Green Hydrogen Organisation

February 2026

MENA's green iron opportunity: Decarbonising the global steel industry

About the Green Hydrogen Organisation (GH2)

The Green Hydrogen Organisation (GH2) is an international non-profit foundation working to accelerate the production and use of green hydrogen globally. GH2 collaborates with governments, producers, financial institutions and civil society to promote key applications such as green fertilisers, shipping fuels and green iron and steel.

Founded in 2021, GH2 has established a presence in Geneva, London, Jakarta, Nairobi and Oslo. It serves as the secretariat for the Africa Green Hydrogen Alliance (AGHA), a government-led platform uniting eleven African countries to drive regional cooperation on green hydrogen.

GH2 is a founding member of the Global Renewables Alliance (GRA).

Author

Flore Schmerber, Green Hydrogen Organisation

Contributors

Joe Williams, Green Hydrogen Organisation
Sam Bartlett, Green Hydrogen Organisation
Simran Sinha, Green Hydrogen Organisation
Krystyna Serdiuk, Green Hydrogen Organisation
Ysanne Choksey, Agora Industry
Fabian Barrera, Agora Industry
Emir Çolak, Agora Industry

Peer-reviewers

Alli Devlin, Responsible Steel
Shiva Kumar, Responsible Steel
Simon Nicholas, Institute for Energy Economics and Financial Analysis
Karim Elgendy, Carboun Institute
Elliot Mari, Industrial Transition Accelerator

Design

Mariam Ghaly

For interviews or more information on the use and dissemination of the contents of this policy briefing, please contact:

Flore Schmerber (flore.schmerber@gh2.org)

GH2 Green Hydrogen Organisation

Summary

- Steel production is of strategic importance but today's production methods are highly polluting. Currently, green iron and steelmaking based on renewable technologies is associated with a "green premium" primarily due to market failure in pricing fossil fuel-based iron and steel production. Investing in green iron and steel would position MENA's industries for long-term competitiveness particularly as the world shifts to an energy system based on renewable electrification.

- Oman, Saudi Arabia, and Egypt have an opportunity to become first-movers in green ironmaking: they combine strong renewable energy potential, low levelised cost of hydrogen, and pre-existing Direct Reduced Iron (DRI) infrastructure. These countries could become green iron suppliers globally, with climate policies in the EU and Asia driving potential green iron trade. The production of green iron and steel should become a strategic priority and be integrated into national green hydrogen strategies and industrial policies.

- Export markets such as the EU, Japan, and South Korea, and their steel decarbonisation policies will be key drivers due to limited local willingness to pay a green premium. Buyers' alliances, public procurement, concessional climate finance, carbon pricing, and mechanisms like H2Global should be leveraged to improve bankability and accelerate deployment.

- Genuinely low-carbon green iron projects in the region tend to be inactive, small-scale or at very early stage, with only two that have managed to secure offtake in Oman. This highlights the need for innovative demand-side coordination mechanisms. Additionally, many projects labelled "green" are natural gas-based DRI projects or "hydrogen-ready" projects for which it is unclear if/when they will ever use green hydrogen.

- Clear green iron standards and certification are essential to comply with policies like the EU's Carbon Border Adjustment Mechanism (CBAM) and access low-carbon markets, where only green hydrogen-based iron products will be able to compete. Greater scrutiny is needed to avoid greenwashing and prevent stranded assets while securing long-term competitiveness and genuine emissions reductions.

Table of Contents

Introduction

Steel production is strategically important and underpins nearly every sector of the economy, from construction and transport to advanced manufacturing, critical national infrastructure, defence and the energy transition. Yet, the steel industry remains highly dependent on fossil fuels, accounting for 7-9% of global greenhouse gas emissions (Worldsteel, 2021), as traditional production methods heavily rely on coking coal. Since over 70% of existing blast furnaces will need reinvestment by 2030, there is a unique opportunity to shift toward low-carbon steel production (Climate Bonds, 2025). Because steel plants operate for about two decades before needing significant reinvestment to keep operating, and because many projects are now close to their end of life, the next 5 years will be decisive to decarbonise the steel industry by 2050. Producing lower-emissions iron without coal via Direct Reduced Iron (DRI) and further processing it into steel in an electrical arc furnace (EAF) is a mature pathway already in use at commercial scale and can offer a near zero carbon alternative, if DRI is powered by green hydrogen.

There is currently a large “green premium” - the additional cost that consumers or industries need to pay for steel produced through environmentally sustainable methods. Overall, studies have estimated that the green premium ranges between 20-30% (RMI, 2019; IEEFA, 2025), but sometimes reaches 50% (BNEF, 2024) or 70% (WEF, 2023). Depending on the region and ambition, other research finds that the current green steel premium ranges between USD $40 - $150 per tonne, with costs converging with conventional steel at parity scenarios, if green hydrogen was priced at a very optimistic USD $1/kg (cf. Figure 1). As an indication, Stegra, which aims to start production in 2026, has already sold around 50% of its future initial 2.5Mt capacity to companies including Mercedes-Benz, Porsche, Scania, Cargill and ZF with a green premium between 20% - 30% (Hydrogen Insight, 2023).

Scenario / Region	Approximate Premium over Conventional Steel
Europe typical for low-carbon / CO_2-reduced steel (20-30% emission reduction)	**€50–100 per tonne** premium (Discovery Alert).
Asian markets for similar product (20-30% reduction)	**US$40–80 per tonne** premium (Discovery Alert).
Global/various production for very low emission steel	Premiums often above **US$100 per tonne**, sometimes US$150/t depending on method & location (S&P Global)
Mature green H_2-DRI-EAF vs natural gas-DRI-EAF in United States	With H_2 priced at **US$1/kg**, cost roughly **US$544/t steel**, close to or slightly lower than some conventional routes; but at higher H_2 prices, sizeable premium (Transition Asia).

Figure 1. Source: GH2 (2025)

It is important to acknowledge that while the potential for reducing the cost of green iron and steel production should be discussed, the green premium for iron and steel is primarily due to market failure in the pricing of fossil fuel-based steel. Longstanding direct, hidden, and indirect subsidies – which include fossil fuel-tax breaks, network tariffs, externalised environmental costs, and infrastructure subsidies across the fossil fuel value chain – artificially lower the price of fossil-derived steel. Additionally, because steel is the bedrock of supply chain resilience, economic growth and national security, governments are often willing to support the industry, even when it is not profitable. Efficiency arguments, while important, are therefore not decisive. Hence, despite the large premium currently associated with green steel vs unabated fossil fuel-based steel, MENA countries could become global leaders in green ironmaking thanks to their strategic location, cost-competitive renewables potential, and existing DRI infrastructure. Seizing this opportunity would allow MENA countries to position their steel industry for long-term competitiveness and advance the global energy transition.

The MENA green iron opportunity

Green steel production 101: Revolutionising the value chain

Green hydrogen-based ironmaking offers a near zero carbon alternative to the traditional iron production, cutting emissions by up to 98% (Agora, 2024) when powered by renewable electricity. Production pathways include green hydrogen-based direct reduction iron (DRI) for higher quality iron ore. The hydrogen reacts with the ore to create “sponge iron” or direct reduced iron (DRI), which can be further processed into steel in an electric arc furnace (EAF). For lower quality ores, the DRI process is combined with an electric smelting furnace (ESF) process. Other production pathways under development include electrolytic ironmaking (molten oxide electrolysis and / or electrolysis of iron ore slurry), biomass-based reduction using sustainably sourced biocarbon (charcoal/biomass) instead of fossil coke in blast furnaces or DRI plants, electrowinning, and hydrogen plasma smelting reduction. This paper focus on the DRI-EAF production pathway.

DRI can be compressed into hot briquetted iron (HBI) which can be easily stored and transported over long distances, making it ideal for international shipping and trade. This has the potential to revolutionise the steel value chain: whereas conventional steelmaking relies on the co-location and integration of blast furnaces (iron) and basic oxygen furnaces (steel), the production of HBI enables the decoupling of iron- and steelmaking processes globally. This could reroute international trade flows by allowing MENA countries, which are endowed with abundant renewable resources and have pre-existing DRI infrastructure, to emerge as key suppliers of green iron, becoming central players in green steelmaking globally.

Traditional vs. Green Ironmaking

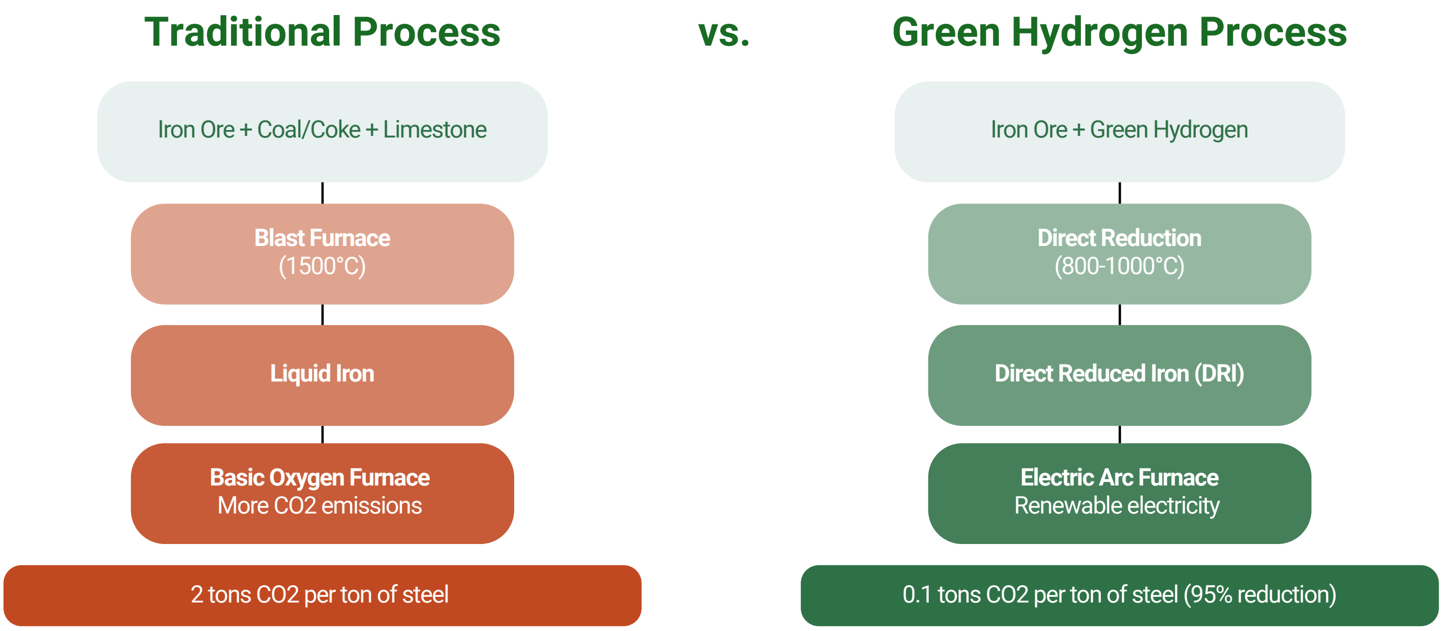


Figure 2. Source: GH2 (2025)

