in Australia at ~AU$668 per tonne (green HBI, flexible) without policy support, (see Figure 5).

The state has numerous natural advantages. Its Middleback Ranges conceal 19 billion tonnes of magnetite reserves, including 7.9 billion tonnes economically demonstrated. Its wind and solar energy are on track to deliver 100% renewable electricity by 2027. The concentration around SA's Upper Spencer Gulf of abundant magnetite deposits and renewables – combined with deep water ports, established industrial pit-to-port infrastructure and a skilled workforce – means the region can potentially support 1-3 Mtpa of green iron production by 2030, with the right policy settings.

SA hosts Whyalla Steelworks, which produces the majority of Australia's structural steel. Currently in administration, Whyalla's recent AU$2.4 billion transition package – backed by both federal and state governments – includes converting the plant from its existing coking coal-powered blast furnaces to a hydrogen-ready DRI/EAF facility by 2030, with a planned capacity of around 1.8 Mtpa. However, uncertainty persists. In May 2025, the state shelved its ~AU$600 million green hydrogen power project plan and dissolved the body charged with managing it.[117] In June, the government formally put the steelworks up for sale; so its strategic direction and green future will depend on the new owner.[118]

Pilbara, Western Australia

As discussed in Chapter 2.1, Pilbara is Australia's iron ore heartland. Two-thirds of the country's hematite is found there and a combination of operational scale, simple processing and efficient transport infrastructure make Pilbara's iron ore exports among the lowest-cost in the world. A record 730 Mt of iron ore were exported from Pilbara's ports in 2024-25, accounting for 81% of the national trade and 43% of the global trade.[119]

Pilbara's challenge is to adapt to the demands of low-carbon production, which requires direct reduced iron that avoids fossil-powered blast furnaces. It either needs to invest in beneficiation and electric smelting of its ubiquitous hematite, or it must significantly ramp up mining of DRI-grade magnetite ore.

Magnetite concentrate is already being produced in Pilbara, in relatively modest quantities – for example in Iron Bridge (~5-9 Mt) and Cape Preston (~14 Mt) – with Ridley Magnetite Project near Port Hedland going through regulatory approvals.

Despite Pilbara's rich resources, its green future is hampered by inadequate renewable power and shared-used transmission infrastructure, with slow approvals preventing progress (see Chapter 4.3).

Geraldton, Western Australia

Geraldton has the potential to produce the cheapest green iron in Australia after Eyre Peninsula – at ~AU$770 per tonne of (green HBI, flexible) without policy support, according to TSI (see Figure 5).

Its renewables infrastructure is well-developed and it has access to reserves of DR-grade magnetite ore from the nearby Mid-West. Geraldton's connection to wholesale electricity markets via the South West Interconnected System (SWIS) enables producers to shore-up the cost-effectiveness of renewable energy production by arbitraging power prices.

Momentum behind green iron production is building in the region. The Mid-West Green Iron project aims to produce 7 Mtpa of green iron pellets by 2029, while Green Steel of WA plans a 2.5 Mtpa hydrogen-ready DRI plant at Oakajee. Geraldton's existing deep-water port and the planned Oakajee Strategic Industrial Area (SIA) offer direct export routes to key Asian steelmakers seeking low-carbon feedstocks.[120]

Gladstone, Queensland

Gladstone is a hub of heavy manufacturing, with natural and economic assets that position it well for a future in green iron. It has access to extensive renewable energy resources, with the potential to generate over 47 GW of renewable energy.[121] Its industrial infrastructure includes the deepwater Port of Gladstone, with a total throughput of 120 Mt per annum.[122] In addition, Gladstone has a highly skilled workforce, with 14.4% of the region's jobs in the manufacturing sector.[123] However, the city also faces pressure from local communities about the impacts of industrial development on healthcare, housing and liveability.[124]

Lighthouse green iron projects – critical to unlocking investor confidence

> **We're not short of capital — we're short of investable projects. Unlocking that means reducing risk, ensuring transparency and giving investors confidence that offtake and infrastructure will be there.**
>
> Panellist, Financing discussion

The idea of Lighthouse projects to prove the commercial viability of green iron captured the imagination of participants at the Adelaide workshop. It should be possible to secure FID for one or two commercial-scale green hydrogen-based DRI plants by the end of 2027, they reasoned. These projects could act as anchors for the industry, unlocking investor confidence and catalysing the development of green iron infrastructure and corridors.

