



IIM

Metallurgy
Materials Engineering
The Indian Institute of Metals-Delhi Chapter

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Honouring the IIM Corpus Benefactors of Delhi-NCR

The Indian Institute of Metals has constituted a CORPUS FUND for self-sustenance of IIM. The CORPUS Fund Contributions have been earmarked in four categories:

- Chief Paton
- Grand Patron (Platinum)
- Grand Patron (Diamond)
- Grand Patron (Gold)

M/s YOGI JI DIGI Pvt. Ltd., Faridabad, and M/s MAS Equipments Pvt. Ltd. Bahadurgarh, have been recognized as IIM Grand Patron (Diamond) and IIM Grand Patron (Gold) respectively for their generous contribution for IIM Corpus Fund towards strengthening the Institute.

IIM Head Office sent mementos to our Chapter and desired that we hand over the same ceremoniously to M/s YOGI JI DIGI and M/s MAS Equipments on behalf of IIM.

IIM Delhi Chapter representatives visited the Works of YOGI JI DIGI on 10.8.2026 and presented the memento to Shri Navneet Singh, Managing Director.



Presentation of memento to Shri Navneet Singh, Managing Director, M/s YOGI JI DIGI

IIM Delhi Chapter also visited the Delhi office of M/s MAS Equipments Pvt. Ltd. on 12.8.2026 and presented the memento Shri S K Goswami, Managing Director.



Presentation of memento to Shri S K Goswami, Managing Director MAS Equipments

India's Steel Production: Q1 FY26-27

India's *production of finished steel* during June this year went up to 13.5 million tonnes, which represents a 3.8 per cent increase over the corresponding figure of 13 million tonnes in the same month last year. The country's production of finished steel for the April-June quarter of the current financial year now works out to 40.6 million tonnes which reflects a 4.9 per cent rise from 38.7 million tonnes in the same quarter of 2025-26.

India's production of *crude steel* during the April-June quarter touched 42.1 million tonnes, up 3 per cent from 40.8 million tonnes in the same quarter last year. India's production of crude steel was recorded at 14.1 million tonnes in June, which is 4.5 per cent higher compared with the corresponding figure of 13.5 million tonnes in the same month of the previous year.

The country's *consumption of finished steel* shot up by a robust 25.6 per cent during June compared with the same month last year as demand from big ticket infrastructure projects taken up by the government in the highways, railways and ports sectors fuelled demand.

India's *total crude steelmaking capacity* reached approximately 222 million tonnes per annum (as of June 2026), keeping the industry on track to achieve the National Steel Policy 2017 target of 300 million tonnes per annum by 2030.

During May, SAIL announced its FY 2025-26 financial results, reporting record sales volume of 19.93 million tonnes and revenue of Rs 110,810 crore. Sales volume increased by 11.4 per cent year-on-year, reflecting strong market demand and improved operational performance.

SAIL and NMDC are actively exploring coking coal asset acquisitions, nickel supplies in Russia. NMDC is evaluating overseas coal assets to strengthen long-term raw material security.

SAIL's Bhilai Steel Plant received Environmental Product Declaration (EPD) certification for its TMT Bars, reinforcing its commitment to sustainable steelmaking. The plant's 15 MW floating solar project generates approximately 34.25 million units of clean power annually, supporting lower carbon emissions and energy sustainability. The certification enhances the product's environmental credibility and aligns with growing demand for green steel in domestic and global markets. These initiatives reflect SAIL's broader strategy to integrate renewable energy and environmentally responsible practices into its steel production operations.

India's 2050 Aluminium Prospect

By mid-century, aluminium is set to become one of the defining industrial commodities of the energy transition. Global aluminium demand could grow by around 80 per cent by 2050 compared with 2020. According to World Economic Forum reports, one recent macro-model of primary aluminium fundamentals suggests that demand for primary metal alone could approach 110 million tonnes by 2050, even as a rising share of total use is met by recycled metal.

India is the world's second-largest producer of primary aluminium, accounting for roughly 6 per cent of global output in 2023, and has seen production capacity more than double over the past two decades from about 1.7 million tonnes in 2003 to just over 4.17 million tonnes in FY2024. However, the same period has also seen a sharp rise in imports of metal and scrap.