Although other pathways are being explored to decarbonise the iron and steel industry, they fail to significantly and sustainably reduce CO_2 emissions and do not represent viable decarbonisation options. For example, natural gas-based DRI with EAF (NG-DRI-EAF) is less emission-intensive than the conventional coal-based blast furnace-basic oxygen furnace (BF-BOF) route, but its CO_2 abatement potential is only 50%, compared to 98% for green hydrogen-based steelmaking (cf. Figure 3). In some countries, natural gas sourcing involves substantial upstream emissions, significantly reducing the GHG emissions savings that are possible using the NG-DRI-EAF production route. Natural gas extraction, processing, and transportation and use often involves substantial methane leakage and other greenhouse gas emissions that need to be properly accounted for. Existing standards often use default values where there is a risk that methane emissions are under-reported (ICCT, 2023).

Global average direct and indirect emissions intensities of crude steel production via key pathways in Net Zero Emissions (NZE) by 2025 scenario

Figure 3. Source: Agora (2025). Based originally on data published by the IEA in 2023

Even when paired with CCS technologies, the BF-BOF and NG-DRI-EAF routes present many uncertainties regarding upstream methane emissions, technological feasibility, infrastructure costs, and timeline on infrastructure build out (UNIDO, 2025). CCS technologies tend to critically underperform, CO2 storage and transport infrastructure lack availability, and there is a lack of regulatory clarity for managing and monitoring CO2. Adopting such pathways would also lead to emissions lock-in due to investment in gas infrastructure. Lastly, the use of blue hydrogen - produced from fossil fuels with carbon capture - for iron and steelmaking has been found to offer no climate benefits given the significant underperformance of CCS and as the process would require even more natural gas than NG-DRI-EAF coupled with CCS (IEEFA, 2025).

The MENA region is emerging as a competitive location for green iron production

As the market is increasingly looking to decarbonise steel production, the MENA region is gaining attention as a competitive green ironmaking hub. The region benefits from a strong renewable energy potential: according to the World Bank, 22% to 26% of global solar energy potential is concentrated in the MENA region (WEF, 2024), and 75% of the region also benefits from winds strong enough for utility-scale wind farms (WEF, 2023). This is a fundamental locational factor for green hydrogen and therefore green iron production (OECD, 2025), as the cost of green hydrogen is the most critical when determining the economic feasibility of green steelmaking (cf. Figure 4).

Share of each component from the LCOS of a new green H2-DRI-EAF plant in China (this is for 100% green H_2 at \$4/kg H_2).

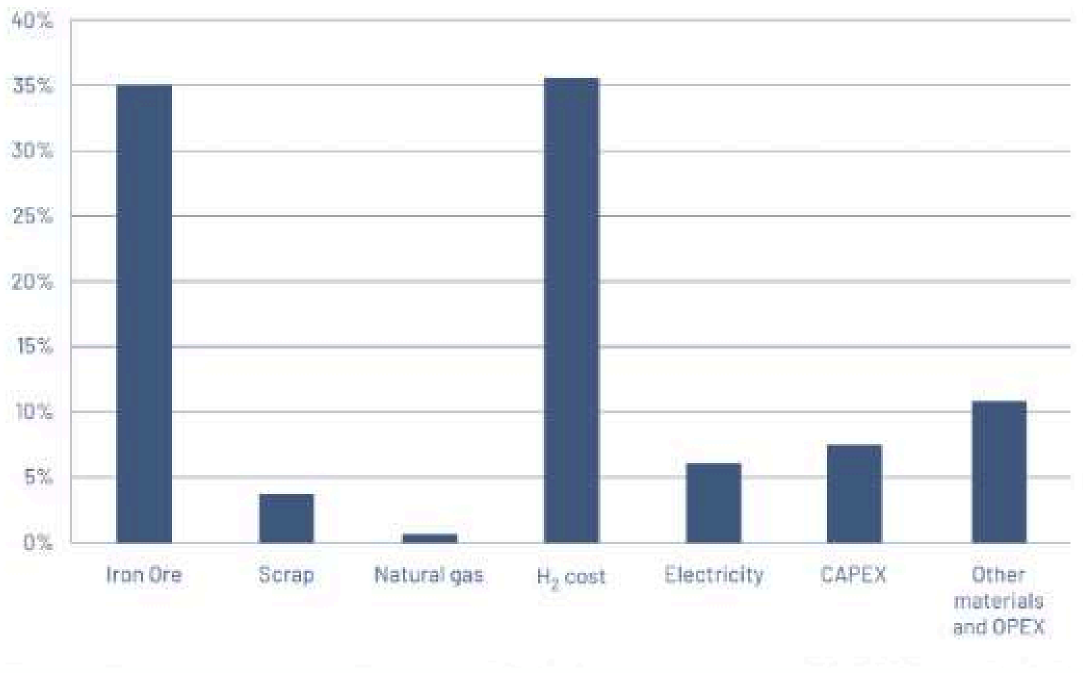
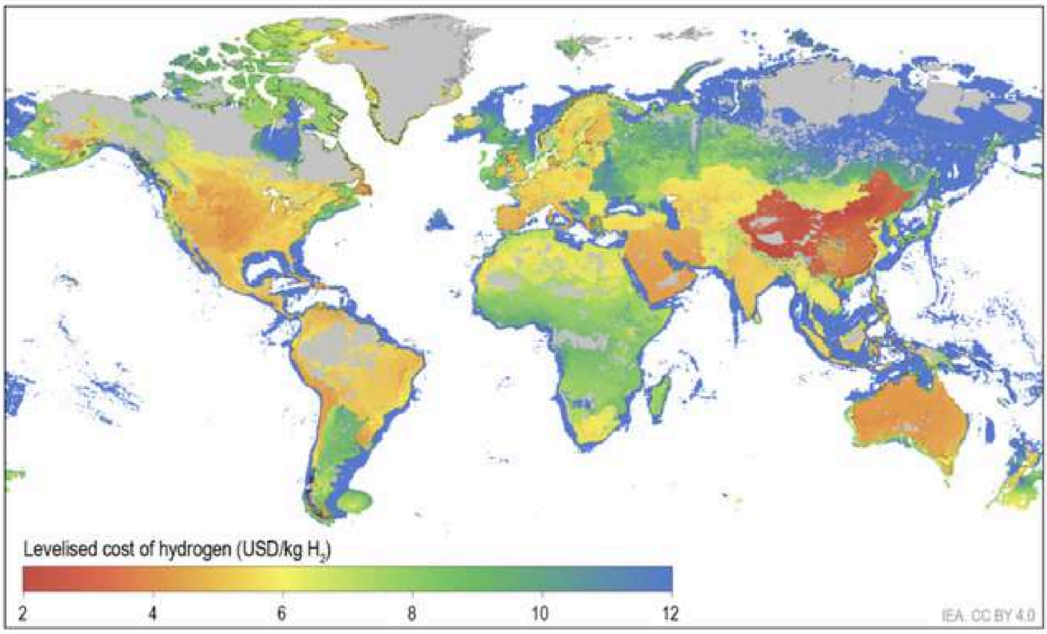


Figure 4. Source: Transition Asia (2024)

Studies that project green hydrogen costs for the MENA region have consistently highlighted Oman and Saudi Arabia's low levelised cost of green hydrogen (LCOH). The IEA has shown Saudi Arabia and Oman to be among the most competitive countries for electrolytic hydrogen production globally by 2030 (cf. IEA map), while another study highlights the huge green hydrogen potential of solar-rich countries in Africa and the Middle East, particularly in Saudi Arabia and Oman, where a liquid hydrogen export cost of 2.07 €/kg is deemed achievable by 2050 (Franzmann et. al, 2023). The low LCOH potential of Morocco and Egypt has also been explored, with cost estimates ranging from $2.12-$3.35/kg for electrolytic hydrogen powered by solar and wind energy (Nasser & Hassan, 2024). In the coming years, the decrease in the cost of renewable energy technologies and the potential drop in electrolysis costs due to large-scale deployment, improved technology integration and innovation is expected to further narrow the cost gap (IEA, 2025). The cost-competitiveness of green ironmaking in the MENA region will also depend on the region's ability to increase its energy storage capacity, given the variability of solar and wind energy and the need for a constant supply of renewable energy to the electrolysers.

