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Oman at the frontline of the green steel transition

Advancing large-scale hybrid projects that set new benchmarks for steel decarbonisation

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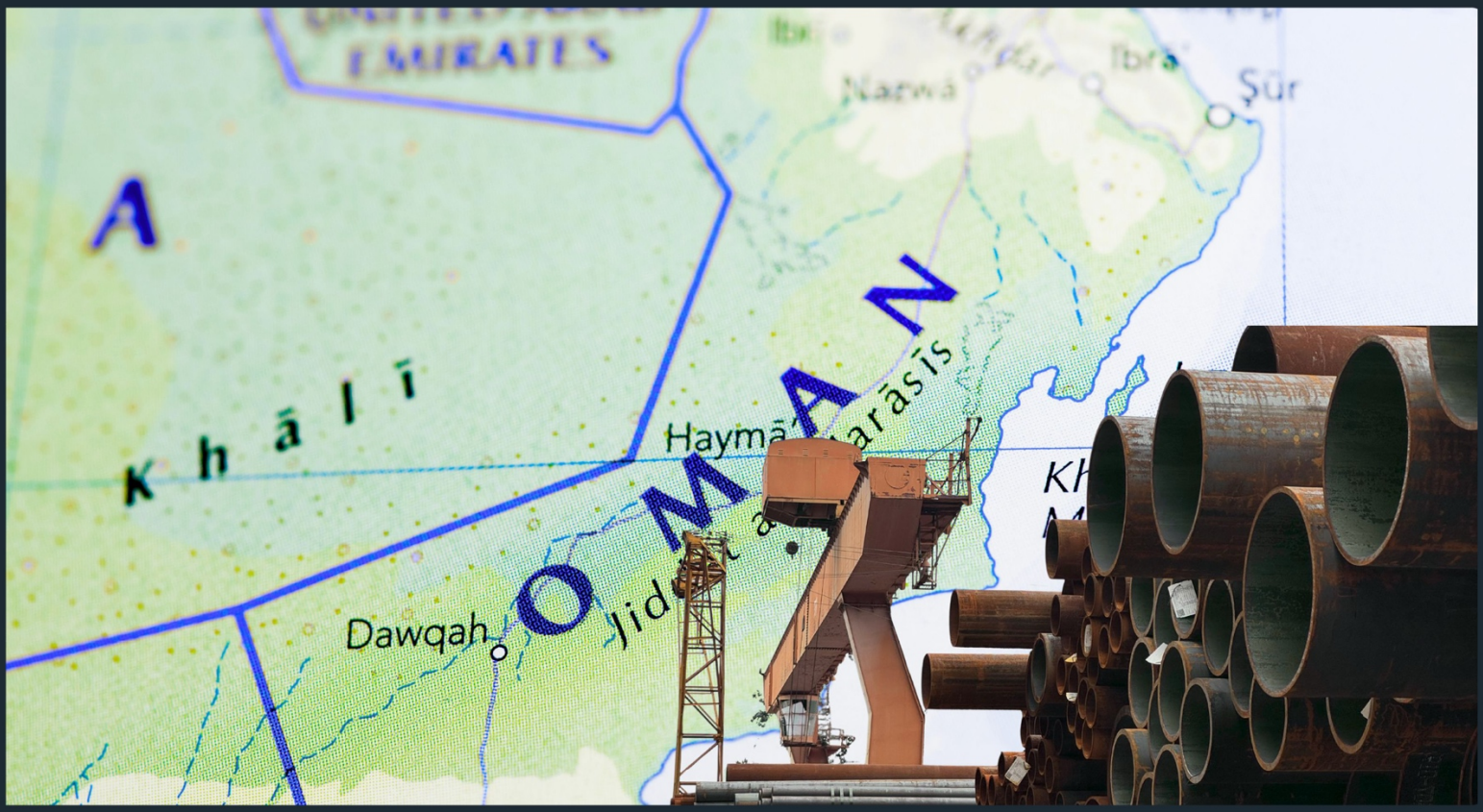

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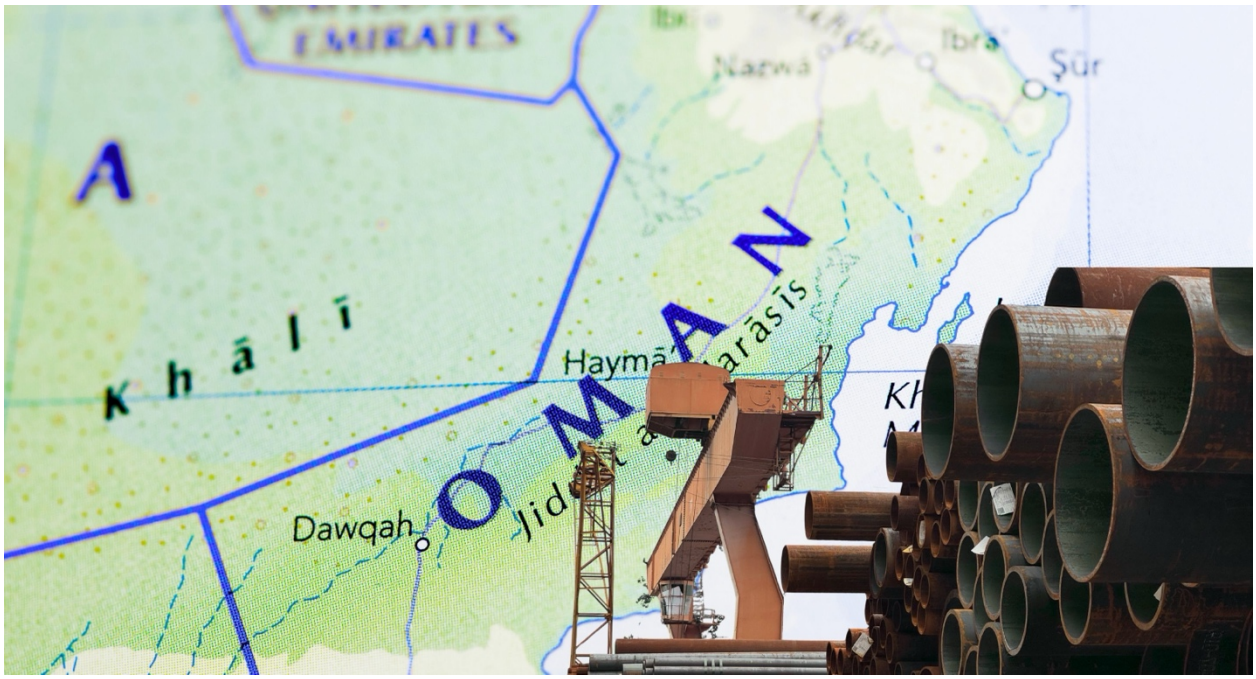
Key Findings

Oman is emerging as a global green iron and steel hub, thanks to its vast renewable energy potential, growing hydrogen initiatives, abundant land for project development, a strategic location with access to open seas, and a supportive regulatory framework.

A new generation of direct reduced iron facilities is being developed in Oman, featuring flexible technologies that allow use of hydrogen from the outset. This approach could set a new standard for the green iron transition.

Oman benefits from an integrated steelmaking supply chain well suited for moving towards green iron and steel. This set-up includes pelletizing, direct reduction and electric arc furnace facilities – with expansion plans that include domestic iron ore concentration.



Executive summary

Oman is one of the few nations in the Middle East and North Africa (MENA) region with an integrated steelmaking supply chain, from global iron ore concentrate supply to electric arc furnaces (EAFs) for steelmaking. This established industrial base provides a solid foundation for transitioning towards low- emission iron and steel production – and ultimately green iron and steel.

Oman's iron and steel sector has traditionally been dominated by two major players, Jindal Group and Vale. Now, the country is attracting new international initiatives, such as Meranti Green Steel, Mitsui and Kobe Steel, and Jinnan Steel, which are entering and reshaping the market.

Based on the projects currently in the pipeline, an additional 12.6 million tonnes per annum (Mtpa) of concentrate, 6Mtpa of pellets, and 12.5Mtpa of direct reduced iron (DRI)/hot-briquetted iron (HBI) are expected to be added to the country's existing production capacity. By establishing these new capacities, Oman aims to position itself as a regional hub for iron production.

Several large-scale low-emissions ironmaking projects are expected to reach final investment decision (FID) by 2026, and integrating green hydrogen with iron production represents a promising step for Oman toward achieving net zero emissions by 2050.

Oman's Vision 2040 outlines a target of achieving a non-oil share of GDP of over 90%, signalling the country's ambition to move away from reliance on fossil fuel exports. The country has set clear targets for expanding its renewable energy portfolio, with significant investments in both solar and wind power. Oman has 13.5 gigawatts (GW) of announced solar power capacity, of which 1.8GW is operational, and 2.1GW is under construction. For wind power, announced projects total around 13.2GW, with 50 megawatts (MW) operating and 100MW under construction.