Participants said the most likely risks facing the rapid roll-out of Lighthouse projects are access to sufficient quantities of affordable green power and the speed of government approvals. They suggested the following key enablers:

- **Common-user infrastructure** for electricity transmission, iron ore beneficiation and testing (e.g. DRI + EAF or ESF), as well as for hydrogen storage and logistics.
- **Fast-track permitting** via single-window approvals and an "overriding public interest test" to accelerate project timelines.
- **Public-private consortiums and location-based incentives** to attract anchor tenants and build industrial clusters.
- **A transparent emissions measurement framework** to build trust in commercial offtakes with first mover buyers.
- **Smaller-scale demonstration facilities** to prove the viability of producing different commercial grades of green iron from a range of Australian ores, developed as common-user infrastructure to lower barriers for new entrants.

4.5 Regional enablers

> **How do we value the cost of transforming our biggest export?**
>
> Workshop participant

This section looks at the critical role regional export markets will play in driving demand for Australia's nascent green iron industry. Energetic diplomacy is needed with partners across the region to develop a regional green trade architecture, with interoperable standards and green shipping corridors (see Chapter 3.4). Building consensus around regional carbon pricing would further enhance the affordability – and therefore bankability – of Australian green iron.

Export strategy critical to long-term success of green iron industry

Australia has a chance to be a first mover in the green iron export market but must act quickly, as the window of opportunity is closing. Other countries (especially the US and Middle East economies) are moving ahead with subsidies and fast-track developments. There is a risk that global buyers will turn to other producers if Australia does not signal commitment. Collaboration with global and regional trade partners and alignment with global standards in green steel are high priorities. The government has already signed a slew of MoUs on green trading and shipping with key partners in the region, including Korea and Singapore (see Appendix).

China imports 50-60% of its iron ore from Australia, accounting for 86% of all Australian iron ore exports in 2023.[125] The global leader in most zero-emissions technologies, China is accelerating the decarbonization of its economy and in late 2024 extended its ETS to include steel. Clearly Australia's relationship with China is critical to boost the country's fledgling green iron industry. When he met President Xi Jinping and Premier Li Qiang in Beijing in a visit to China in July 2025, Prime Minister Albanese acknowledged that "one in four of Australia's jobs depends upon trade" and "China is overwhelmingly, by far, the largest trading partner that Australia has." At that meeting, both countries' leaders agreed to establish a new policy dialogue on steel decarbonization.

Meanwhile, South Korea and Japan are adopting net-zero measures that influence demand for green iron and steel. Cost competitiveness is critical for Australia to attract investment and compete with the Middle East and Southeast Asia. Policies and incentives are needed to reduce infrastructure and production costs, leveraging Australia's natural advantages.

Export deals for green iron with regional trading partners would send a much-needed demand signal to producers in Australia, said one speaker at the workshop, adding that Australia needs to feed the growth opportunities of its regional partners. In South Korea, for example, there are three EAF projects that will need access to DRI, while in Japan there are four (see Table 3).

It is also important, said one participant, to appreciate that regional partners are starting from the same point that Australia is – that is to say, "Made in Japan", "Made in Korea". The difference will come down to whether Australia has a competitive advantage to manufacture green iron more cheaply, given its access to enormous quantities of renewable power and iron ore.

There was broad consensus that Australia's green iron industry will only achieve longevity if export demand is triggered. "We need to activate our foreign policy and diplomatic effort," said one participant, adding: "We need a green export strategy tying all this together." When asked whether the industry could provide government with a value to justify this level of government involvement, one participant replied: "How do we value the cost of transforming our biggest export?"