Hydrogen production cost from electrolysis using hybrid solar PV and onshore wind, and from offshore wind, in the Stated Policies Scenario, 2030



Notes: Assuming optimal oversizing of the renewable plant in each location to minimise the levelised cost of hydrogen production. Solar PV CAPEX is USD 400-1 250/kW, Onshore Wind CAPEX is USD 950-2 300/kW, Offshore Wind CAPEX is USD 1 720-4 850/kW. The cost of capital is assumed to be between 6-20% across different locations in this map. Water cost is not included. More details on the cost of producing low-emissions hydrogen using different technologies and in different regions can be found in the new Hydrogen Tracker available on the IEA website.
Source: Analysis by Jülich Systems Analysis at Forschungszentrum Jülich using the ETHOS model suite.

Figure 5. Source: IEA (2025)

Regions with large renewable resources and low costs for electrolysers and renewable energy technologies, plus a low cost of capital, could achieve competitive production of renewable hydrogen by 2030.

Crucially, the region is already a hub for gas-based production of DRI, which represents 7% of steel production globally (UNIDO, 2025). The region's DRI capacity accounted for 45% of global DRI production in 2023 (IEEFA, 2025), with Egypt, Saudi Arabia, Iran and Oman leading DRI production given their access to low-cost natural gas and well-established natural gas infrastructure. Since the development of hydrogen DRI technology is at the commercialisation stage, first movers are likely to acquire a competitive advantage (SFOC, 2023). The MENA region is therefore well-positioned to benefit: by retrofitting existing DRI infrastructure to become "hydrogen-ready", MENA countries can integrate existing gas-based DRI infrastructure with future green hydrogen supply, allowing them to quickly become first movers in green iron production. Conversely, failing to invest in green iron and steelmaking would be a strategic risk for MENA countries, as it would lock-in fossil fuel-based production in the long-term (GH2, 2025), generating stranded assets.

Access to high-quality iron ore reserves is another driver of competitiveness for green ironmaking and, together with hydrogen, accounts for more than half of the cost structure of hydrogen-powered DRI (Agora, 2025). In that regard, MENA countries have an established supply of DR-grade pellets from Oman and Bahrain, which relies primarily on imported concentrate from Brazil (IEEFA, 2025). Brazilian iron ore producer VALE, one of the world's largest iron ore producer, is also planning to establish three "Megahubs" in Saudi Arabia, Oman and the United Arab Emirates (UAE), which will produce iron briquettes from DR-grade pellets supplied by the same company (VALE, 2023). Vale's megahub in Oman is expected to reach FID in 2026, with construction scheduled to begin in 2027. Vale is therefore taking advantage of MENA countries' strategic location, competitive energy resources and industrial policies, effectively confirming their strategic importance in green ironmaking. Oman is also a particularly credible location for the development of green iron production given the country's hydrogen strategy: Meranti Green Steel's DRI project in Port Duqm, which plans to start with at least 15% of green hydrogen before gradually ramping it up to 85%, is therefore attached to credible green hydrogen introduction timelines due to Oman's national rollout plans.

In the longer term, MENA countries could become green iron exporters. Today, only 4.8% of global DRI production is traded internationally as DRI facilities usually supply nearby steel producers, but an intensification of green iron trade could take place in the coming decade. MENA and North African countries, which currently account for about 7% of EU steel imports (ITA, 2025) and with Egypt being in its top 10 suppliers (Eurofer, 2025), are currently expanding their DRI and EAF capacity (OECD, 2025), positioning themselves as green iron and steel producers. These projects are therefore located close to high-demand regions like Europe and Asia, where decarbonisation policies are driving investment in greener steelmaking production. China, India and the EU are expected to have the highest steel demand expectations by 2030, with the EU remaining the largest net importer of steel globally (OECD, 2025; Worldsteel, 2025). Steel decarbonisation policies around the world may therefore generate demand for cost-competitive green iron from MENA and North African countries (OECD, 2025), allowing them to become global green iron suppliers.

Policy incentives and the green iron opportunity: A new model for global steelmaking and win-win partnerships

With its strategic geographic location, renewable energy potential, existing DRI infrastructure and pragmatic ties with Europe and Asia, the MENA region is well-placed to take advantage of policy incentives for green steel production such as the EU's Carbon Border Adjustment Mechanism (CBAM), which came into force on 1 January 2026. CBAM is "the EU's tool to put a fair price on carbon emitted during the production of carbon-intensive goods that are entering the EU, and to encourage cleaner industrial production in non-EU countries" (European Commission, 2025). CBAM requires EU importers of certain goods, such as iron and steel, to buy CBAM certificates to pay for the embedded carbon emissions of their imports. The impact of CBAM on green iron projects is direct and immediate: Meranti Steel has already shown how the carbon price of its final EU export destination will inform the share of green hydrogen used for DRI and HBI production, and how it will reduce the use of natural gas (cf. Figure 7). The policy implementation of a carbon price is therefore driving the business case for green hydrogen and incentivising its use.

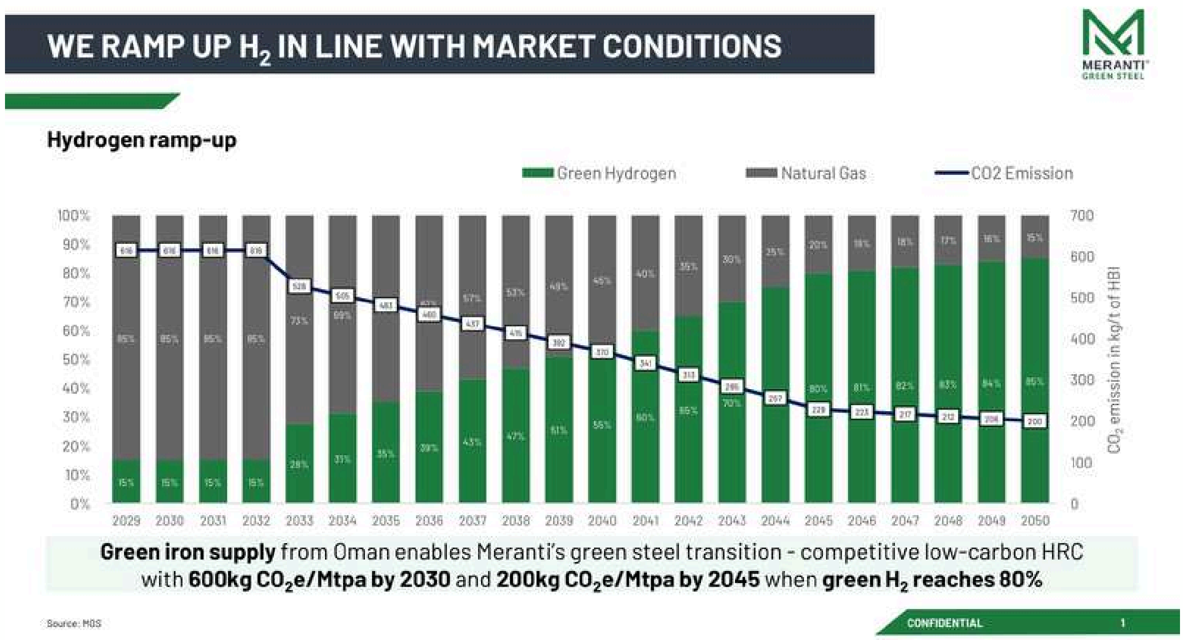


Figure 6. Source: Meranti Green Steel, Pohang Knowledge Exchange on Low Carbon Steel (2025)

With both CBAM and the EU's Emissions Trading System (ETS), a study found that importing HBI from countries with existing steelmaking competences and affordable renewable electricity, such as Middle Eastern and North African countries, could allow the European steel industry to decarbonise in a cost-competitive way (Johnson et al, 2025). Another decarbonisation route highlighted by the study is for European steelmakers to outsource hydrogen-based DRI to countries with minor current steel production but affordable renewable electricity, such as Mauritania, Oman, and Morocco (ibid). Another study estimates that imported green iron could cut steelmaking production costs by around 15% by 2040 for countries like Germany, Japan and South Korea (Agora, 2025). In a de-risked scenario, HBI exports from Saudi Arabia and Egypt particularly could enable cost-effective steelmaking in these three countries (cf. Figure 8).

De-risking projects in some potential exporters could help establish green HBI trade routes, while enabling more cost-effective steelmaking worldwide