Where India really stands in 2025

On the production side, India's primary aluminium output has been on a modest upward trend. Primary production rose from around 3.6 million tonnes in FY2021 to

roughly 4.16 million tonnes by FY2024. India's share of world primary production was about 5.7 per cent in FY2024-25. On those numbers, India is a serious global producer, but not yet a dominant one.

Consumption tells a different story. India's aluminium consumption in 2023-2024 was around 4.9 million tonnes, with demand projected to reach about 8.3 million tonnes by 2030, implying a CAGR of 8 per cent per annum. Other market assessments point to a similar trajectory, with some placing expected demand near 9-10 million tonnes by the early 2030s.

Over the past 14 years, the Aluminium Association of India (AAI) has estimated that domestic aluminium consumption has increased by about 160 per cent, while imports of aluminium products have risen by around 250 per cent and scrap imports by roughly 285 per cent.

The structure of that demand is equally important. Power sector accounts for roughly 48 per cent of India's aluminium use, followed by transport at around 15 per cent and building and construction at about 13 per cent, with consumer durables, machinery and packaging making up most of the balance.

Per capita consumption remains low by global standards. AL Circle estimates for 2025 put India's per capita aluminium use in the 3.9-kilogram range, compared with a global average near 11 kilograms.

Long-term demand

Analysis by the International Aluminium Institute (IAI) and other industry platforms suggests that, under scenarios consistent with stated climate and development policies, total global aluminium demand could reach the equivalent of 335 million tonnes a year by 2050, counting both primary and recycled metal. The bulk of that growth is expected to come from transport (particularly electric vehicles and light-weighting), construction (especially in rapidly urbanising Asia and Africa), packaging and electrical infrastructure.

Primary aluminium demand continues to grow into the 2040s and, around mid-century, reaching the order of 110 million tonnes per year, even as recycled metal takes a larger share of total use.

Energy and carbon

Aluminium is a power-hungry metal. Globally, the aluminium sector consumed about 7 exajoules, or roughly 1,944 terawatt hours, of energy in 2023, making it the fourth-largest industrial energy consumer worldwide. While the sector's overall energy intensity has improved by around 15 per cent since 2010, most primary

smelters are already relatively close to best-available technology, meaning future gains will depend increasingly on decarbonising the power supply rather than dramatic efficiency breakthroughs.

India's aluminium producers are at the sharp end of that reality. The country's grid remains heavily coal-based. Captive coal-fired power plants are still the backbone of most large smelter complexes. This makes Indian primary aluminium particularly exposed to carbon-related trade measures.

The European Union's Carbon Border Adjustment Mechanism (CBAM), now in a transitional phase and scheduled for full implementation from 2026, will gradually impose a carbon price on imports of aluminium and other energy-intensive goods to mirror the EU Emissions Trading System.

The European Commission has recently confirmed that while indirect emissions for metals will not be included initially, pre-consumer scrap will be treated as a separate product category, a nuance that still leaves Indian producers with significant exposure, given the direct emissions profile of coal-based smelting.

Benchmark emission intensities for aluminium electrolysis under CBAM rules point to a figure of about 1.55 tonnes of CO₂ equivalent per tonne of aluminium from 2026 as a reference point. Many Indian smelters, depending on their power mix, sit above that threshold.

In April 2025, Rio Tinto signed a MoU with India-based AMG Metals & Materials to explore a low-carbon aluminium project in India, with a concept of up to 1 million tonnes per year of primary aluminium and 2 million tonnes of alumina powered by a combination of wind, solar and pumped hydro storage.

But one project cannot, on its own, rewrite the sector's emissions profile. For India to remain competitive in a 2050 world where buyers and regulators will scrutinise embedded carbon, a broader shift in energy sourcing for smelters – through renewable power purchase agreements, hybrid grid-captive models and potentially dedicated green energy corridors – will be necessary rather than optional.

Recycling and circularity's ability to absorb the shock

The second structural lever available to India is secondary, or recycled, aluminium. India has made some progress in increasing the share of secondary metal in its consumption mix. India's 'Vision Document 2047' on the aluminium sector notes that the share of secondary aluminium in total consumption has risen over the past decade, even as primary continues to dominate. At the same time, it flags the difficulty of sourcing enough domestic scrap and the challenges associated with importing scrap at scale.