Various regional bodies, including Asia-Pacific Economic Cooperation (APEC) and others, could play a role in promoting Asia-Pacific green trade (see Appendix). However, participants at the workshop emphasized that the real momentum lies in Australia's bilateral deals with Japan, Korea and Singapore, where offtakes and MoUs are already happening.

TABLE 3 | **Green iron projects announced since 2022 in Australia's main export markets**

Company/Consortium	Country	Project	Status
HBIS Group (Xuansteel)	China – Hebei	600 kt H_2-rich shaft-DRI plant (60% H_2)	Financed and operating since 2023
China Baowu (Zhanjiang)	China – Guangdong	1 Mt H_2-ready DRI shaft + downstream EAF	Operating since 2023
Rio Tinto + Baowu	China (site to be decided)	Pilot electric melter using Pilbara-ore HBI	MoU Jun 2024; internal funding; concept design
BHP + HBIS	China – Hebei	BF abatement tech and optimization of iron-ore usage for DRI and EAF production	MoU in 2024; ongoing tests; proof of concept
POSCO HyREX pilot	Korea – Pohang	Fluidised-bed H_2-DRI (HyREX) pilot	Pilot furnace installed 2024; full plant FID 2025; planned for completion by 2027
POSCO HBI offtake MoU	Korea (import)	Long-term MoU to buy WA low-carbon HBI	MoU 2023; conditional on AU FID
JFE Steel – H_2-DRI pilot	Japan – Kurashiki/Fukuyama	Small H_2 shaft-DRI pilot using low-grade pellets	Gov't grant; trials Dec 2024
JFE Steel – Advanced EAF plan	Japan – Kurashiki	2 Mt high-efficiency EAF	Gov't grant in 2025; expected production starts in 2028
Nippon Steel & Toyota Tsusho (HBI imports)	Japan (import)	Framework to procure HBI from Middle-East/Oceania green-iron hubs	Commercial MoU 2024

Source: BCG, 2025.

Non-exhaustive

Aligning Asia's carbon markets with Europe offers another route to green iron

Another solution aired at the workshop is for Australia to work with regional partners to align regional carbon pricing – ideally through an Asian Carbon Border Adjustment Mechanism (CBAM), similar to Europe's, which will impose a price on the embodied carbon in goods imported to the bloc from January 2026 onwards.

The EU is the world's largest importer of finished and semi-finished steel products, accounting for 35% of global steel imports. Once CBAM is established, the EU's steel imports are expected to attract an additional €2.21-2.70 billion in carbon tax in 2026.[126] The prospect of these CBAM-driven taxes is already creating incentives for Asia's emission trading systems (ETS) to converge.

At the end of 2024, China's ETS – the world's largest carbon market – expanded from covering power only to encompass steel, aluminium and cement.[127] Japan is moving to a mandatory ETS in 2026, while Korea is under pressure to raise prices in its ETS. An Asian CBAM would not only level the playing field regionally, it would also reduce EU compliance costs and ensure that the benefits of any carbon levies remain within the region, rather than – for example – being paid to the EU (see Box 11). If Asia's ETSs were to converge towards EU ETS levels, carbon costs would then become material enough to change the calculus on sourcing low-carbon iron ore and green HBI for use in primary steel production, providing a much-needed demand signal for Australian green iron.

BOX 11 | Impact of CBAM on Asia's iron and steel market

Europe's Carbon Border Adjustment Mechanism (CBAM) comes into full force on 1 January 2026. It will require all importers of specified commodities – including iron and steel – to surrender CBAM certificates priced off the weekly EU's Emission Trading System (ETS) auction price. The calculation will based on the following: embedded emissions of imported commodity (tCO_2) x CBAM price (€/tCO_2) *minus* any domestic carbon price already paid in the country of origin that meets EU criteria. In July 2025, analysts forecast this price would average ~€73/tCO_2 for Q3 2025, rising to €108 by 2027, as the free supply and auctions of CBAM certificates contracts.