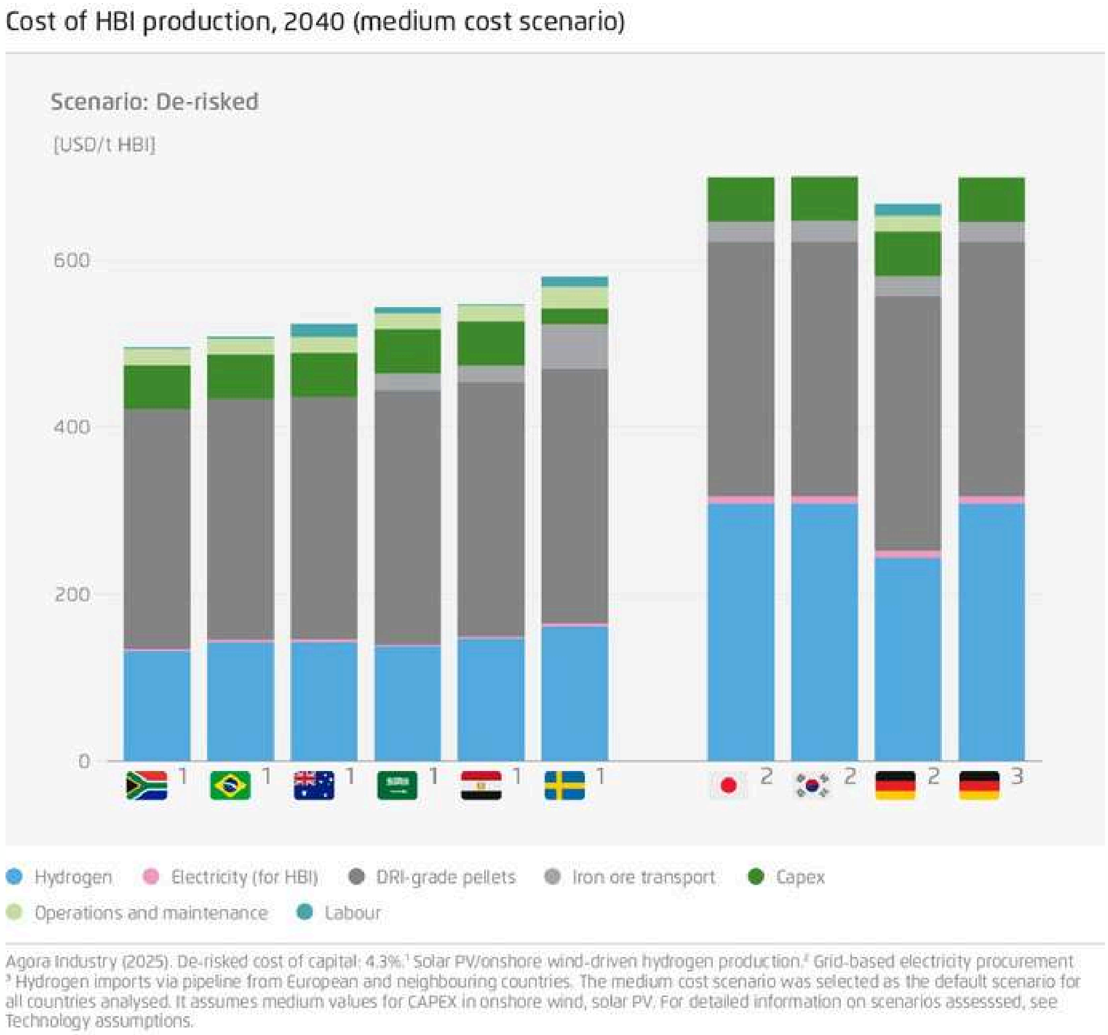


Figure 7. Source: Agora (2025)

Moreover, the upcoming green steel label that the EU intends to publish as part of its Industrial Accelerator Act (IAA) in February 2026 will likely rule out natural gas-based DRI as being able to compete with scrap-based steel for construction products. This will hurt the competitiveness of iron and steel production that is not genuinely green. There will also likely be some Buy European stipulations applying to products that could undercut European made NG-DRI-EAF steel facilities. This means that only hydrogen-based iron products will be able to compete for coveted EU-based consumers in automotive and construction. Only those projects that move straight to H2 will be able to charge a significant premium.

MENA and North African countries like Oman, Saudi Arabia, and Egypt might therefore be able to export cost-competitive green hydrogen-based iron to European countries and increase the value added from iron ore and renewable energy resources, generating jobs and trade value gains. Moreover, MENA's relative proximity to the European market results in lower transportation costs, making the region a potentially more competitive location for green iron production compared to large iron ore exporters such as Australia or Brazil. It is also in line with IRENA's projections of the Middle East becoming a key DRI exporter to Europe by 2050 (cf. Figure 9). More research on the economy-wide effects of green hydrogen-based DRI production for export in MENA countries would however be beneficial, as contemporary literature to date has rather focused on optimising supply chains for the EU (CBAM region).

About 20% of the global hydrogen and related commodities demand could be internationally traded in 2050

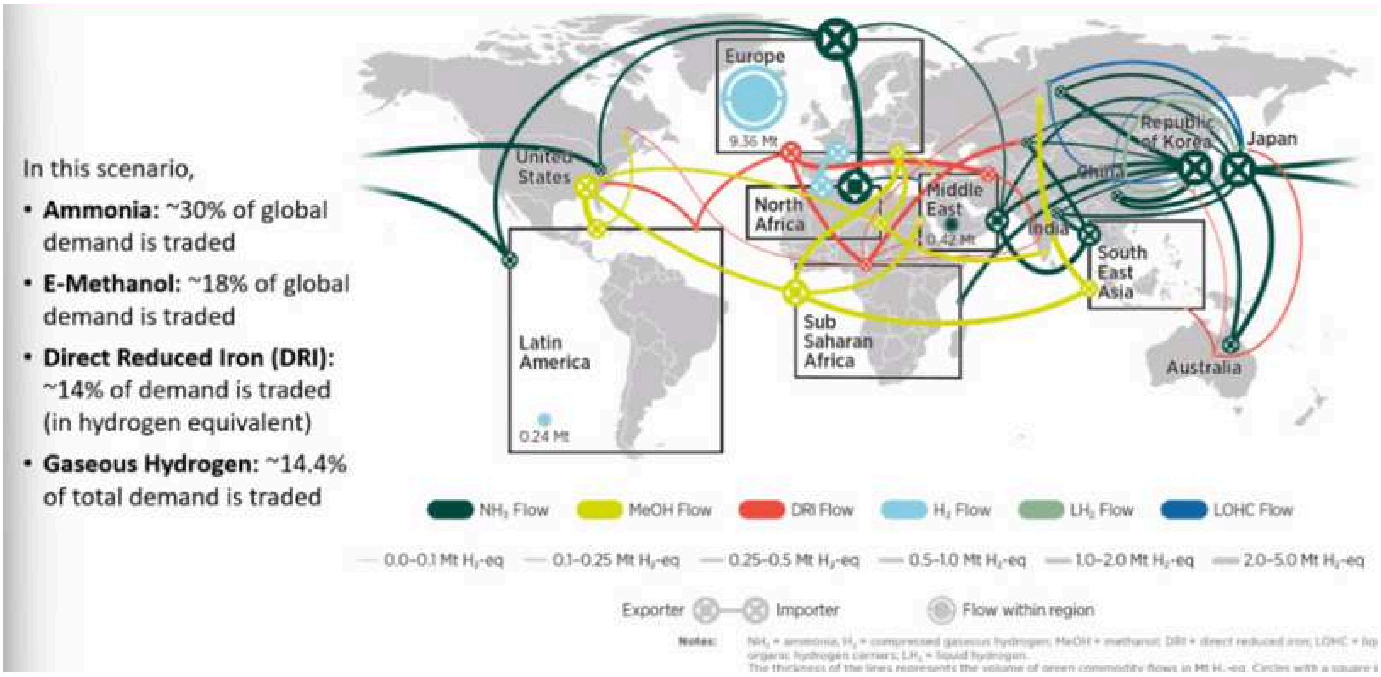


Figure 8. Source: IRENA (2025)

Additionally, incentives for green steelmaking are emerging in Asia and could represent an opportunity for MENA green iron suppliers. Japan's steel decarbonisation roadmap identifies green hydrogen-based DRI imports from regions with low renewable energy generation costs as a key pillar, given the country's lack of large quantities of inexpensive green hydrogen (REI, 2023). In South Korea, the release of a 10-year roadmap for ETS earlier this year is expected to increase carbon costs for steelmakers. Similarly, China has approved the expansion of its ETS to include steel, raising carbon costs for domestic producers. These measures will all contribute to making MENA low-carbon iron comparatively more competitive (Carboun Institute, 2025).

With the implementation of CBAM and other climate policies, failing to invest in genuinely green iron and steelmaking poses a strategic risk for MENA countries. This would indeed hurt their competitiveness in markets where carbon prices are rising, while continued reliance on fossil-based production would lock in long-term emissions and create stranded assets (GH2, 2025). Conversely, investing now in green hydrogen-based ironmaking could give MENA producers a competitive advantage over other countries that fail to rapidly decarbonise their iron and steel sectors, in addition to lowering their domestic carbon emissions and achieving economic and industrial diversification. Stegra, with its H2 DRI EAF plant currently being built in Sweden, has proven that the green premium is possible when buyers are confident that the plant will produce fully green steel. Stegra has sold about half of its future products with a premium between 20%-30% (OIES, 2025). It is very unlikely that Stegra could have achieved these offtake agreements at this high green premium without assurances for buyers that it would be near zero from the start.

Priority should be given to creating synergies with and building momentum for hydrogen projects that will directly feed the DRI projects that are planned. On site generation of hydrogen through electrolysis has been successful for the Stegra project and can be used as a blueprint for straight to green hydrogen-based DRI projects in the MENA region as well.

Financing green iron projects – The main barriers and solutions

Financing is the central bottleneck for scaling genuinely green ironmaking in the MENA region. Most MENA projects have struggled to progress beyond MoUs because their cost and risk profile does not meet current financing conditions. The sector faces three interlinked barriers: high capital intensity, high cost of capital, and slow offtake despite the above-mentioned policy mandates and incentives. These constraints are widely recognised across global analyses of early green steel markets (IEEFA 2024; RMI, 2024; Agora, 2025; OECD, 2025).

Hydrogen-based DRI requires integrated investment across renewable electricity generation, transmission and storage, electrolysis, hydrogen compression and storage, DR-grade pellets, and DRI or HBI units. This makes green iron one of the most capital-intensive industrial pathways in the clean energy transition (Climate Bonds 2022). The cost of capital in many MENA countries ranges from 10–14%, significantly higher than in OECD economies - a decisive factor for whether MENA producers can compete under CBAM and ETS price trajectories (OECD, 2025). As financing costs represent a substantial share of the levelised cost of hydrogen and DRI, this Weighted Average Cost of Capital (WACC) gap alone can undermine competitiveness.

A second barrier is the absence of a coordinated financing architecture for green iron. GH2's engagement with the World Bank, IFC, EBRD, AfDB, KfW, the Climate Investment Funds (CIF), the European Commission (DG INTPA, DG ENER), and several export credit agencies shows that support for green iron remains fragmented and largely exploratory (OECD, 2025). Each institution applies different emissions accounting methodologies, due-diligence expectations, and risk allocation frameworks. The RVO-funded de-risking programme for Egypt and Morocco has further demonstrated that hydrogen developers, pellet suppliers, DRI stakeholders and financiers operate on misaligned timelines, with no common assessment framework for integrating green hydrogen into existing DRI assets or for CBAM-aligned emissions disclosure. Without structured coordination among Development Finance Institutions (DFIs), and a shared set of investment criteria for genuinely green DRI, early projects risk stalling at MoU stage. GH2's dialogues with these institutions confirm strong interest but limited operational alignment, reinforcing the need for a joint financing platform for green iron in MENA.