Producing continuous, round-the-clock electricity from solar energy is now possible using battery storage. An Ember study indicates that, backed by Oman's exceptional solar irradiation, it could get 99% of the way to delivering a 1GW constant power supply, at a competitive price compared to other locations and technologies. Having such potential to generate cheap and reliable electricity could be a major advantage for steelmakers in Oman, providing the constant power needed for EAFs, direct reduction facilities, and, importantly, power-hungry hydrogen electrolysers.

The three large-scale DRI projects currently in development, with a combined capacity of 12.5Mtpa, will require around 130 petajoules (PJ) of gas, equivalent to nearly a quarter of the country's gas exports. While Oman has sufficient gas to initiate these projects, it is important to note that they are expected to start with a blend of gas and green hydrogen from the outset.

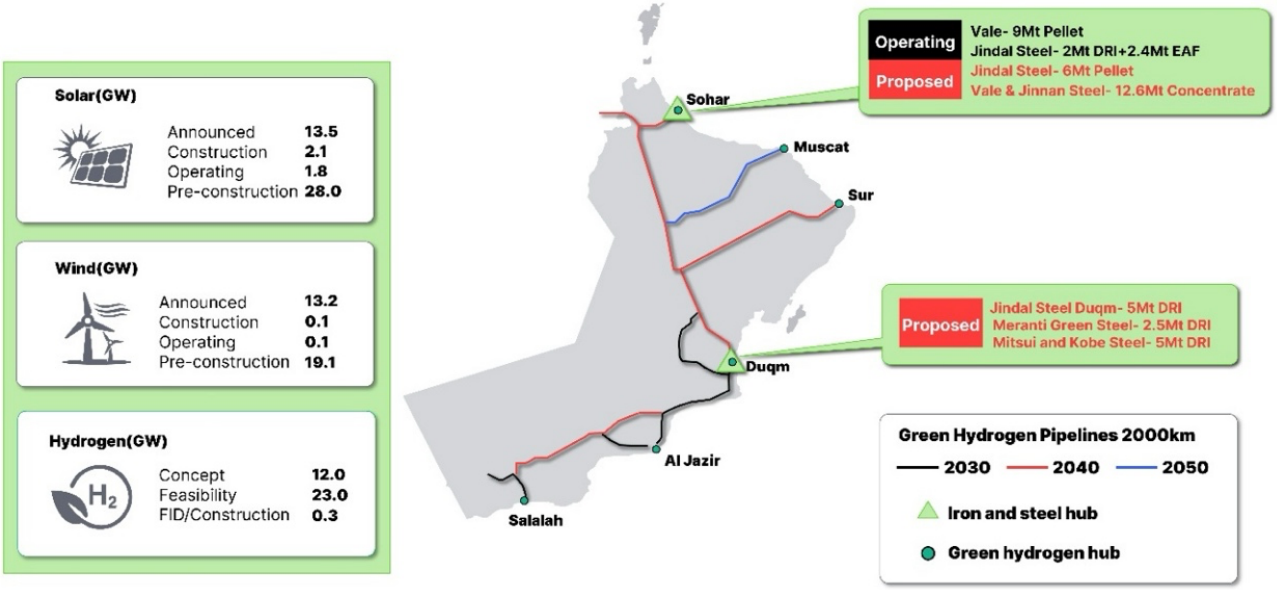
Gas-based DRI is emissions-intensive, and it is not possible to produce green iron and steel with gas. Without transitioning from gas to green hydrogen, these projects will – like other gas-based DRI plants – be unable to benefit from a green premium in the market, as their emissions would still exceed the thresholds for near-zero iron classification (even those equipped with carbon capture).

The country aims to produce 1–1.5 million tonnes of green hydrogen by 2030. To achieve this target, Oman has established a clear and coordinated strategy led by Hydrom, the national hydrogen orchestrator. The strategy focuses on enabling conditions to reach the set goals, including the development of shared infrastructure, bridging supply and demand gaps, offering financial incentives, and streamlining regulatory processes.

Coupled with its national strategy to become a leading hub for green hydrogen production, Oman is aligning its energy transition with industrial decarbonisation goals. Among all the announced initiatives, only a few have indicated plans to allocate their hydrogen production to steelmaking, including the Amnah project and, more recently, India's ACME Group. The steel industry could become a major offtaker in Oman's emerging green hydrogen economy, and domestic hydrogen use for iron and steel production should be prioritised.

Given its unique combination of industrial readiness supported by major corporates such as Vale and the Jindal Group, renewable energy ambitions, strong policy support, and a strategic location, Oman is well positioned to become a leading supplier of green iron and steel to international markets. Studies indicate that while Oman can produce gas-based DRI at low cost with limited competition from other regions, it also has the potential to supply green iron to markets such as the EU cost-competitively, holding an advantage over other producers, including Australia.

Oman's energy transition and the rise of green iron and steel



IEEFA

Overview of Oman's iron and steel sector

Oman is one of the few nations in the Middle East and North Africa (MENA) region with an integrated steelmaking supply chain from global iron ore concentrate supply to electric arc furnaces for steelmaking.[1] Oman's iron and steel sector has traditionally been dominated by two major players, Jindal Group and Vale. Now, the country is attracting new international initiatives, such as Singapore-based Meranti Green Steel, which are entering and reshaping the market.

At present, all steel plants in Oman produce only long products, though plans are underway to expand into flat product production. Future low-emissions iron projects are also focused on serving both domestic demand and export markets.

Jindal Group is the leading player in Oman's steel market, with two operating facilities – Jindal Steel Sohar and Sohar Steel LLC – with additional projects under construction.

Operating facilities

Jindal Steel Sohar

Formerly known as Jindal Shadeed Iron and Steel, the Jindal Steel Sohar facility has a direct reduced iron (DRI) capacity of 2 million tonnes per annum (Mtpa), and electric arc furnace (EAF) steelmaking capacity of 2.4Mtpa, making it the first and only operating DRI plant in Oman.[2] Like all other steel mills in the country, it focuses solely on long products, including 1.4Mtpa of rebar.

Sohar Steel LLC

Sohar Steel is a secondary steel mill that uses scrap in EAFs to produce steel, with a crude steel capacity of 0.7Mtpa; it also produces wire rods, with 0.5Mtpa capacity.[3] Jindal Group acquired the mill in 2023.[4] .

Moon Iron & Steel Company SAOC

This company is another scrap-EAF steel producer in Oman, with an annual capacity of 1.2Mtpa, based in Sohar.[5] Limited information is available regarding its production levels and overall performance.

[1] IEEFA. MENA's Opportunity to Lead the Green Iron and Steel Transition. 6 March 2025.
[2] Jindal Steel. Jindal Steel Sohar. Accessed 22 October 2025.
[3] Jindal Steel. Sohar Steel. Accessed 22 October 2025.
[4] SteelRadar. Jindal Shadeed buys Omani Sohar Steel. 15 March 2023.
[5] GEM. Moon Iron & Steel Company Sohar plant. Accessed 22 October 2025.

Vale Oman

Vale has been operating a 9Mtpa pelletizing plant in Oman since 2012, marking its first investment in the country and establishing one of the key pillars of the company's presence in the Gulf Cooperation Council (GCC) region.[6] Vale has announced plans to transition this facility to 100% renewable energy by 2030 in order to reduce emissions.[7] Its 105-megawatt (MW) agreement with OQ Alternative Energy (OQAE) will also provide power for its planned Green Metallic Mega Hub in Duqm.[8]

Proposed projects

Jindal Steel Duqm

In September 2025, the Jindal Steel Duqm facility secured its second DRI plant, a 2.5Mtpa hot-briquetted iron (HBI) unit, supplied by Tenova and Danieli using their Zero-Reformer Energiron technology.[9] Jindal Steel Duqm, formerly known as Vulcan Green Steel, placed an order for the same hydrogen-ready plant in 2023.[10] Construction work on the facility is moving forward.

The two DRI plants are targeted for commissioning by 2027.[11] The facility will initially operate on gas, with supply agreements already secured. In the future, green hydrogen, sourced from third-party suppliers, has been announced as part of the planned reducing mix.

Jindal Steel has also signed offtake agreements for its final products, including a 1Mtpa binding agreement with Vitkovice Steel and an additional agreement with Volkswagen AG.[12,13]

Jindal Pelletizing

The 6Mtpa pelletizing plant is expected to source its iron ore from Jindal's mines in Cameroon and South Africa.[14] The pellets produced will supply the new DRI facilities in Duqm. The project is slated for commissioning in the fourth quarter of 2025.