Both South Korea and Japan are exposed to CBAM through their exports of largely flat steel of automotive or industrial grade. The EU imported ~3.21 Mt of flat steel from South Korea in 2024 and ~1.75 Mt from Japan in 2023. Most of this steel is produced using carbon-intensive BF-BOF mills, with average emissions of ~2.3 tCO_2/t steel. Calculating the actual levy on steel from CBAM is complicated and will depend on the emissions values the EU sets for imported steel under CBAM as well as the final benchmarks used for deducting free allowances, which will not be available until early 2026.

Best estimates for the likely CBAM levy in 2026 currently range from €50-60 per tonne of steel. Europe has been paying an average of €500-550 per tonne of imported hot-rolled coil (a type of flat steel used as a proxy). Consequently a CBAM levy of €55 per tonne would be equivalent to ~10% of the steel's value – similar to an import tariff, although the EU characterizes it as an environmental compliance mechanism.

Korea has a mandatory ETS, but prices are far below the EU ETS rate; Japan has a voluntary ETS, with plans for it to become mandatory from 2026. So currently, deductions from the CBAM levy would be low to zero.

CBAM will therefore have a significant effect on East Asia's steel exporters. They may choose to export to other markets without a carbon price, or they may choose to ramp up exports of steel made using the scrap-EAF route, which averages emissions of ~0.7 tCO_2/t. Equally, they may decide their trade with Europe is sufficiently valuable to invest in importing green iron ore from producers such as Australia.

There is also another scenario. Given that the EU's CBAM allows for deductions of domestic carbon prices already paid in the country of origin, subject to EU criteria, countries across Asia might opt to align their national ETSs with EU ETS – or create an Asian CBAM. At least then, exporting nations stand to benefit by collecting the carbon levy from their own exporters rather than seeing Brussels pocket the cash.

Source: see endnote.[128]

5

The way forward for Australia's green iron industry

Participants set a goal to secure financial close on one or two Lighthouse projects by late-2027. Five priority actions could help deliver this.

The opportunity for Australia and the region offered by green iron is, as one participant put it – "immense". Progress hinges on bankable projects, demand aggregation and enabling policy frameworks. This chapter highlights top takeaways from the workshop and priority actions to help actors from all sectors seize Australia's green iron opportunity.

> **Australia has what the world wants. But to lead, we need to stop thinking like a quarry and start acting like a clean industry superpower.**
>
> Ross Garnaut, Keynote speaker; Founder, The Superpower Institute; Emeritus Professor of Economics, University of Melbourne

5.1 Key takeaways from industry stakeholders

Australia is in a race with competitors to seize the first-mover advantage

Australia's renewable energy capacity, DR-grade magnetite resources and export infrastructure create a strong base, but rivals in the US and Middle East are moving faster with subsidies and approvals. Getting a commercial green iron project to financial close by late-2027 is an urgent priority to claim a competitive edge in the market.

Regional engagement is vital to align export markets on carbon pricing and certification

Australia must forge strong partnerships with Europe and East Asia. Korea and Japan – dependent on imports and exposed to CBAM – are ideal offtake anchors, as their EAFs prepare to use DRI. Aligning regional carbon-pricing and green certification – especially in the lead-up to COP31 – are key to driving demand.

A systems approach is key to deliver a green iron industry, not siloed projects

Transforming Australia's largest export industry requires a systems approach, with coordinated action by government, industry and finance players to share risk and coordinate across federal and state levels to fast-track approvals, common-use infrastructure and regional engagement.

Capital is available – but seeks project confidence, policy clarity and scale

Investors are aligned on green iron's potential and significant capital is available, but it must be matched by confidence in project readiness, regulatory clarity, government backing and – above all – long-term offtake agreements. Projects need designing for scale from the outset to compete globally. Financiers seek large, collaborative ventures underpinned by stable government strategy, not isolated pilot projects.