The third barrier concerns demand and offtake certainty. Despite policies in the EU and Asia driving steel decarbonisation momentum, and even though most MENA projects focus heavily on supply and "hydrogen readiness", projects lack long-term buyers in the EU, Japan or South Korea. For financiers, however, offtake agreements are the foundation of revenue certainty. Analyses show that early green steel producers require 10–20 year offtake commitments (for DRI, HBI or green steel) to reach bankability (RMI 2024, Transition Asia, 2023). Without instruments such as carbon contracts for difference, advance market commitments, or guaranteed price floors, buyers have little incentive to absorb the current green premium. This directly affects CBAM compliance: without predictable, long-term demand for green iron, MENA producers could lose access to the EU market from 2026 due to rising carbon prices (Agora, 2025).

Addressing these barriers will require concessional finance and coordinated market mechanisms. Blended finance structures combining grants, low-interest loans, first-loss capital, political risk insurance, and partial guarantees, can significantly reduce WACC and catalyse private investment (Climate Bonds, 2022; OECD, 2025). Concessional instruments from CIF, the Green Climate Fund, the European Investment Bank, and export credit agencies could support early flagship projects and shared infrastructure such as renewable hubs, desalination facilities, hydrogen pipelines and port terminals. International evidence shows that shared infrastructure reduces overall project capex and allows multiple DRI assets to scale simultaneously (Agora, 2025).

Demand-side coordination is also critical. MENA DRI and HBI producers could benefit from the creation of buyers' platforms similar to the EU Hydrogen Mechanism under the EU Energy and Raw Materials Platform, which are developing structured offtake models for renewable hydrogen and derivatives between European offtakers and European and global suppliers (European Commission, 2025). Additionally, H2Global was originally planned to support green hydrogen projects outside of the EU, however, there are growing calls that it should move down the value chain and support green HBI projects instead. Japan's Green Transformation plan and South Korea's ETS roadmap create similar opportunities, with both countries identifying hydrogen-based DRI imports as essential to steel decarbonisation (Carboun Institute, 2025). Buyers' clubs, supported by carbon contracts for difference or CBAM-aligned price guarantees, would materially improve revenue certainty and enable project financing.

Finally, green credentials must be credible. As highlighted by OECD and Climate Bonds, the lack of clear emissions thresholds and certification pathways for green iron allows gas-based DRI projects to be mislabelled as "green" (OECD, 2025; Climate Bonds, 2022). GH2's Green Iron Principles (GH2, 2025), launched at COP30, provide a transparent benchmark for embedded emissions in the DRI process. Clear and verifiable standards will be essential for accessing CBAM-compliant markets and for unlocking concessional finance tied to measurable climate outcomes.

Genuinely sustainable green iron and steel requires that the environmental, social and governance consequences of iron and steel production are thoroughly evaluated, and that the development opportunities and impacts fully considered. The ResponsibleSteel International Production Standard V2.1.1 (ResponsibleSteel, 2024) provides a comprehensive framework for addressing wider sustainability considerations, including requirements on land use planning, water resource management, human rights, community benefits, transparency and consultation. The responsible sourcing of renewable electricity and green hydrogen should be considered in accordance with the Green Hydrogen Standard (GH2, 2023) and the Joint-Agreement on the Responsible Deployment of Renewables-Based Hydrogen (GH2, 2023).

Without a coordinated concessional finance strategy, credible green standards, and structured demand signals, most early-stage green iron projects in MENA will remain inactive. Conversely, targeted de-risking, harmonised DFI coordination, and long-term offtake mechanisms would enable the region to scale genuinely green ironmaking and secure its role in the emerging global low-carbon steel value chain.'

Seizing the green iron opportunity – What's happening in the MENA region

Analysis of low-carbon iron projects in MENA countries

Using publicly available information, GH2 has identified a total of 22 low-carbon iron product projects announced in the last three years in Saudi Arabia, Oman, the UAE, Egypt, Algeria, Mauritania and Morocco. Below, we provide a broad overview of the green iron and steel sector in the MENA and North Africa region, where the following classification has been used:

- "Active" projects are projects for which the last update is less than 1.5 years old. Otherwise, projects are considered to be "inactive". One project's status is "unknown", as it is a green hydrogen project which is "considering" producing green iron but has not confirmed this.
- Projects are given different grades depending on how "green" they are:

  - **Grade "A"** projects are Stegra-like projects, which will use 100% green hydrogen from the beginning to power the DRI process. None of the active projects analysed in this study that have gone beyond MoU achieve this grade.

  - **Grade "B"** projects are projects for which at least some green hydrogen and renewable electricity is to be used from the start to process iron ore. It is important to note that these grade B projects are usually not entirely green from the start and do not all plan to use only green hydrogen in the future due to technical challenges. However, by using some green hydrogen from the outset, they are well-positioned to kickstart low-carbon iron production.

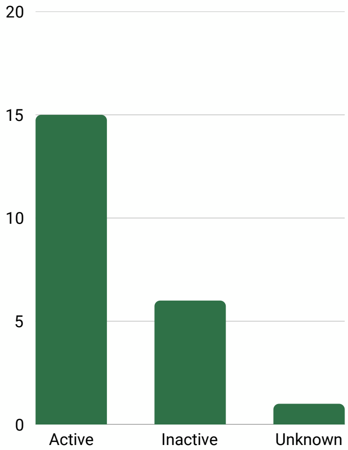
  - **Grade "C"** projects are "hydrogen-ready", but are not yet using hydrogen: they do not plan to use hydrogen from the start and their timeline to switch from natural gas to green hydrogen is unclear.

  - **Grade "D"** projects are all the other projects for which the use of green hydrogen is mentioned as an aspirational goal or is not mentioned at all (but which are still referred to as "green" in news articles).

- Upcoming DRI projects that do not intend to use green hydrogen and are not referred to as "green" in the press are beyond the scope of this paper and are therefore excluded from this analysis. It is however important to acknowledge that not all announced DRI projects in the region are to be built "hydrogen-ready".

Project status, type and state of advancement

Project status, type and advancement



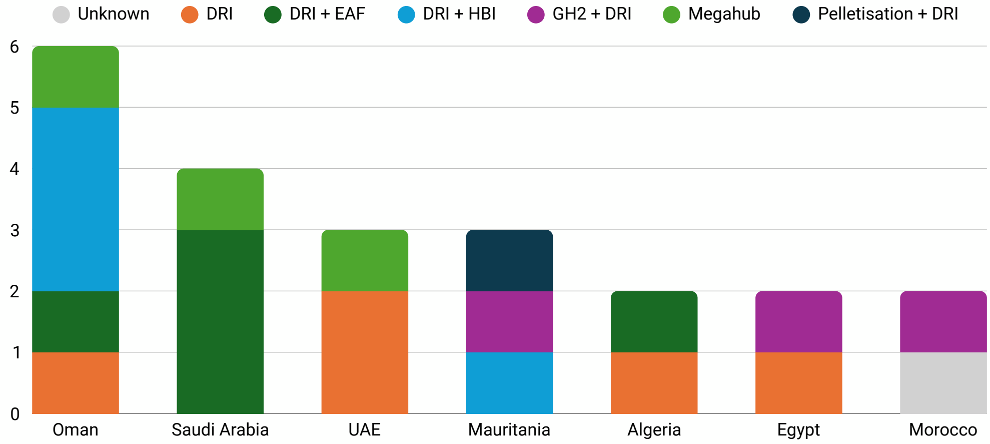
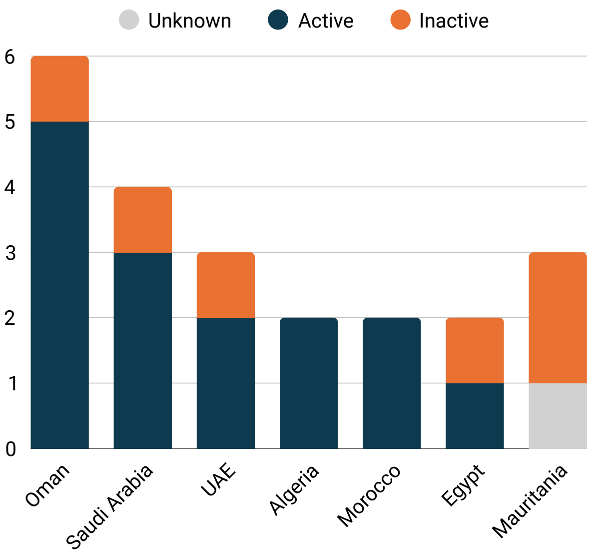


Figure 9. Project status for all announced low-carbon iron product projects in the MENA region (left)
Figure 10. Types of projects per country (right)

Out of all 22 identified project, 15 projects are “active” and 6 projects are “inactive”. The projects identified include Vale’s so-called “Megahubs”, as well as DRI projects coupled or not with green hydrogen plants, HBI plants and EAF. This shows that low-carbon iron and steel processes tend to be integrated. Oman and Saudi Arabia have the highest number of active projects. Despite having announced some green iron product projects, Mauritania has no active projects at the moment. Additionally, out of all active projects, Oman and the UAE have the most advanced projects, while projects in Algeria, Morocco and Egypt are either at MoU stage or have just been announced.