[6] Vale Oman. Vale in Oman. Accessed 22 October 2025.
[7] SteelRadar. Vale and OQAE join forces for green industry in Oman. 14 May 2025.
[8] Energy Oman. OQ signs $2 billion worth strategic deals. 25 May 2025.
[9] Danieli. Jindal Steel orders second hydrogen-ready DRI plant in Oman. 16 September 2025.
[10] Danieli. Vulcan Green Steel orders DRI plant from Danieli and Tenova. 5 December 2023.
[11] Jindal Steel. Forging Oman's Future with Low-Carbon Steel. Accessed 22 October 2025.
[12] Oman Observer. Omans Vulcan green steel parent company to acquire Czech firm. 14 October 2024.
[13] Volkswagen group. Low-carbon steel: Volkswagen AG and Vulcan Green Steel enter into partnership. 16 December 2024.
[14] Jindal Steel. Jindal Pelletizing. Accessed 22 October 2025.

Table 1: List of iron and steel projects in Oman (operating and proposed)

	Plant	Production	Capacity (Mtpa)	Start Year	Location
Operating	Vale Oman	Pellet	9	2012	Sohar
	Jindal Steel Sohar	DRI	2	2010	Sohar
	Jindal Steel Sohar	EAF	2.4	2014	Sohar
	Sohar Steel LLC	EAF	0.7	2008	Sohar
	Moon Iron & Steel Company	EAF	1.2	2020	Sohar
Proposed	Vale & Jinnan Steel	Concentration	12.6	Mid 2027	Sohar
	Jindal Steel Duqm	DRI/HBI	5	Mid 2027	Duqm
	Jindal Steel Sohar	Pellet	6	Q4 2025	Sohar
	Mitsui and Kobe Steel	DRI	5	2027	Duqm
	Meranti Green Steel	HBI	2.5	Mid 2029	Duqm

Source: Company reports, IEEFA.

Vale and Jinnan Steel concentration

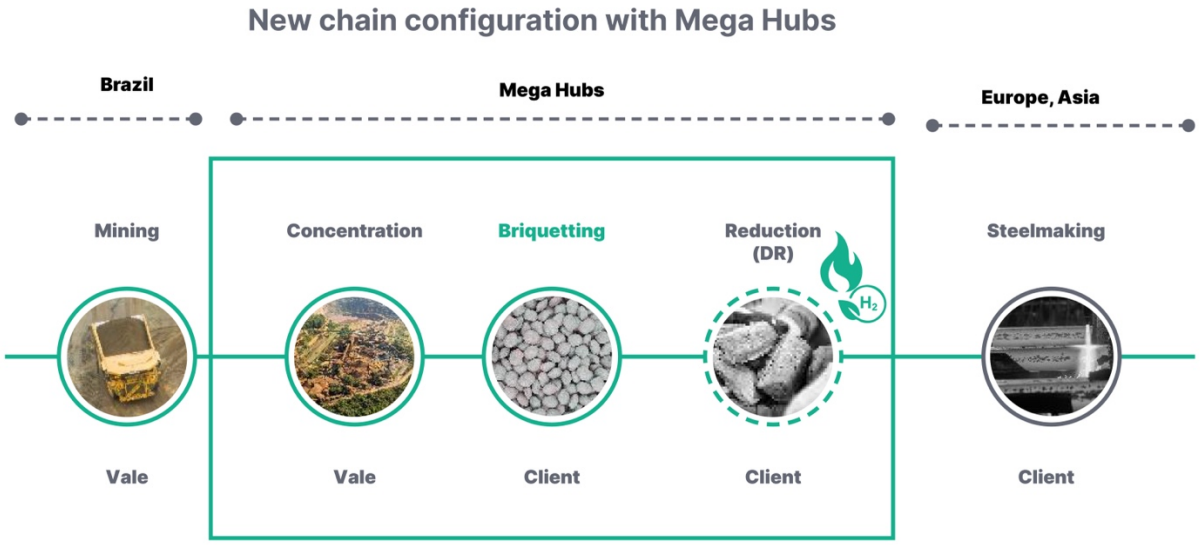
Vale and Jinnan Steel have announced a joint partnership to establish a concentration facility with a capacity of 12.6Mtpa.[15] Vale will supply 18Mtpa of high-grade ore as feedstock and invest US$227 million to connect the new plant to the pelletizing facility. Jinnan will run the plant under a Build, Own and Operate (BOO) model, with an investment of around US$400 million. The facility is expected to commence operations by mid-2027. Building on this long-term foothold, Vale is now planning to expand its capacity through Mega Hubs in Oman, the United Arab Emirates and Saudi Arabia. Vale has disclosed that it intends to make two final investment decisions (FIDs) relating to its Mega Hubs plans in 2025.[16]

Vale has developed its Mega Hub business model to strengthen its role in the low-emission iron value chain. Under this model, Vale supplies high-grade raw iron ore and concentrate, while partner companies (clients) produce iron ore agglomerates and metallics such as DRI and HBI. This approach is developed to leverage the comparative advantages of different regions, such as access to raw materials, renewable energy potential and industrial infrastructure, to enhance overall competitiveness.

The MENA region has a long history of iron production and remains one of the most cost competitive locations for DRI-based steelmaking. Oman, in particular, stands out due to its long-term partnership with Vale, which already operates a pelletizing plant in Sohar. This established industrial base, combined with Oman's growing hydrogen and renewable energy initiatives, gives the country a stronger position than other regional contenders identified by Vale as potential Mega Hub locations.

[15] Vale. Vale and Jinnan Steel & Iron Group announce investment in iron ore concentration plant in Oman. 28 October 2024.
[16] Vale. Institutional Presentation. October 2025. Page 44.

Figure 1: Vale's Mega Hubs concept



Source: Vale.[17]

Meranti Green Steel HBI

Meranti Green Steel, headquartered in Singapore, plans to build its first 2.5Mtpa HBI plant in Oman's Duqm Special Economic Zone.[18] In the first phase of its project, the company intends to produce steel in Thailand using HBI imported from Oman and allocate 50% of the HBI for potential EU offtakers.[19] Meranti has targeted an FID by mid-2026 and commissioning by mid-2029. The project will start with 15% green hydrogen in the reducing mix, gradually increasing to 85%.[20] It has also secured a conditional gas allocation from Oman's Integrated Gas Company (IGC).[21]

Meranti has also signed several offtake agreements with end users of the final product, including Memorandums of Understanding (MOUs) with INTERFER Edelstahl Handelsgesellschaft[22], Steelinvest Group[23], POSCO Vietnam[24], Salzgitter Mannesmann International[25], and Belmont & Knott[26].

[17] Vale. Institutional Presentation. October 2025.
[18] Meranti Green Steel. Meranti Green Steel Announces Strategic Green Iron Project in Oman. 11 August 2025.
[19] Argus. Meranti sees 2030-35 sweet spot for green HRC premiums. 23 August 2025.
[20] Hydrogeninsight. Singaporean developer plans green iron plant in Oman — but it will take years to ramp up green hydrogen use. 27 August 2025.
[21] The Arabian Stories. Oman's Duqm emerges as global hub for green steel production; Meranti secures gas allocation. 9 July 2025.
[22] Meranti Green Steel. INTERFER Edelstahl Handelsgesellschaft mbH and Meranti Green Steel Offtake Partnership Announcement. 17 March 2024.
[23] Meranti Green Steel. Steelinvest and Meranti Green Steel Offtake Partnership Announcement. 9 April 2024.
[24] Meranti Green Steel. LinkedIn post.
[25] Meranti Green Steel. LinkedIn post.
[26] Meranti Green Steel. LinkedIn post.

Mitsui-Kobe Duqm DRI

Kobe Steel and Mitsui & Co are conducting a feasibility study for the development of a 5Mtpa DRI facility in Duqm, with potential for future expansion.[27] The two companies have signed an agreement with the Public Authority for Special Economic Zones and Free Zones (OPAZ) and concluded a Land Reservation Agreement with Port of Duqm Company SAOC. They aim to start production by 2027. The project will be based on Midrex Flex technology, with plans to replace gas with hydrogen, and to incorporate carbon capture, utilisation and storage (CCUS) to further reduce emissions.[28]

However, Midrex has clarified that carbon capture and storage (CCS) is unlikely to play a significant role in emission reductions for direct reduction technologies, citing fundamental challenges encountered in the past.[29] The company emphasised: "For now, CCS remains a niche technology for steel and is likely to work only in very specific locations and under particular circumstances." Midrex also noted that the DRI pathway offers far greater potential for large-scale adoption compared with other decarbonisation routes, adding: "Hydrogen use in the iron and steelmaking process could be a viable decarbonization option…"

> **For now, CCS remains a niche technology for steel and is likely to work only in very specific locations and under particular circumstances.**
>
> ***Midrex***

Oman's energy sector

Oman Vision 2040, the country's national development strategy, outlines a target of achieving a non-oil share of GDP of over 90%, signalling its ambition to move away from reliance on fossil fuel exports.[30] The strategy reflects a clear shift toward clean and green products, with renewable energy and the green economy identified as key priorities. Oman is also committed to net zero emissions by 2050.