Demand signals and offtake agreements are essential to de-risk investment

Governments must decouple industrial growth from emissions by underwriting early-stage risk and providing long-term contracts. Green iron requires secure offtake agreements supported by industry and government. The First Movers Coalition and RMI's Sustainable Steel Buyers Platform provide critical demand signals.

Swift approvals and shared infrastructure are essential enablers

Slow, fragmented approval processes undermine investor confidence. Single-window sign-offs and an "overriding public interest test" are needed to accelerate project timelines. Public-private collaboration on green hubs and industrial clusters is vital to scale up shared infrastructure spanning energy, water, ports, transport and workforces.

Trust, transparency and tangible benefits must underpin community engagement

Transparency, inclusion and tangible benefits are important factors when engaging with local communities and First Nations. Genuine partnerships, consistent communication and strong commitments to local hiring and training are critical to earning lasting social licence.

5.2 Five priority actions needed during FY2026-27 to deliver Lighthouse project success

Workshop participants agreed the principal goal for the industry must be to accelerate one or two Lighthouse green iron projects towards financial close by the end of 2027 and achieve commercial operations before 2030. This will test-drive the right approach – from technology and policy to permissions and financing – need to deliver success. In turn, this will reduce risks and anchor early investor confidence – both essential to mobilizing the commercial bank lending and institutional investment needed for the industry to scale up.

To deliver FIDs on these Lighthouse projects by late-2027, the following five priority actions are necessary:

Action 1

Government to provide additional, coordinated and targeted supply-side incentives

The government's AU$1 billion Green Iron Investment Fund and production tax incentive of AU$2/kg for renewable hydrogen are welcome. But they are not sufficient to match either the scale of the opportunity to transform Australia's leading export – or the risk of failing to seize it. Participants identified a key role the government could play in taking on more early-stage risk. Urgent action is needed, since FIDs on Lighthouse projects must consider all incentives well in advance. These could include:

- **Additional grant funding and concessional finance**, coordinated and targeted at bridging the early-stage bankability of green iron projects.
- **A production tax incentive** for green iron that enables the industry to compete with fossil-fuelled incumbents in international markets. This tax credit could match the critical minerals production tax incentive, due to come into force in 2027.

Action 2

Boost demand through private offtake commitments and public procurement mandates

Australia's green iron industry cannot exist on the life-support of government grants alone – a healthy future depends on significant injections of market demand, for example:

- **Greater private sector offtake commitments** by 2030, aggregated by platforms including the First Movers Coalition and RMI's Sustainable Steel Buyers Platform.
- **Government procurement of green iron.** For example, Australia's "Major Public Infrastructure Pipeline" demands 8.1 Mt of steel over four years to 2028 – mandating 50% of this as green steel from local production would send a very strong demand signal to the industry.
- **Government contracts for difference.** CfDs, offered for products sold within Australia, could help bridge the gap between pricing and production costs.

Action 3

Implement fast-track approvals for renewable energy projects supporting green iron and steel

Access to sufficient, affordable green electricity is one of the top barriers hampering Australia's green iron and steel industry, said participants. To compete with markets such as the Middle East, it is critical for Australia to lower the cost of the green energy needed to decarbonize its largest export industry. Slow permitting pushes up risks and costs, so accelerating approvals for both renewables and green hydrogen projects is essential:

- **An "overriding public interest" test** would fast-track approvals to build the infrastructure needed to supply sufficient, cheap green energy where the industry needs it.
- **One-window approvals** would streamline a permissions process currently mired in bureaucracy.

Action 4

Implement consistent "green" standards and certification

Buyers need to know and trust what the "green" in green iron actually means. Workshop participants deemed third-party certification as the most critical mechanism to build trust in early offtake agreements. Urgent measures include the following:

- **Create consistent definitions and methodologies** for emissions limits, accounting standards and certification, aligned with international frameworks. ANU's Embedded Emissions Accounting (EEA) principles and the government's Guarantee of Origin scheme are a good start.
- **Decide on the role of gas:** is gas-based DRI/EAF, which reduces steelmaking emissions by ~35-40% compared to the BF-BOF process, a valid transition pathway, if it blends in green hydrogen over the next decade as the market develops?