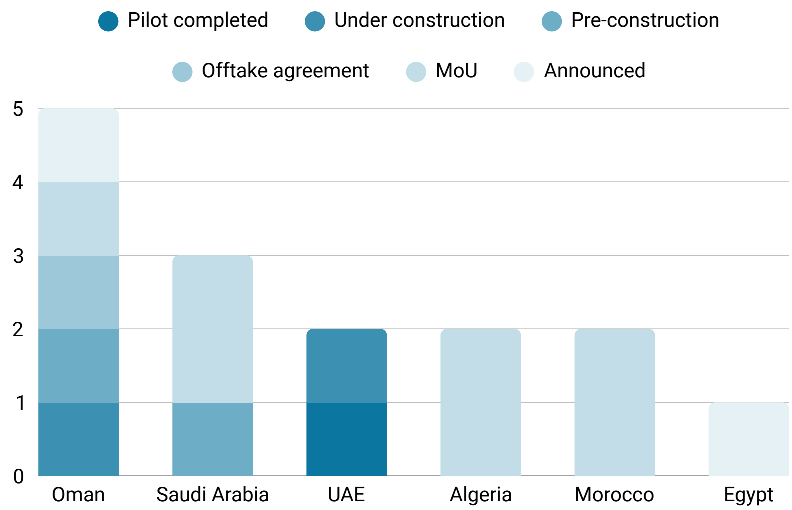


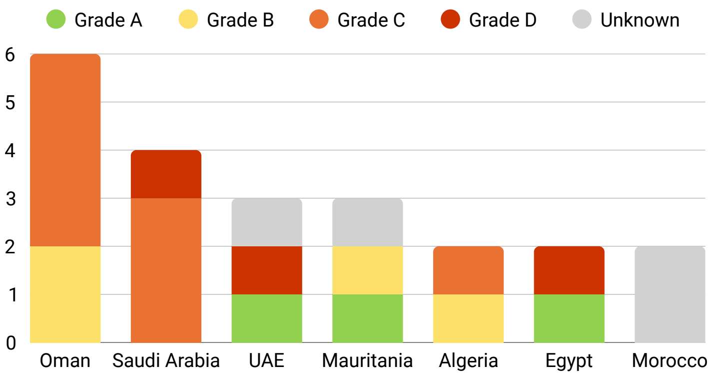
Figure 11. Level of activity of announced projects, per country (left)
Figure 12. State of advancement of active projects, per country (right)

Project grades and state of advancement

Algeria, Egypt, Mauritania, Oman and the UAE all have announced “grade A” or “grade B” projects (as defined above). However, only 4 projects are actually active, and from those, only two have moved beyond MoU or are not a pilot project (in Oman). The active “grade A” and “grade B” projects identified are:

- ACME’s planned DRI project in Oman, which just signed an offtake agreement with Vietnamese steelmaker Stavian Industrial Metal;
- Meranti Green Steel’s HBI plant in Oman, which will start with a mix of natural gas and green hydrogen (at least 15%) and is at a pre-construction stage;
- The pilot project by Masdar and Emsteel, successfully completed in the UAE in October 2024;
- The expansion of Tosyali’s steel plant in Algeria, which will include a “hydrogen-ready” DRI plant and an EAF. An MoU has also been signed to develop green hydrogen onsite.

Project grades and advancement



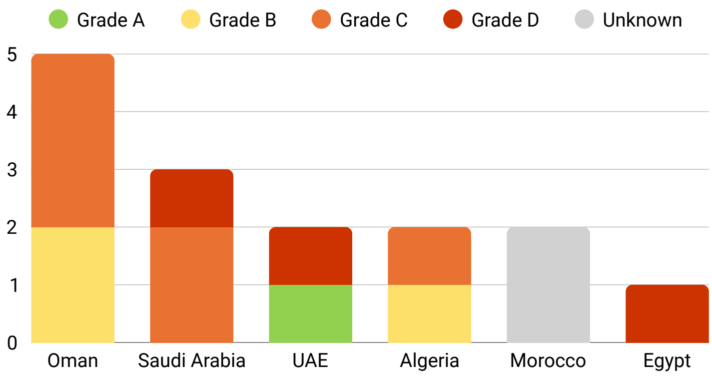
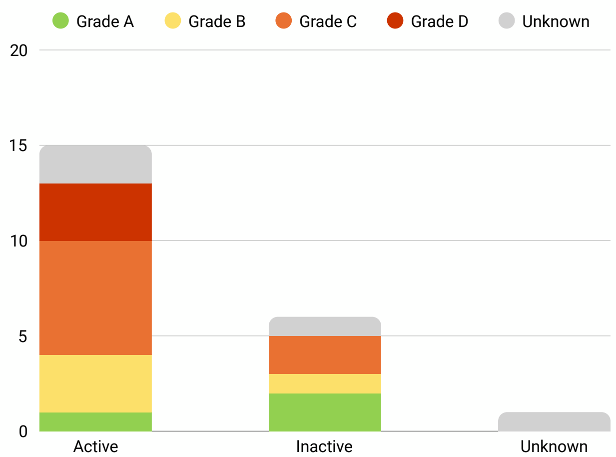


Figure 13. Grade of low-carbon iron projects from all announced projects, per country (left)
Figure 14. Grade of active low-carbon iron projects, per country (right)



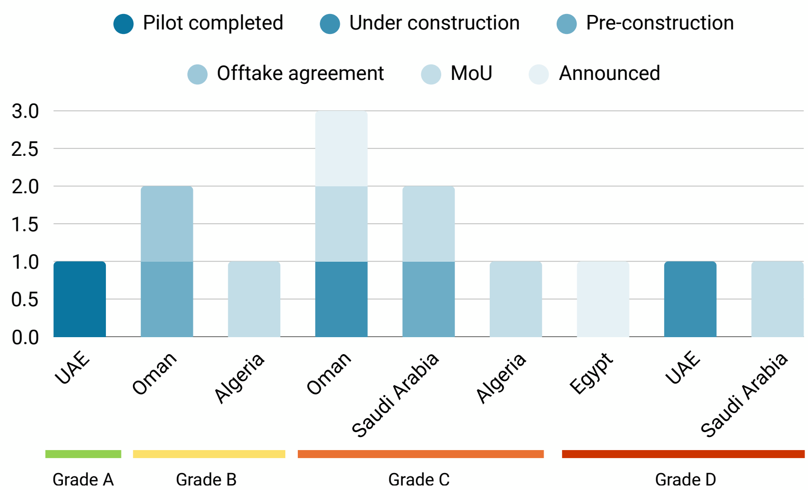


Figure 15. Project status by grade of project (left)
Figure 16. State of advancement of active project, by country and grade (right)

All of the other supposedly low-carbon iron product projects identified either do not mention green hydrogen despite being referred to as "green" in the press, or their plans to transition from natural gas to green hydrogen lack clarity and concreteness. It is for example unclear whether Jindal Steel's "hydrogen-ready" DRI projects in Oman will ever use hydrogen (Hydrogen Insight, 2025). Similarly, Essar's green flat steel complex in Saudi Arabia plans to use gas-based-DRI (Essar Case, 2024) which, despite being combined with EAF, can hardly be called a green process. Even Vale, whose megahubs are meant to provide decarbonisation solutions and produce "green briquettes" (VALE, 2022), shows little clarity on how it plans on using green hydrogen in the future, and how it will be sourced.

Finally, projects that do not plan to use green hydrogen from the start or have no concrete path to using it tend to be more advanced and active, while grade A and B projects, which are greener, tend to be either inactive or at very early-stage. This can be explained both by technical challenges and the difficulty for green iron projects to secure offtake, which highlights the need to foster demand-side coordination.

Key takeaways

The above analysis of low-carbon green product projects in the MENA countries reveals that:

1. Low-carbon iron projects planning to use green hydrogen from the outset tend to be inactive, small-scale or at very early-stage. Only two of the identified grade B projects have managed to secure offtake, which highlights the need for innovative demand-side coordination mechanisms. Oman emerges as a promising location for green iron projects, hosting the most advanced grade B projects.

2. Many projects in the region are referred to as "green" in the press because they plan to use gas-based DRI, which has lower emissions compared to coal-intensive conventional steel manufacturing processes. However, the CO2 abatement potential of this pathway is no higher than 50% (Agora, 2025) and substantially less when methane leakage is properly taken into account. These projects remain highly polluting and reliant on fossil fuels.

3. For projects that do mention green hydrogen and are to be built "hydrogen-ready", they most often lack rigorous plans and concrete timelines to switch from natural gas to green hydrogen in the DRI process. This will hurt their competitiveness, especially given CBAM, the EU ETS, the upcoming EU IAA green steel label, and other carbon pricing policies around the world. Additionally, there will likely be some "Buy European" stipulations applying to products that could undercut European made NG-DRI-EAF steel facilities. This means that only hydrogen-based iron products will be able to compete for coveted EU-based consumers in automotive and construction. Only those projects that move straight to H2 will be able to charge a significant premium.

Recommendations - What is needed for genuinely green iron projects to scale

Scaling green ironmaking production in MENA countries requires a comprehensive approach integrating policy, infrastructure, innovation, and market instruments.

1 Green ironmaking should become a strategic priority for MENA countries: there is a need for catalytic investment and stronger collaboration.

MENA countries are uniquely positioned to become global green iron suppliers and secure access to high-demand centres such as the EU and Asia. The green premium is however large, the cost of capital in most MENA countries is high, and there is no dedicated green steel finance mechanism to support the scale up of green iron product projects. To overcome these barriers, the following actions are recommended:

- The production of green iron and steel should become a strategic priority, particularly for Oman, Saudi Arabia and Egypt, and be integrated into national green hydrogen strategies and industrial policies.

- DRI projects in MENA countries should use green hydrogen from the start if they are to become exporters of iron products. Otherwise, given carbon-pricing and steel decarbonisation policies around the world, MENA countries will have no comparative advantage over domestic iron producers.

- Although the cost of green hydrogen and the green steel premium are expected to fall as renewables are deployed and projects scale up (Transition Asia, 2024), in the interim, retrofit support mechanisms and market incentives for green iron and steel are needed to influence buyers' willingness to pay the premium. Catalytic investments in targeted projects, public procurement for derisking, concessional climate finance and carbon pricing could all contribute to accelerating the scale up of green iron projects in the region.