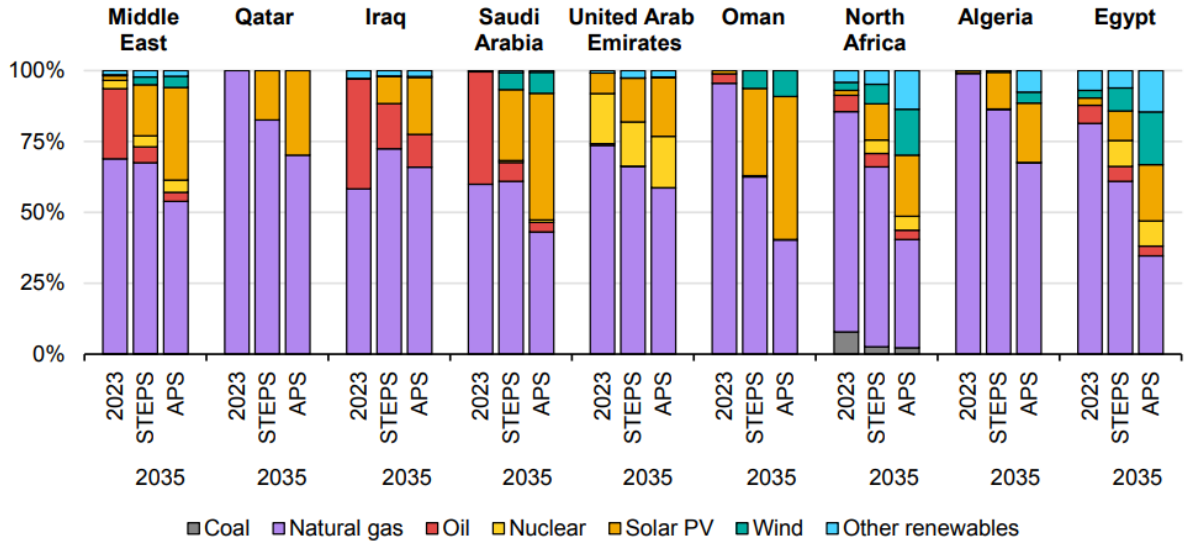
Electricity

Electricity generation in the MENA region is currently dominated by gas. According to the International Energy Agency (IEA), the region's electricity demand tripled from 2000 to 2024, the

[27] Mitsui & Co. Mitsui & Co. explores low CO2 iron metallics production in Special Economic Zone at Duqm, Sultanate of Oman. 10 April 2023.
[28] Midrex. Kobe Steel & Mitsui Announce DRI Project in Oman; 5 million Tons Using MIDREX® Hydrogen-based Technology. June 2023.
[29] Midrex. Is CCS a Solution for Iron and Steel? Only in the Right Conditions. 19 August 2025.
[30] Oman Vision 2040 Oman Vision 2040. Page 11.

third largest growth after China and India.[31] While gas will continue to play a role as electricity demand rises rapidly, renewables are expected to significantly reshape the region's power mix. Under the IEA's Stated Policies Scenario, MENA is projected to rank fifth globally in renewable capacity expansion by 2035, after China, the US, the EU, and India. According to IEA projections, Oman is set to achieve one of the largest shares of solar and wind in its electricity mix among MENA countries by 2035.

Figure 2: Electricity generation mix in selected MENA countries by 2035



Source: IEA.[32]
Note: STEPS = Stated Policies Scenario, APS = Announced Pledges Scenario.

Iron and steel are the main drivers of rising industrial electricity consumption in the MENA region and will continue to be so in the future. Together with aluminium, they account for two thirds of total industrial electricity use in the region.[33] As their share grows, the electricity market in MENA is set to become a cross-section competition zone among multiple sectors, from space cooling and desalination to hydrogen production and, eventually, data centres.

The country has strong potential for both solar and wind energy and is actively developing capacity in both areas.[34] Oman's superior wind power potential complements solar by extending the availability of renewable energy, particularly during periods when the sun is not shining.[35]

[31] IEA LinkedIn post.
[32] IEA. The Future of Electricity in the Middle East and North Africa. 18 September 2025. Page 74.
[33] Ibid. Page 66.
[34] Nama Power and Water Procurement. Project Development. Accessed 22 October 2025.
[35] Al-dhaw. Wind and Solar. Accessed 22 October 2025.

According to Global Energy Monitor (GEM) data updated in February this year, Oman has 13.5 gigawatts (GW) of announced solar power capacity, of which 1.8GW is operational, and 2.1GW is under construction.[36] For wind power, announced projects total around 13.2GW, with 50MW currently operating and 100MW under construction.[37]

In just the first five months of 2025, the share of renewable electricity in Oman increased to 11.5%, from 4.88% at the end of 2024.[38] The country has set ambitious targets of reaching 30-40% by 2030 and 60–70% by 2040, on its path toward achieving net zero by 2050.

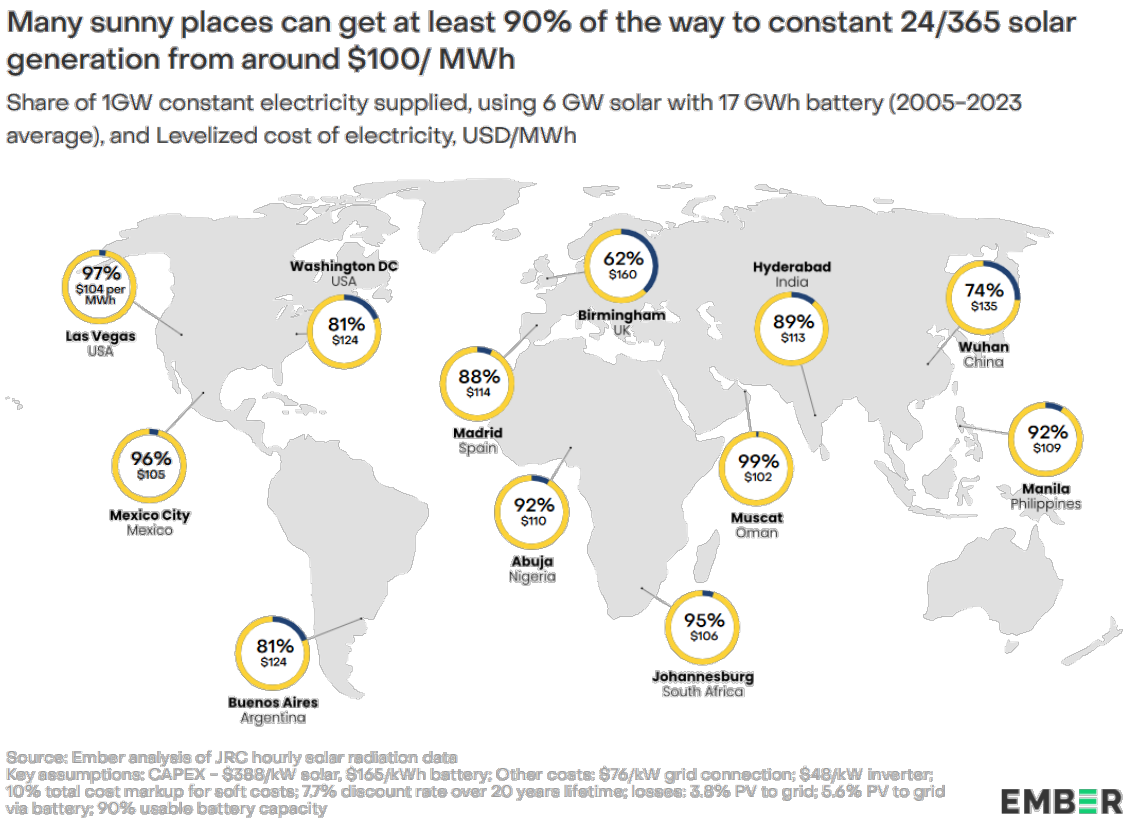
Oman enjoys excellent solar irradiation, making it highly suitable for generating a consistent electricity supply throughout the year. Producing continuous, round-the-clock electricity from renewables is now possible by using batteries to deliver a reliable supply of clean energy. Recent advances in battery technology have made this increasingly feasible, especially in locations with abundant sunshine.

A study by Ember indicates that Oman's capital Muscat could get 99% of the way to delivering a 1GW constant power supply using 6GW of solar capacity supported by 17 gigawatt-hours (GWh) of battery storage.[39] The report also highlights that the levelised cost of electricity (LCOE) in this set-up would be US$102 per megawatt-hour (MWh) in Oman, the lowest among all regions studied, with the strongest overall performance. The cost of solar and battery technologies has fallen rapidly, dropping by nearly 50% between 2019 and 2024. This means the combination of solar and battery systems can now compete with other power generation technologies. According to Ember, based on Lazard's average LCOE data, new coal projects cost around US$118/MWh and nuclear projects about US$182/MWh in 2024.