– **Develop a credible book-and-claim system**, enabling producers to generate tradeable certificates for each tonne of clean commodity.

Action 5

Strengthen regional trade partnerships

As critical markets in China, Korea and Japan decarbonize and develop national ETSs, Australia has a significant opportunity to ramp up green iron exports before rivals muscle in on the trade. Actions should include the following:

– **Treat green iron as a two-way trade** and investment opportunity that enables shared growth across Asia.

– **Agree a regional carbon price** with Asian partners, initially limited to green iron and steel. In time this could develop into full alignment of national ETSs and an Asian version of Europe's CBAM.

– **Build on regional momentum:** in late 2024 China extended its ETS to include steel, while Japan is moving to a mandatory ETS in 2026; in July 2025, the government agreed to establish a policy dialogue on steel decarbonization with China.

– **Bilateral cooperation** with India and Singapore would boost exports of iron ore and ammonia decarbonized with green hydrogen. Investing in green corridors from Pilbara to China – including safe bunkering infrastructure, regulation and workforce training – is essential.

Appendix

A1 Government funding for clean energy skills development in 2024-25 budget

AU$265.1 million in targeted support for the Australian Apprenticeships Incentive System.

AU$178.6 million in worker transition support, including the Energy Industry Jobs Plan and place-based Regional Workforce Transition Plans which will reflect the voices of communities, workers and employers.[130]

AU$91.0 million to expand skills training and training centres for the new energy workforce in wind, solar, pumped hydro, batteries, grid, hydrogen and related trades.

AU$68.4 million to attract and retain skilled workers in priority industrial sectors under FMiA.

AU$55.6 million for the Building Women's Careers programme.

AU$38.2 million to support diversity in science, technology, engineering and maths roles.

AU$30 million to "turbocharge" clean energy teaching, training and assessment.

Establishing a National Hydrogen Technology Skills Training Centre.

A2 Australian diplomacy to promote green trade with regional partners

China

July 2025: China-Australia Annual Leaders' Meeting – Prime Minister Anthony Albanese and Chinese Premier Li Qiang agreed to establish a new policy dialogue on steel decarbonization, continue exchanges on the green economy and review the *China-Australia Free Trade Agreement*.

June 2024: *Australia-China MoU on Climate Change Cooperation* – to promote policy and technical cooperation on climate change and its impacts, recognizing a shared commitment to multilateral climate processes (e.g. Paris Agreement). In August 2024, the two countries revived their Australia-China Ministerial Dialogue on Climate Change, last held in 2017.

India

November 2024: *India-Australia Renewable Energy Partnership* – areas of cooperation include solar power, green hydrogen and energy storage.

Indonesia

July 2024: *Australia-Indonesia MoU on Cooperation in the Field of Energy Transitions* – to promote mutual support for the energy transition and investment in clean energy infrastructure and manufacturing.

Japan

October 2023: *JBIC-CEFC MoU* – Japan Bank for International Cooperation (JBIC) agreed to work with Australia's Clean Energy Finance Corporation (CEFC) on promoting decarbonization through hydrogen and renewable energy.

June 2021: *Japan-Australia Partnership on Decarbonisation through Technology* – to cooperate on clean hydrogen and ammonia, as well as low-emissions steel and iron ore.

Korea

February 2025: Australia-Korea green shipping route – an MoU to examine the feasibility of establishing a green shipping route using eco-friendly fuels, with a goal to initiate the route from 2029.

December 2024: *Green Economy Partnership Arrangement on Climate and Energy* – a 10-year agreement to boost cooperation and mutual trade opportunities in renewable hydrogen, clean energy technologies, green metals and carbon sequestration.[131]

Singapore

March 2024: Green and Digital Shipping Corridor – an MoU to accelerate maritime decarbonization and digitalization, aligned with IMO's net-zero strategy, through a joint supply chain for near-zero fuels, safety training and standards, bunkering requirements and port-to-port pilot projects.