- Collaboration should be fostered between MENA green iron producers, hydrogen developers and key export markets such as the EU, Japan and South Korea, to scale up capacity and accelerate project deployment (IEEFA, 2025). Strategic partnerships between governments and de-risking platforms to build a liquid HBI global market would contribute to the scaling of green iron trade globally (Agora, 2025). Facilitating the coordination between multilateral development banks constitutes another way to unlocking financing, derisking projects and catalyzing investments.

- Financing mechanisms such as H2Global, which were created to support green hydrogen projects outside of the EU, should move down the value chain to support HBI projects to catalyse green iron production (Agora).

2 Buyers' alliances similar to the EU Hydrogen Mechanism emerging under the EU Energy and Raw Materials Platform should be leveraged to strengthen demand-side coordination.

MENA green iron producers would benefit from the creation of platforms similar to the EU Hydrogen Mechanism under the EU Energy and Raw Materials Platform, which are developing structured offtake models for renewable hydrogen and derivatives between European offtakers and European and global suppliers. This is particularly relevant as MENA countries are facing a limited local willingness to pay a green premium, making access to export markets the primary commercial driver of green iron projects. Buyers' coalitions can indeed aggregate demand, reduce revenue risk and improve bankability. Similar opportunities are also emerging in Japan and South Korea, where importing hydrogen-based DRI is increasingly recognised as an integral part of the steel decarbonisation process.

3 Carbon pricing regimes like CBAM should be scaled up and not scaled back

The EU's CBAM is driving action on decarbonisation and cleaner production processes. CBAM requirements in other covered sectors such as fertilisers are under threat. It is important that the EU resist calls to relax CBAM requirements and other countries such as the UK remain on track to introduce their own regimes. In parallel, MENA green iron producers could focus on introducing carbon pricing and working closely with key import nations in the EU to ensure their compliance with CBAM.

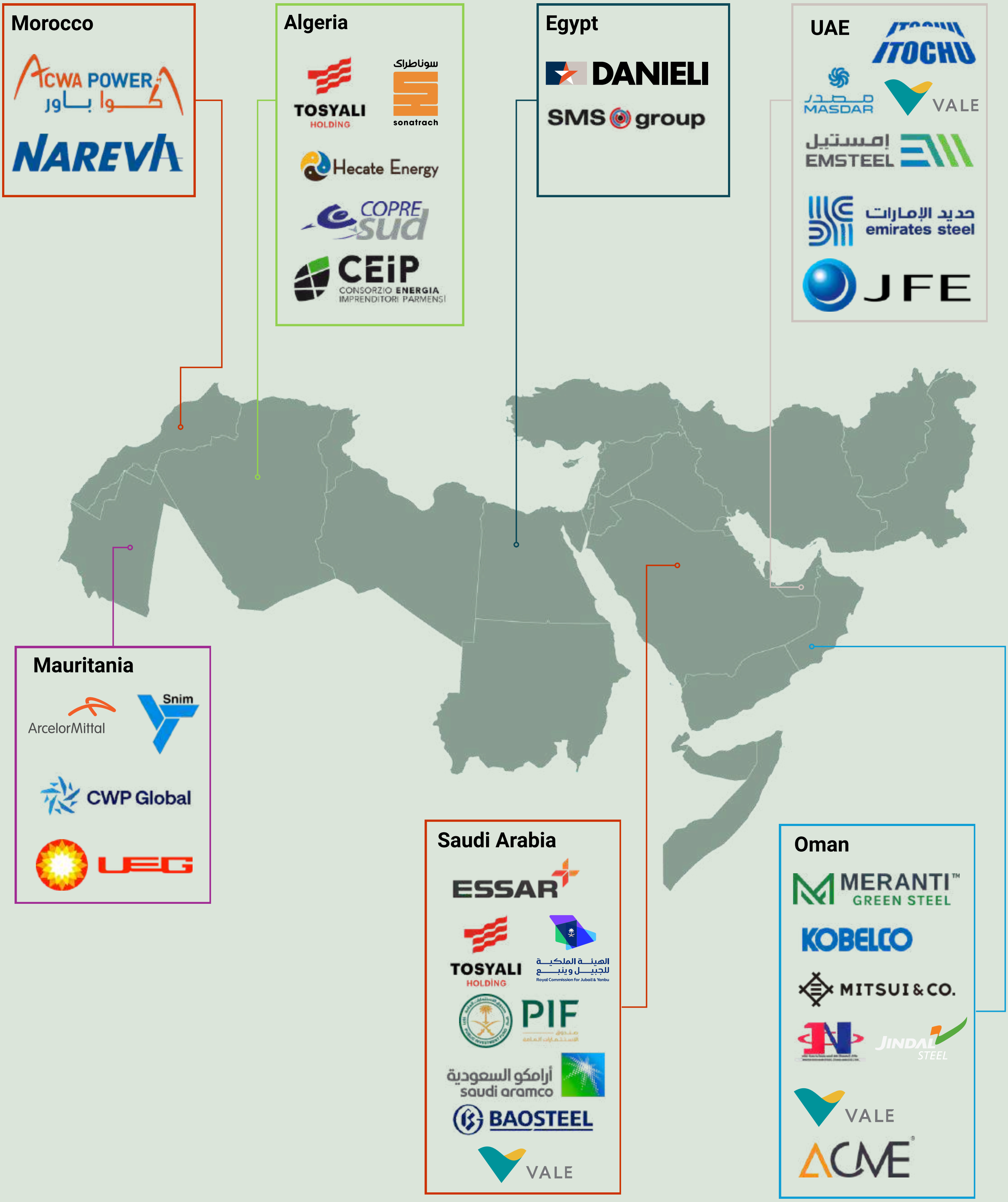
4 Green iron standards need to be developed to demonstrate green credentials, secure access to low-carbon markets and unlock international trade.

In order to seize the green iron export opportunity to high-demand centres such as the EU or Asia, MENA green iron projects will need to prove their green credentials. Currently, there is no common definition nor understanding of what green iron should mean, and there is a lack of certification pathways for green hydrogen-based DRI. Developing transparent standards will therefore be critical in jurisdictions such as the EU, where CBAM will require EU importers to pay for the embedded emissions of imported green iron products. GH2 has recently launched the Green Iron Principles (GH2, 2025) during COP30 and advocates for clear emissions thresholds in the DRI process.

5 More scrutiny is needed to avoid greenwashing and push low-carbon iron projects to move from gas-based to green hydrogen-based DRI. Otherwise, MENA countries risk being left behind with stranded assets and locking in greenhouse gas emissions.

More than half of supposedly “green” iron projects in MENA countries are in fact natural gas-based DRI projects. While they do achieve less emissions compared to conventional coal-based ironmaking, their CO2 abatement potential is no higher than 50% and they remain highly polluting. Calling such projects “green” is therefore misleading and potentially harmful to MENA countries: by supporting gas-based DRI, investing in gas infrastructure and failing to prioritise green hydrogen-based ironmaking processes, MENA countries risk locking-in greenhouse gas emissions and be left with stranded gas assets. Not only would MENA countries fail to move away from fossil fuels, they would also miss the opportunity to position their steel industry for long-term competitiveness. Conversely, MENA countries are in a unique position to benefit from developing green iron projects, their renewables potential, strategic location and pre-existing DRI assets giving them an early-mover advantage. Greater scrutiny is therefore needed on how “green” iron producers plan to catalyse green hydrogen production, whether by producing it themselves or by securing binding offtake agreements. Without such commitments, claims to future green hydrogen use lack credibility. This scrutiny is essential to distinguish between lower-carbon and genuinely green iron projects, to position MENA’s iron and steel industry for long-term competitiveness, and to advance regional economic development and the global energy transition.

Appendix



Map of low-carbon iron project developers in selected MENA countries (GH2, 2026)

Country	Companies	Project type	Advancement	Green grade	Status	Sources
Algeria	Tosyali ; Sonatrach ; Hecate Renewable Energy	DRI + EAF	MoU	B	Active	Source 1 ; Source 2
Algeria	Copresud ; CEIP Scarl	DRI	MoU	C	Active	Source 1 ; Source 2
Egypt	Danieli	GH2 + DRI	Announced	A	Inactive	Source
Egypt	SMS Group	DRI	Announced	D	Active	Source 1 ; Source 2
Mauritania	CWP Global ; Snim	DRI + HBI	MoU	A	Inactive	Source
Mauritania	ArcelorMittal ; Snim	Pelletisation + DRI	MoU	B	Inactive	Source
Mauritania	UEG	GH2 + DRI	Unknown	-	Unknown	Source
Morocco	ACWA Power	Unknown	MoU	-	Active	Source
Morocco	Nareva	GH2 + DRI	MoU	-	Active	Source
Oman	Vale ; Jinnan Iron & Steel Group	Megahub	MoU	C	Active	Source 1 ; Source 2 ; Source 3
Oman	Kobelco ; Mitsui & Co	DRI	MoU	C	Inactive	Source
Oman	Jindal Steel Duqm	DRI + EAF	Under construction	C	Active	Source

Table of identified low-carbon iron product projects in selected MENA countries (GH2, 2026)

Country	Companies	Project type	Advancement	Green grade	Status	Sources
Oman	Meranti Green Steel	DRI + HBI	Pre-construction	B	Active	Source 1 : Source 2 ; Source 3 ; Source 4
Oman	ACME Group	DRI + HBI	Offtake agreement	B	Active	Source 1 ; Source 2 ; Source 3
Oman	Jindal Steel	DRI + HBI	Announced	C	Active	Source
Saudi Arabia	Essar Group	DRI + EAF	Pre-construction	C	Active	Source 1 ; Source 2
Saudi Arabia	Vale ; Royal Commissions of Jubail and Yanbu	Megahub	MoU	C	Active	Source 1 ; Source 2
Saudi Arabia	Saudi Aramco ; Saudi Arabian Public Investment Fund ; Baosteel	DRI + EAF	MoU	C	Inactive	Source 1 ; Source 2
Saudi Arabia	Tosyali	DRI + EAF	MoU	D	Active	Source 1 ; Source 2
UAE	Masdar ; Emsteel	DRI	Pilot completed	A	Active	Source 1 ; Source 2 ; Source 3
UAE	Vale ; Emirates Steel Arkan (ESA)	Megahub	MoU	-	Inactive	Source
UAE	Itochu ; Emsteel ; JFE	DRI	Under construction	D	Active	Source