It's worth noting that the average wholesale electricity price in Europe during the first three quarters of this year was €89/MWh (about US$102), with several countries, including Poland and Italy, experiencing prices above €100/MWh (about US$115).[40]

[36] GEM. Global Solar Power Tracker. February 2025.
[37] GEM. Global Wind Power Tracker. February 2025.
[38] Oman Observer. Renewables share of Oman's total power output climbs to 11.5%. 12 July 2025.
[39] Ember. Solar electricity every hour of every day is here and it changes everything. 21 June 2025.
[40] Ember. European electricity prices and costs. Accessed 22 October 2025. US dollar amounts are IEEFA calculations based on 6 November 2025 exchange rates.

Figure 3: Continuous power supplied by solar with batteries across locations



Source: Ember.[41]

Earlier this year, Masdar, in collaboration with Emirates Water and Electricity Company (EWEC) and Abu Dhabi Future Energy Company PJSC, announced a project in Abu Dhabi to deliver 1GW of baseload power, supported by 5.2GW of solar capacity and 19GWh of battery storage.[42] The project demonstrates the potential to achieve gigawatt-scale firm baseload electricity in the MENA region.

In September 2025, Oman's Nama Power signed its first large-scale solar and battery storage project, the Ibri III Project, which includes 500MW of solar capacity and a 100MWh battery system.[43]

Currently, due to the heavy reliance on gas for power generation, the MENA region's average grid carbon intensity is much higher than the global average. Low renewable penetration significantly affects steelmakers' Scope 2 emissions, and using grid electricity largely negates their advantages in carbon reduction.[44]

[41] Ember. Solar electricity every hour of every day is here and it changes everything. 21 June 2025. Page 7.
[42] Masdar. UAE President witnesses launch of world's first 24/7 Solar PV, Battery Storage gigascale project to be built in Abu Dhabi. 14 January 2025.
[43] Energy Storage. Oman selects developers for 100 MWh solar-plus-storage project. 24 September 2025.
[44] IEEFA. Slides: Unlocking the Potential of Green Steel in MENA. 23 September 2024.

Having such potential to generate cheap and reliable electricity could be a major advantage for steelmakers in Oman, providing the constant power needed for EAFs, direct reduction facilities, and, importantly, power-hungry hydrogen electrolysers.

Companies across the steel value chain are also investing in renewable energy. Jindal Group and OQAE have signed a joint development agreement (JDA) for 500MW capacity to supply electricity for the current steel mill in Sohar and also an upcoming green steel plant in Duqm.[45] In a separate agreement, Vale also signed a head of agreement with OQAE to supply 105MW of renewable energy for its operations in Oman.

The country is also investing US$2.2 billion in grid expansion and related infrastructure, as many new users are expected to connect to the national grid in the coming years.[46] It is reported that over 32 major industrial and commercial projects will be connected to the national grid by 2028.

The country is also introducing new financing mechanisms to support the energy transition. Future Fund Oman has launched its first energy transition fund, with committed capital of US$200 million, in partnership with China's investment company, Templewater.[47] The fund will invest across multiple areas of the energy transition, including wind and solar, clean molecules, and energy storage.

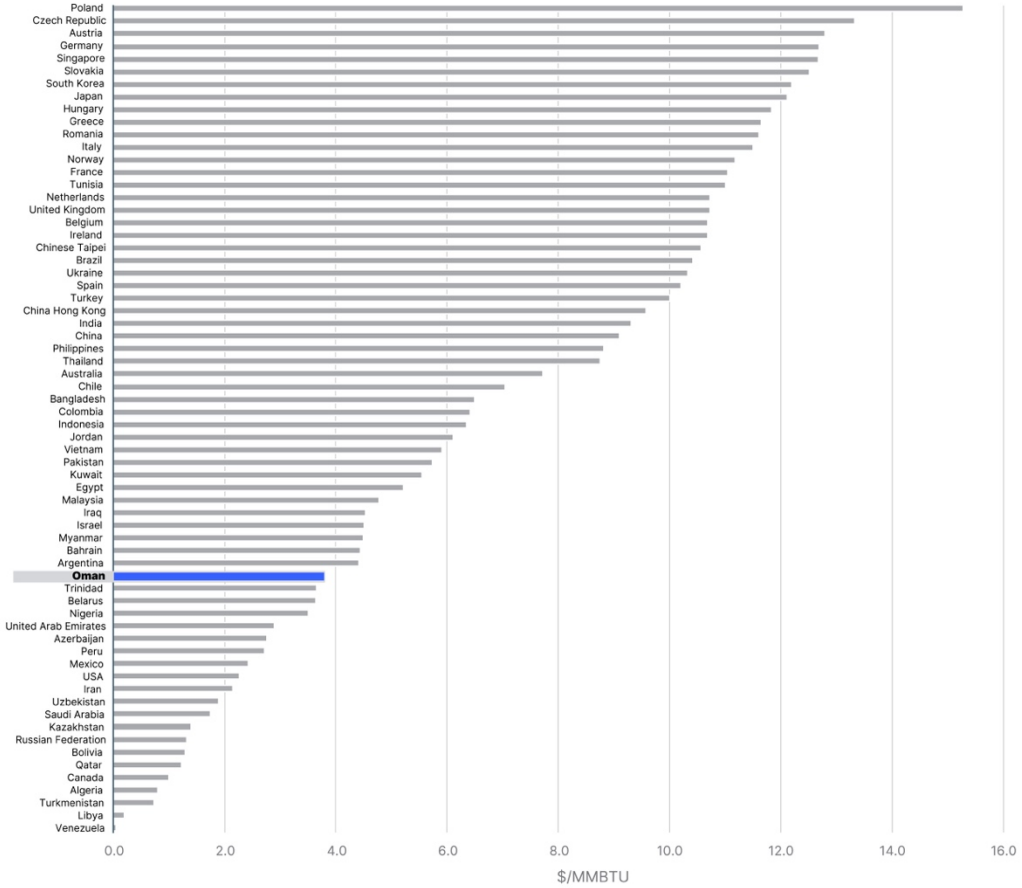
Gas

Oman is one of the largest producers and exporters of gas in the world, and after Qatar is the second largest exporter in the Middle East. In 2023, the country produced over 1,577 petajoules (PJ) of gas.[48] The share of gas in the total energy supply was over 86%, while the share of gas in power generation was 95.5%.[49] While the country is gradually shifting away from gas in electricity generation by adopting renewable alternatives, gas continues to be used for industrial purposes.

Historically, the MENA region has consistently maintained the lowest gas prices, showing minimal sensitivity to global market volatility. According to the International Gas Union survey, the average wholesale gas price in Oman in 2024 was less than US$4/MMBtu, significantly lower than in many other countries.[50] Some major producers in the MENA region, including Iran, the United Arab Emirates, Saudi Arabia, Qatar in the Middle East, and Algeria and Libya in North Africa, have even recorded prices lower than Oman at times. This price gap could indicate that Oman may lose some of its regional competitiveness in gas-based production technologies and may need to gradually shift away from gas in line with its long-term vision of achieving net zero emissions and reducing its reliance on fossil fuels.

[45] Energy Oman. OQ signs $2 billion worth strategic deals. 25 May 2025.
[46] Oman Observer. OETC earmarks $2.2 billion for Oman's grid infra expansion by 2028. 29 March 2025.
[47] Oman News Agency. Oman's First Energy Transition Fund Launched. 9 July 2025.
[48] IEA. Oman Natural Gas. Accessed 22 October 2025.
[49] IEA. Oman Energy Mix. Accessed 22 October 2025.
[50] International Gas Union. Wholesale Gas Price Survey 2025 Edition. 25 June 2025. Page 38.

Figure 4: Wholesale gas prices in 2024 by market



Source: International Gas Union, Wholesale Gas Price Survey 2025 Edition.[51]

The three large-scale DRI projects currently in the pipeline, with a combined capacity of 12.5Mtpa, will require around 130PJ of gas, equivalent to nearly a quarter of the country's 554PJ of gas exports in 2023.[52]

While Oman has sufficient gas to initiate these projects, it is important to note that they are expected to start with a blend of gas and green hydrogen from the outset, demonstrating a clear commitment to transitioning toward fully green iron in the longer term. Gas-based DRI is emissions-intensive, and it is not possible to produce green iron and steel with gas.[53] Without transitioning from gas to green hydrogen, these projects will remain – like other gas-based DRI plants – unable to benefit from the green premium in the market, as their emissions would still exceed the thresholds for any near-zero iron classification (even those equipped with CCUS).[54]

[51] International Gas Union. Wholesale Gas Price Survey 2025 Edition. 25 June 2025. Page 38.
[52] IEA. Natural Gas. Accessed 22 October 2025.
[53] IEEFA. Fact Sheet "Grey iron" will never be green. 4 September 2025.
[54] RMI. Zeroing in on Steel Sector Emissions for Market Transformation. 21 January 2025.