October 2022: *Singapore-Australia Green Economy Agreement* – to promote cooperation with policies and standards, carbon markets, green finance, and low-carbon trade and investment.

A3 Collaboration bodies that could promote regional trade in green iron

Asia Zero Emission Community (AZEC): launched by Japan in 2023 with 11 partner countries (including Australia, but not China or Korea) to promote pathways towards "carbon neutrality/net-zero emissions" in Asia. AZEC can convene stakeholders, pilot methodologies (e.g. for emissions accounting, supply chain decarbonization) and facilitate MoUs. It could serve as a "sandbox" to test regional certifications and standards.

Indo-Pacific Economic Framework (IPEF): launched by US President Biden in 2022, IPEF supports regional collaboration on supply chains, trade and the adoption of clean energy through its Clean Economy Agreement. Through IPEF, Australia is building cooperation on interoperable regional methodologies to classify and facilitate trade in low-emissions products. IPEF is also promoting regional development of renewable hydrogen and its derivatives. It aims to mobilize private sector finance to advance the region's clean energy transition, through its Catalytic Capital Fund established by Australia, Japan, Korea and the US.

Asia-Pacific Economic Cooperation (APEC): founded in 1989, this is now a 21-member regional forum for trade and economic integration, including green-growth goals through its Environmental Goods List. APEC promotes voluntary sustainability standards (VSS) and mutual recognition, supporting regional norm-setting and capacity building.[132] APEC could provide a forum for developing shared definitions and cross-border frameworks for low-emissions commodities such as green iron. APEC's Energy Working Group (EWG) has set goals to reduce energy intensity and double the share of renewables in the energy mix by 2030. EWG has also published guidance to develop low-carbon hydrogen policy frameworks in the region.[133]

Contributors

World Economic Forum

Noam Boussidan
Programme Head, First Movers Coalition

Jelena Aleksić
Industry Decarbonization, Metals Lead (Aluminium and Steel), First Movers Coalition

Mette Asmussen
Lead, Maritime Sector Initiatives, First Movers Coalition

Thibault Villien De Gabiole
Industry Decarbonization, Trucking Lead, First Movers Coalition

Nadia Mondini
Specialist, Energy and Industry Transition Finance

Julia Franchi Scarselli
Regional Decarbonization Lead, First Movers Coalition

Jonathan Walter
Lead author & editor

Boston Consulting Group (BCG)

Rebecca Russell
Managing Director & Partner; Climate & Sustainability Lead, Australia and New Zealand

Diana Sukailo
Consultant, Climate & Sustainability in Industrial Goods

Nelly Eggert
Consultant

Production

Bianca Gay-Fulconis
Designer, 1-Pact Edition

Tanya Korniichuk
Illustrator, 1-Pact Edition

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Greenhouse

Harry Guinness
Chief Partnership Officer

Ed Schmidt
Chief Operating Officer

Elsie O'Gorman
Program Manager

Boundless Earth

Eytan Lenko
Chief Executive Officer

Georgia Lourandos
Commercial and Investments

Springmount Advisory

Tom Quinn
Managing Director

Jane Sewell
Head of Operations and Research

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– Project risk – e.g. permitting and permissions, which in turn has an impact on whether the project be delivered on time and on budget.

– Technology risk – will the technology deliver to expectations? Novel technologies bring the risk of being un-tried or tested. Established technologies may get superseded by newer, more effective technologies.

– Project-on-project risk – when the success of one project depends on the success of another, e.g. a green iron plant depends on renewable energy plants to deliver accessible, affordable and timely supplies of green power.

– Regulatory risk – e.g. changes in government incentives, tax breaks, other enabling policies; or changes to export markets through carbon taxes and border adjustments.

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World Economic Forum
91–93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744
contact@weforum.org
www.weforum.org