Table of identified low-carbon iron product projects in selected MENA countries (GH2, 2026)

Bibliography

Agora Industry (2024). Low-carbon technologies for the global steel transformation. *https://www.agora-industry.org/publications/low-carbon-technologies-for-the-global-steel-transformation#c570*

Agora Industry (2025). Achieving climate neutral steel by 2050. *https://www.agora-industry.org/publications/achieving-climate-neutral-steel-by-2050*

Agora Industry (2025). The role of green iron trade in accelerating competitive steel transformation. *https://www.agora-industry.org/publications/the-role-of-green-iron-trade-in-accelerating-steel-transformation*

BNEF (2024). Scaling up hydrogen: The case for low-carbon steel. *https://assets.bbhub.io/media/sites/25/2024/01/Scaling-Up-Hydrogen-The-Case-For-Low-Carbon-Steel-Bloomberg-New-Economy.pdf*

Carboun Institute (2025). Leveraging green trade: The MENA region's opportunity in the global green iron and steel market. https://www.carboun.com/leveraging-green-trade

Climate Bonds Initiative (2022). Steel Criteria Background Paper: Development of eligibility criteria under the Climate Bonds Standards & Certification Scheme. *https://www.climatebonds.net/files/documents/Steel_Criteria_Background_Document_Dec-2022.pdf*

Climate Bonds Initiative (2025). A fork in the road for the global steel sector. *https://www.climatebonds.net/files/documents/publications/A-Fork-in-the-Road-for-the-global-steel-sector_2025-02-17-162914_tluz.pdf*

Eurofer (2025). European steel in figures. https://www.eurofer.eu/assets/publications/brochures-booklets-and-factsheets/european-steel-in-figures-2025/European-Steel-in-Figures-2025_23062025.pdf

European Commission (2025). Carbon Border Adjustment Mechanism. *https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en*

Essar Case (2024). Green steel ecosystem: Essar Group's vision for a strong and sustainable future. *https://essarcase.com/green-steel-ecosystem-essar-groups-vision-for-a-strong-and-sustainable-future/*

Franzman, D., Heinrichs, H., Lippkau, F., Addanki, T., Winkler, C., Buchenberg, P., Hamacher, T., Blesl, M., Linβen, J. & Stolten, D. (2023). Green hydrogen cost-potentials for global trade. International Journal of Hydrogen Energy. https://www.sciencedirect.com/science/article/pii/S0360319923022401

GH2 (2023). Joint-agreement on the responsible deployment of renewables-based hydrogen. *https://gh2.org/article/joint-agreement-responsible-deployment-renewables-based-hydrogen*

GH2 (2023). The Green Hydrogen Standard. https://greenhydrogenstandard.org/standard

Bibliography

GH2 (2025). In search of the real price of blue hydrogen. https://gh2.org/publication/search-real-price-blue-hydrogen

GH2 (2025). The Green Iron Principles. https://gh2.org/green-iron-principles

Hydrogen Insight (2023). Interview | 'Our hydrogen-based green steel could be cost-competitive with dirty equivalents within ten years. Here's how'. https://www.hydrogeninsight.com/industrial/interview-our-hydrogen-based-green-steel-could-be-cost-competitive-with-dirty-equivalents-within-ten-years-heres-how/2-1-1552201

Hydrogen Insight (2025). Indian steel giant plans second 'hydrogen-ready' direct-reduced iron plant in Oman. https://www.hydrogeninsight.com/production/indian-steel-giant-plans-second-hydrogen-ready-direct-reduced-iron-plant-in-oman/2-1-1873265

ICCT (2023). Recommendations for a stringent ISO standard on the GHG emissions from blue hydrogen production. https://theicct.org/wp-content/uploads/2023/07/ISO_blue_hydrogen_GHG_ICCT_DNV.pdf

IEA (2025). Global Hydrogen Review 2025. https://iea.blob.core.windows.net/assets/a6c466dd-b6f0-44bd-a60a-6940eccfb1c3/GlobalHydrogenReview2025.pdf

IEEFA (2024). Hydrogen unleashed: Opportunities and challenges in the evolving H2-DRI-EAF pathway beyond 2024. https://ieefa.org/resources/hydrogen-unleashed-opportunities-and-challenges-evolving-h2-dri-eaf-pathway-beyond-2024

IEEFA (2025). Blue hydrogen: A false hope for steel decarbonisation. https://ieefa.org/sites/default/files/2025-01/BN_Blue%20hydrogen-%20A%20false%20hope%20for%20steel%20decarbonisation_Jan25.pdf

IEEFA (2025). India needs targeted public finance to scale green steel. https://ieefa.org/articles/india-needs-targeted-public-finance-scale-green-steel

IEEFA (2025). MENA's opportunity to lead the green iron and steel transition. https://ieefa.org/resources/menas-opportunity-lead-green-iron-and-steel-transition#:~:text=MENA%20has%20one%20of%20the,than%20traditional%20coal%2Dbased%20processes.

International Trade Administration (2025). Global steel trade monitor. https://www.trade.gov/data-visualization/global-steel-trade-monitor

IRENA (2025). Analysis of the potential for green hydrogen and related commodities trade. https://www.irena.org/Publications/2025/Jun/Analysis-of-the-potential-for-green-hydrogen-and-related-commodities-trade

Bibliography

Johnson, C., Ahman, M., Nilsson, L. & Zhenxi, Li. (2025). Emerging green steel markets surrounding the EU emissions trading system and carbon border adjustment mechanism. Nature Communications. https://www.nature.com/articles/s41467-025-64440-9

Nasser, M. & Hassan, H. (2024). Feasibility analysis and Atlas for green hydrogen project in MENA region: Production, cost and environmental maps. Solar Energy. https://www.sciencedirect.com/science/article/abs/pii/S0038092X24000203

OECD (2025). Green iron opportunities in Australia: A case study within the OECD's global green iron project. https://www.oecd.org/en/publications/green-iron-opportunities-in-australia_bbd1e2b8-en.html

OECD (2025). Hydrogen in steel: Addressing emissions and dealing with overcapacity. https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/03/hydrogen-in-steel_f4d15f8d/7e2edc69-en.pdf

OECD (2025). OECD Steel Outlook 2025. https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/05/oecd-steel-outlook-2025_bf2b6109/28b61a5e-en.pdf

OIES (2025). 50 Shades of green: Unpacking what green means for steel. https://www.oxfordenergy.org/wpcms/wp-content/uploads/2025/06/CM12-50-Shades-of-Green-Steel.pdf

REI (2023). The path to green steel: Pursuing zero-carbon steelmaking in Japan. https://www.renewable-ei.org/pdfdownload/activities/REI_greensteelEN2023.pdf

ResponsibleSteel (2024). The ResponsibleSteel International Production Standard V2.1.1. https://www.responsiblesteel.org/standards

RMI (2019). The disruptive potential of green steel. https://rmi.org/insight/the-disruptive-potential-of-green-steel/

RMI (2024). Steel decarbonisation policy levers: Identifying policy concepts and areas that could drive forward the steel transition in the United States. https://rmi.org/insight/steel-decarbonization-policy-levers/

SFOC (2023). Industry trends brief | Korean government's low carbon steel production strategy: Key challenges and improvements. https://content.forourclimate.org/files/research/1z4mFUe.1-1

Transition Asia (2023). Green steel premium: Pricing & market development in China. https://transitionasia.org/green-steel-premium-pricing-market-development-in-china/

Transition Asia (2024). Green steel economics. https://transitionasia.org/green-steel-economics/

Bibliography

UNIDO (2025). Iron and steel: What is the state of decarbonization technologies? https://decarbonization.unido.org/resources/state-of-steel-decarbonization-technologies/

VALE (2022). Vale signs agreements to develop Mega Hubs in the Middle East and provide decarbonization solutions for steelmaking. https://vale.com/ca/w/vale-signs-agreements-to-develop-mega-hubs-in-the-middle-east-and-provide-decarbonization-solutions-for-steelmaking-1

VALE (2023). Vale advances on Mega Hubs project by signing off take agreement with Essar Group to supply iron ore agglomerates. https://vale.com/ca/w/vale-advances-on-mega-hubs-project-by-signing-off-take-agreement-with-essar-group-to-supply-iron-ore-agglomerates

WEF (2023). How MENA can play a pivotal role in the global energy transition. https://www.weforum.org/stories/2023/11/mena-energy-transition-solar-renewables/#:~:text=MENA's%20natural%20advantages&text=The%20region%20has%20superior%20access,storage%20capacities%20in%20the%20world.&text=Your%20browser%20can't%20play%20this%20video.&text=An%20error%20occurred.,is%20disabled%20in%20your%20browser.

WEF (2023). Net-zero industry tracker 2023. https://www.weforum.org/publications/net-zero-industry-tracker-2023/in-full/steel-industry-net-zero-tracker/

WEF (2024). This is how the MENA region can accelerate its renewable energy production. https://www.weforum.org/stories/2024/04/renewable-energy-capacity-mena/#:~:text=MENA's%20solar%20and%20wind%20potential,North%20American%20or%20European%20country.

Worldsteel (2021). Climate change and the production of iron and steel. https://worldsteel.org/wp-content/uploads/Climate-change-production-of-iron-and-steel-2021.pdf

Worldsteel (2025). 2025 World Steel in Figures. https://worldsteel.org/wp-content/uploads/World-Steel-in-Figures-2025.pdf