Amnah Green Hydrogen has already announced plans to supply green hydrogen to local steel producers, aligning closely with the projected timelines of upcoming industrial developments.[55] Similarly, India's ACME Group has indicated that part of its hydrogen output will be dedicated to ironmaking.[56]

Oman's emerging fleet of new DRI plants, alongside existing facilities, is set to create a significant future demand for domestically produced green hydrogen. Looking ahead, more offtake agreements are expected between steelmakers and hydrogen developers, ensuring that this valuable resource is increasingly directed toward high-priority, energy-intensive sectors such as iron and steel.

In deploying this strategy, Oman could be one of the first nations that starts its journey towards green iron at scale. As some of the announced projects in ironmaking and green hydrogen get closer to FID, 2026 will be an important year for these plans.

> **Gas-based DRI is emissions-intensive, and it is not possible to produce green iron and steel with gas.**

Oman's green hydrogen

The IEA expects that Oman could be the sixth largest exporter of hydrogen globally, and the largest in the Middle East, by 2030.[57] IEA projections suggest that Oman could potentially export over 0.6Mtpa of hydrogen by the end of this decade, significantly higher than any other country in the region. Considering the current pipeline of projects, Oman is expected to emerge not only as one of the lowest-cost producers of green hydrogen but also as a leading exporter of this new energy source.[58]

Global low-emissions hydrogen production is progressing slowly and is projected to reach 4.2Mtpa by 2030, equivalent to just 4% of total hydrogen production that year.[59]

Hydrom

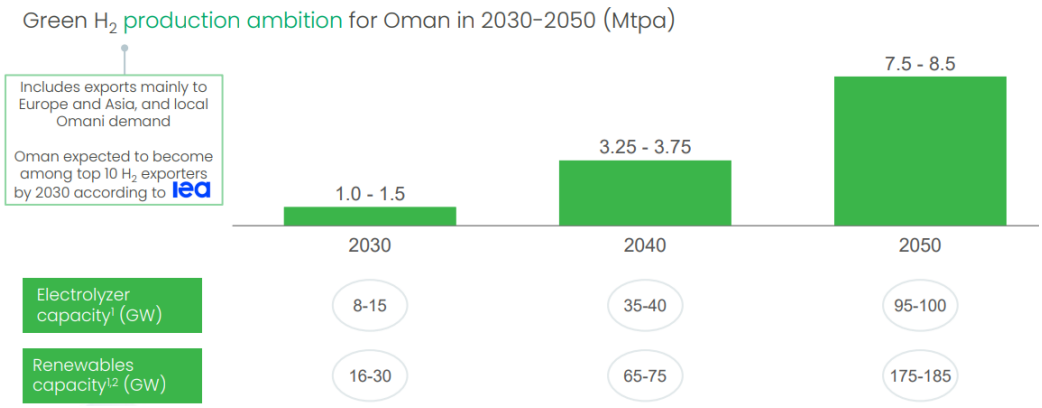
Hydrogen Oman, better known as Hydrom, serves as the central orchestrator of the country's green hydrogen initiatives. Its vision entails "Positioning Oman as a leading global green hydrogen hub".[60]

[55] Oman Observer. Amnah commits hydrogen to Oman's green steel industry. 26 December 2023.
[56] Hydrogeninsight. India's ACME to supply millions of tonnes of green hydrogen-derived iron to Vietnamese steel maker. 13 October 2025.
[57] IEA. Renewable hydrogen from Oman. 12 June 2023. Page 7.
[58] Ibid. Page 28.
[59] IEA. Global Hydrogen Review 2025. Page 8.
[60] Hydrom. Oman Green Hydrogen Strategy. May 2024. Page 9.

Hydrom is responsible for preparing Oman's hydrogen master plan, coordinating infrastructure development, and managing project auction rounds and land allocation.

Oman has outlined a clear and robust strategy for hydrogen development. The state-owned energy company OQ, together with its subsidiary OQ Alternative Energy (OQAE), is actively driving the country's transition into a leading hub for hydrogen production and exports.

Figure 5: Oman's hydrogen ambition



Source: Hydrom.[61]
Note: H_2 = hydrogen; NH_3 = ammonia. [1] Approximate values for Duqm, Oman. [2]Includes 25% buffer over renewables needed for electrolysers to account for balance of plant load (which includes NH_3 synthesis loop, storage tanks for H_2/NH_3, another auxiliary facilities load. Assumption Sustainable Development Scenario (2°C).

To achieve its long-term goals, Oman has allocated 50,000 square kilometres of land for green hydrogen projects across three major locations with high wind and solar potential.[62] The country's solar PV potential exceeds 2,400 kilowatt-hours per square metre, while wind speeds reach up to 11 metres per second, translating to an average capacity factor of around 50% for wind turbines.[63]

To meet its 1-1.5 Mtpa hydrogen production target by 2030, Oman has allocated land blocks through two rounds of public auctions. In these rounds, five projects were awarded in Duqm (Al Wusta province) and three in Salalah (Dhofar province). None of these projects has reached FID yet. Together, the awarded projects represent a production capacity of about 1.38Mtpa of hydrogen, which requires more than US$49 billion in investment.[64] Looking further ahead, Oman's long-term strategy envisions over US$140 billion in investment by 2050 to establish a full-scale hydrogen economy.[65]

[61] Hydrom. Oman Green Hydrogen Strategy. May 2024. Page 6.
[62] Ibid. Page 3.
[63] Ibid. Page 5.
[64] Ibid. Page 16.
[65] Ibid. Page 28.

The third auction round is currently underway, with the winners expected to be announced by the second quarter of 2026.[66] The third round was launched in April, and more than 100 companies have registered for that.

Oman's progress in hydrogen is not only driven by its natural advantages, but also by detailed, long-term planning. Government intervention aims to reduce risks for first movers and create conditions that bring producers and users closer together. The key elements of this strategy include:

- **Shared infrastructure** – In Duqm, a common infrastructure development is planned (expected to reach FID by 2027), including hydrogen transport, electricity transmission, desalination facilities, and water transport. OQ Gas Networks (OQGN) is preparing to make a final investment decision on a hydrogen pipeline of approximately 300–400 kilometres, designed to connect producers with end users across the country.[67] This network forms a key part of Hydrom's long-term strategy. Hydrom's vision is to establish a nationwide green hydrogen network by 2050, extending to Sohar in the north in the first phase by 2040.[68]
- **Closing demand and supply gap** – For the third round, Hydrom plans to engage end-users through a new innovative approach called double-sided auctions, which involves both end-users and developers in the process.[69] Hydrom has signed an MoU with the German H2Global foundation to adapt this innovative mechanism.[70] In a double-sided auction, a government-backed third party acts as an intermediary between green hydrogen producers and buyers. It guarantees the purchase of all production from producers for a defined period and resells the hydrogen to buyers, covering any price gaps through subsidies. Hydrom is actively working to secure its first commercial offtake agreement with South Korea, in conjunction with the Oman–South Korea Green Hydrogen Investment Forum in Seoul.[71]
- **Industrial integration** – A portion of the new green hydrogen capacity is being redirected to supply domestic industries. The third round includes land allocated for downstream industries, including steel.[72]
- **Financial incentives** – Hydrom included financial incentives such as a 90% reduction in land lease fees during development phase, reductions in base royalties, and corporate tax exemption for 10 years.[73]

[66] Hydrom. Oman Green H_2 Auction. 30 April 2025.
[67] Hydrogeninsight. Final investment decision on Oman's 300-400km hydrogen pipeline network to be taken in 2027. 25 April 2025.
[68] Hydrom. Oman Green Hydrogen Strategy. May 2024. Page 24.
[69] Hydrogeninsight. Double-sided auctions | Oman to launch third green hydrogen tender in 2025 with new bidding mechanisms. 11 December 2024.
[70] Oman Observer. Oman taps H2Global to accelerate clean hydrogen development. 8 October 2025.
[71] S&P Global. INTERVIEW: Oman's Hydrom eyes Asia with roadshows for hydrogen offtake deals. 29 August 2025.
[72] MEED. Oman eyes first green hydrogen offtake this year. 5 February 2025.
[73] Fuelcellsworks. Hydrom Rolls Out Tax and Lease Incentives to Boost Duqm's Green Hydrogen Auction. 13 August 2025.

- **Streamlined processes** – Lessons learned from earlier rounds are shaping the third auction, with measures such as a new initiative introduces a "Single Permit System", a one-step process that eliminates the need to obtain approvals from multiple authorities and entities.[74]
- **Tracking progress** – Oman has also launched a digital green hydrogen Ecosystem Readiness monitoring platform called gHad to track the progress of green hydrogen projects based on real-time data-driven insights.[75]

Other initiatives

In addition to the projects awarded via Hydrom's public auction process, other developers are considering investments in Oman. The IEA's Hydrogen Production Projects Database 2025 listed 25 records of different projects in various phases in Oman.[76]

Indian hydrogen and ammonia producer ACME has already commenced construction of the first phase of its large ammonia project in Duqm, designed with a capacity of 320MW. This initial phase is scheduled to begin operations in the first quarter of 2027 and is expected to produce around 100,000 tonnes of green ammonia annually.[77]

ACME is among the most advanced projects in the pipeline, having already secured a binding offtake agreement for its first phase.[78] For this phase, ACME has also placed orders for 5MW electrolysers to Chinese producer, Sungrow Hydrogen.[79] Hydrom has since incorporated the project's expansion phases (2 and 3) into Oman's national portfolio, which will increase the capacity to 0.9Mtpa of green ammonia.[80]

Along with green hydrogen producers, some Chinese electrolyser manufacturers are considering establishing production facilities in the MENA region, such as THE.[81]

[74] Oman Observer. Oman unveils Single Permit System for green hydrogen developers. 3 May 2025.
[75] Muscat Daily. Oman launches platform to track green hydrogen ecosystem readiness progress. 18 February 2025.
[76] IEA. Hydrogen Production and Infrastructure Projects Database. September 2025.
[77] Ame Group. ACME Advances 320MW Green Ammonia Project in Oman. 23 April 2025.
[78] Hydrogeninsight. Fertiliser giant signs binding offtake agreement for 100,000 tonnes of green hydrogen-derived ammonia from Oman. 1 March 2024.
[79] Hydrogeninsight. China's Sungrow wins firm order to supply electrolysers to green hydrogen and ammonia project in Oman. 20 January 2025.
[80] Fuelcellsworks. Oman Deepens Green Hydrogen Push with ACME Duqm Expansion Officially Added to National Projects Portfolio. 28 May 2025.
[81] Hydrogeninsight. EXCLUSIVE | Leading Chinese electrolyser maker plans to build new factory overseas — but not in 'expensive' Europe. 4 April 2025.

Table 2: Major announced green hydrogen projects in Oman

Project name	Project developers	End user	Capacity (per annum)	Location
Green Energy Oman (GEO)	Shell, EnerTech, OQ, InterContinental Energy	Ammonia	150kt H_2	Duqm
HyDuqm (Hydrogen Duqm LLC)	POSCO, ENGIE and other partners	Ammonia	200kt H_2	Duqm
Amnah Green Hydrogen	Copenhagen Infrastructure Partners, Blue Power Partners, and Al Khadra	Steel	200kt H_2	Duqm
BP Oman Green Hydrogen	BP	Ammonia	150kt H_2	Duqm
HyPort Duqm Project	DEME Concessions, OQ, BP Oman	Ammonia	50kt H_2	Duqm
SalalaH2	OQ, Marubeni, Linde, Samsung C&T, and Dutco	Ammonia	175kt H_2	Salaleh
Green Hydrogen Project by Actis and Fortescue	Actis, Fortescue	Ammonia	200kt H_2	Salaleh
Green Hydrogen Project by EDF Group, J-POWER, Yamna	EDF Renewables, J-POWER, YamnaCo Ltd	Ammonia	178kt H_2	Salaleh
ACME Duqm Project – Phase 1	Green Hydrogen and Chemicals Company SAOC (ACME Group)	Ammonia	0.1kt NH_3	Duqm
ACME Duqm Project – Phase 2 & 3	Green Hydrogen and Chemicals Company SAOC (ACME Group)	Ammonia	71kt H_2 + 400kt NH_3 each phase	Duqm
Sur Hydrogen Cluster	Various parties*	Ammonia	225kt H_2	Sur
H2Oman	Air Products, OQ and ACWA Power	Ammonia	1,000kt NH_3	Salaleh
Sohar Port, Steel Industry, Phase 1	Hydrogen Rise, Jindal group	Steel	6kt H_2	Sohar
Sohar Port, Steel Industry, Phase 2	Hydrogen Rise, Jindal group	Steel	55kt H_2	Sohar
ELUPRO Green Ammonia	ELU Pro - Muscat House - MA Corporation MoU	Ammonia	1,000kt NH_3	Duhuk Port

Source: IEA[82], IEEFA, Company Reports.
Note: H_2 = hydrogen; NH_3 = ammonia; kt = 1,000 tonnes.
The first eight listed projects were awarded land through the first two rounds of Hydrom auctions.
**The Sur Hydrogen Cluster includes: Oman LNG; the Sustainable Energy Research Centre (SERC) at Sultan Qaboos University (SQU); the Oman Hydrogen Alliance (Hy-Fly); Phoenix Power Oman; the Oman India Fertiliser Company (OMIFCO); OQ Gas Networks (OQGN); OQAE; and Madayn.*

Oman has announced plans to establish the world's first commercial-scale liquid hydrogen export corridor to the Netherlands and Germany.[83] The state-owned energy company OQ will lead the development of hydrogen production, storage and export facilities in Duqm. Efficiency remains a

[82] IEA. Hydrogen Production and Infrastructure Projects Database. September 2025.
[83] Hydrogen Central. Oman to set up liquid hydrogen corridor to boost exports to Europe. 17 April 2025.

major challenge in transporting liquefied hydrogen over long distances.[84] However, ECOLOG, which is responsible for the project's shipping, has stated it will use zero boil-off vessels to address this issue.[85] The steel sector is one of the key potential end users of this initiative.

Hydrogen for steel

The steel sector offers one of the highest carbon dioxide (CO_2) mitigation potentials per unit of hydrogen consumption. According to Agora Industry, switching from coal-based blast furnaces to hydrogen-based DRI-EAF technology could achieve a mitigation potential of 25 tonnes of CO_2 per tonne of hydrogen.[86]

Hydrogen could be used domestically to produce green iron in Oman, rather than being converted into other exportable derivatives using processes that would require billions of dollars in additional infrastructure and export facilities. Converting hydrogen from its gaseous form into an exportable product entails significant costs, which in some cases can be prohibitively high.

> **The steel sector offers one of the highest CO_2 mitigation potentials per unit of hydrogen consumption.**

One of the key challenges for hydrogen producers in Oman continues to be reaching FID, as project developers face regulatory hurdles in their target markets, particularly in the EU. The IEA's Global Hydrogen Review 2025 found that only a small fraction of current projects are expected to be operational by 2030, with the majority now classified as "uncertain" based on their likelihood of progressing.[87]

Speaking at European Hydrogen Week 2025, Oman's Energy Minister Salim Al Aufi noted that a more flexible interpretation of the rules, such as permitting electricity to be sourced far from the green hydrogen production site, or allowing European industries to use blue hydrogen, could undermine Oman's competitiveness.[88]

While hydrogen developers are contemplating end-users to secure offtake agreements with, steelmakers are shaping a very strong demand for hydrogen in Oman. The steel sector is identified

[84] Agora. Hydrogen import options for Germany. November 2023.
[85] Hydrogen Central. Oman to set up liquid hydrogen corridor to boost exports to Europe. 17 April 2025.
[86] Agora industry. Prioritising hydrogen for the most effective uses. 25 March 2025. Page 14.
[87] IEA. Global Hydrogen Review 2025. Page 8.
[88] Hydrogeninsight. 'Do not change the EU's green hydrogen definition while projects are still under development': Oman and India. 30 September 2025.

as the primary domestic end-user of the new facilities, alongside other hydrogen derivatives that will likely be targeted for export.[89]

As with other early movers in the green hydrogen economy, most projects in Oman's pipeline are currently focused on ammonia. However, one notable initiative is dedicated to supporting green iron and steel. The Amnah Project, which secured the first land block (Z1-01) in Hydrom's initial auction round, has announced plans to allocate its renewable hydrogen specifically for iron and steel production.[90] Located in Duqm, the project is positioned to support all announced initiatives in the area, including Meranti Green Steel, Mitsui, and Jindal Duqm. With an estimated investment of up to US$7 billion, the project's first phase is expected to produce 210,000 tonnes of green hydrogen, which is enough to support approximately 3.8Mtpa of DRI/HBI production.

ACME is another strong example of a hydrogen developer aiming to use its green hydrogen production for green iron manufacturing. The company has signed a binding term sheet agreement to supply hydrogen-based DRI to Vietnamese steelmaker Stavian Industrial Metal.[91] Under the deal, ACME will provide 0.8Mtpa of green DRI/HBI to Stavian over a 10-year period, sourced from its 1.2Mtpa facility, which will be probably supplied by ACME's green hydrogen plant currently under construction in Oman.[92]

A missing piece of Oman's hydrogen puzzle appears to be the limited development at the Port of Sohar, despite it being the site of all current steel operations and part of the planned future growth. Several years ago, Hydrogen Rise and Jindal Shadeed Iron and Steel signed an agreement to begin with a 35MW project and later expand to 350MW.[93] However, no progress has been made, and the project now appears mothballed.

All three prime locations for green hydrogen development – Duqm, Al Jazir and Salalah – are situated in the southern region of the country.[94] In the long-term plan, Sohar and other northern regions are expected to be connected to the hydrogen network by 2040 and beyond.

In addition to domestic demand from iron and steel producers, there are also potential buyers for green hydrogen outside Oman. Tata Steel Nederland is one of 11 parties to a JDA aimed at transporting liquified hydrogen from Oman to the EU.[95] Hans van den Berg, the company's CEO, stated: "In our role as a large potential buyer, we can contribute to the development of a sustainable economy based on green hydrogen in our region." The company has signed a non-binding Joint

[89] Hydrom. Oman Green H_2 Auction. 30 April 2025.
[90] Oman Observer. Amnah commits hydrogen to Oman's green steel industry. 26 December 2025.
[91] Hydrogeninsight. India's ACME to supply millions of tonnes of green hydrogen-derived iron to Vietnamese steel maker. 13 October 2025.
[92] The Economic Times. ACME to set up 1.2 MT per year sponge iron plant using green hydrogen. 13 October 2025.
[93] Hydrogen Rise. Hydrogen Rise and Jindal Shadeed Iron & Steel. Accessed 22 October 2025.
[94] Ministry of Energy and Minerals. Green Hydrogen in Oman. October 2022.
[95] Fuelcellsworks. Tata Steel Nederland Joins Landmark Deal for First Oman–Europe Liquid Hydrogen Corridor. 16 April 2025.

Letter of Intent with the Dutch government to begin decommissioning its blast furnaces and transition to direct reduction technology for ironmaking.[96]

As EU carbon emission regulations tighten and its Carbon Border Adjustment Mechanism comes into effect next year, MENA could seize the opportunity to export lower-emission iron feedstocks, requiring fewer certificates for entry into the EU. To capitalise on this opportunity, substituting gas with green hydrogen and increasing the use of renewables to power steel mills must be prioritised.[97]

Oman in the spotlight

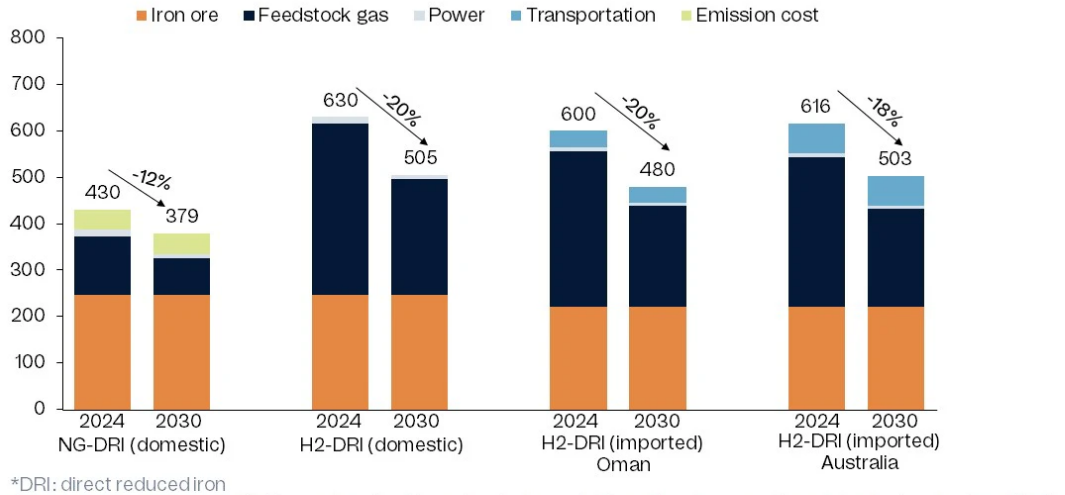
The green hydrogen economy has faced challenges in many regions, with several projects cancelled over the past year. However, the underlying fundamentals in MENA countries, driven by abundant and low-cost renewable resources, remain strong.

This advantage is also crucial in supporting the region's transition toward green iron and steel production. BloombergNEF expects green hydrogen production to become cost-competitive with grey hydrogen (produced using gas) in certain markets starting from 2030.[98] Oman is expected to be one with the lowest costs, which could even reach US$1.6/kg, "positioning Oman as one of the most competitive producers of renewable hydrogen globally" according to the IEA.[99]

Backed by its low costs for renewable energy generation, and consequently low costs for hydrogen production, Oman is widely regarded as one of the leading candidates for green iron production. A Rystad Energy study shows that Oman could become one of the most cost-effective sources of hydrogen-based DRI for EU steelmakers, cheaper than both domestic production in Germany and imports from Australia.[100]

[96] TATA Steel. Tata Steel signs the non-binding Joint Letter of Intent with the Government of the Netherlands and the Province of North-Holland on Integrated Decarbonisation and Health measures Project. 29 September 2025.
[97] IEEFA. Practical steps to position MENA as a green steel leader. 19 September 2024.
[98] Bloomberg. Hydrogen's reawakening has market on verge of a breakthrough. 22 August 2025.
[99] IEA. Renewable hydrogen from Oman. 12 June 2023. Page 7.
[100] Rystad Energy. European steel mills waver on decarbonization despite promise of public funding. 2 May 2024.

Figure 6: Cost of iron production in Germany vs imported HBI (US$/tonne)



*DRI: direct reduced iron
Note: in the import cases, DRI is produced in Oman/Australia and shipped to Germany through hot briquetted iron (HBI).
Costs are in real terms, referenced to 2024.

Source: Rystad Energy.[101]

Currently, energy prices in Oman – as with other MENA countries – are lower than the global average. MENA countries, known for their highly subsidised energy sectors, benefit from this trend.[102] Steelmaking is an energy-intensive industry, and the global transition toward net zero is already driving some industries to relocate to regions with more affordable energy. According to a Deloitte study, while MENA steelmakers currently produce gas-based DRI at a lower cost than most other regions, they are also well positioned to remain competitive as major players in the future, as DRI production transitions from gas to green hydrogen.[103]

In May 2024, Harssha Shetty, CEO of Jindal Steel, said: "Green steel needs gigawatts of energy for the production… Oman has 3500 hours of sunshine per year, which makes it one of the top-5-locations in terms of sun power potential in the world. And the wind velocity can be compared to that in the Netherlands and ranks among the top 6 in the world… For these power plants [renewables] you need hundreds of square kilometres of land – and precisely that is available in Oman… Oman has more than 3000 kilometres of coastline with the Arabian Sea. This provides the opportunity for an unlimited supply of water that can be desalinated and then be used to produce green hydrogen… But you also need a government that intentionally wants to make use of these resources."[104]

Discussing its proposed HBI plant in the country, Meranti Green Steel said it considers Oman to be the "perfect location for this project due to its competitive energy resources, including cost-effective natural gas and a rapidly advancing green hydrogen ecosystem." The company added: "The Special

[101] Rystad Energy. European steel mills waver on decarbonization despite promise of public funding. 2 May 2024.
[102] IEA. The Future of Electricity in the Middle East and North Africa. 18 September 2025. Page 19.
[103] Deloitte. Mined the gap: Australia's place in the emerging green iron value chain. Technical Appendix A. March 2025. Page 24.
[104] MarketSteel. Why is Oman such a great location for producing steel? 14 May 2024.

Economic Zone at Duqm provides a robust infrastructure for the plant, with industrial land, deep-water port access, and efficient regulatory frameworks that enable fast-track development and global distribution. Oman's location also facilitates cost-effective shipping to Meranti's steel plant in Thailand and to European offtakers seeking low-emission HBI, thereby reducing logistics costs and emissions."[105]

Conclusion

With vast potential for low-cost renewables, access to gas, emerging hydrogen initiatives, available land for project development, a strategic location, and access to open seas, Oman is shaping a new generation of low-emission DRI plants. Oman is well positioned to lead the shift to green iron and steel in the MENA region as it is managing the transition in a highly structured way. This includes comprehensive planning across all aspects, from developing infrastructure and providing incentives, to actively supporting the securing of offtakers for hydrogen projects.

Oman stands at a pivotal moment in developing hybrid iron facilities capable of operating on a mix of gas and hydrogen. The new generation of direct reduction shafts has the potential to transform ironmaking by integrating green hydrogen from the outset.

To realise this vision, projects must progress to FID, supported by firm offtake agreements on both the supply and demand sides. It is equally important that new projects incorporate green hydrogen use from day one, as demonstrated by Meranti Green Steel, which has a plan to increase hydrogen usage gradually from 15% to 85%.

The emerging steel sector in Oman can play a central role in absorbing green hydrogen from co-located hydrogen hubs such as Duqm. The Omani government should prioritise domestic hydrogen consumption, as local use avoids the substantial investments required to convert gaseous hydrogen into exportable derivatives and build additional transport infrastructure.

Producing green iron through hydrogen-based DRI represents one of the most practical and impactful applications of green hydrogen, offering significant carbon reduction and mitigation potential.

[105] Oman Observer. New Oman green iron project eyes mid-2026 FID. 17 August 2025.

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