AAI's own analysis, highlighting a near-threefold surge in scrap imports over 14 years, emphasises how dependent India has become on external scrap flows.

The problem is that India's scrap ecosystem remains fragmented and largely informal. Collection rates for post-consumer aluminium in building materials, vehicles and consumer durables lag global benchmarks; formal segregation and tracking at end of life are the exception rather than the rule.

Without a concerted strategy that links urban mining, formal scrap collection, modern sorting and high-efficiency secondary smelting, India risks being squeezed in both directions, paying high prices for imported primary metal in a tight market, and high prices for imported scrap in a world where circularity becomes a key source of comparative advantage.

What a realistic 2050 strategy looks like for India

Put together, the contours of a realistic 2050 strategy for India's aluminium sector are becoming visible.

First, the country has to assume that its domestic demand will grow faster than the global average for at least the next 10-15 years. With consumption growing at roughly 8 per cent annually in recent years and per capita use far below global norms, projections of demand doubling from about 4.5 million tonnes in the early 2020s to around 9 million tonnes by the early 2030s are not speculative; they are consistent with current trajectories and existing policy commitments in infrastructure, manufacturing and energy.

Second, India cannot plan for that demand on the assumption that global markets will always provide cheap, carbon-blind metal and scrap. Long-term industry outlooks suggest that total aluminium demand, primary plus recycled, could exceed 300 million tonnes a year by 2050, with primary demand alone still rising.

Third, the policy levers available are concrete rather than rhetorical. Green power procurement for smelters is one of them; the Rio Tinto-AMG M&M proposal is an early test case of whether India can host large-scale, renewable-powered primary aluminium capacity at competitive cost. A second lever is a serious national circularity programme for aluminium, anchored in formalising scrap flows, incentivising high-efficiency secondary smelting and aligning quality standards for imports with domestic sustainability objectives.

Source: AL CIRCLE, 03 December 2025

Rajasthan has 700 Years of Steel-Grade Limestone

Jaisalmer holds 1,750 million tonnes of the steel-grade limestone Indian mills need, but hauling it 1,853 km to Bokaro's steel plants costs more than shipping it from Oman.

This grade is found in only a few places. Over two-thirds of the country's steel-grade limestone comes from mainly from just two sources: Katni in Madhya Pradesh and Jaisalmer in Rajasthan.

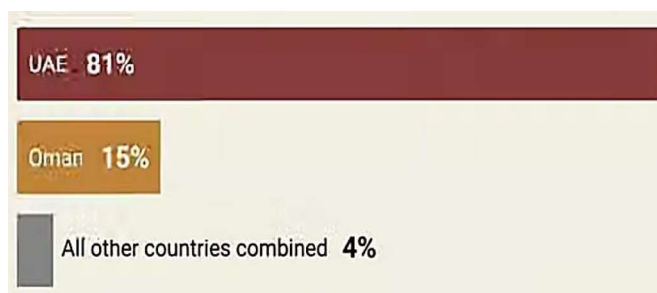
There is a further division within steel-grade limestone, between the material used in the blast furnace and that used in the steel melting shop. Blast-furnace grade tolerates more impurity, up to 6 per cent combined silica and alumina, while steel-melting-shop grade must stay under 4 per cent insolubles, the tighter standard steelmaking demands.

Katni's limestone is mostly blast-furnace grade, which leaves Jaisalmer as the only major supplier of steel-melting-shop grade at scale.

Why The Reserves Sit Idle

Despite holding such resources, India is underusing them and importing steel-grade limestone, and the reason is freight. Moving limestone out of Jaisalmer means hauling it inland for well over a thousand kilometres to reach the steel belt in Chhattisgarh and Jharkhand. That often costs more than shipping it in by sea from the UAE or Oman.

In 2023-24 India imported 33.81 million tonnes of limestone across all grades, with the UAE supplying 81 per cent and Oman 15 per cent. Oman's share has nearly doubled in two years, though the two countries' combined share of Indian imports has barely shifted.



The source countries' share in India's limestone imports

Roughly Rs 6,616 crore was spent importing limestone in 2023-24, putting the average landed cost at about Rs 1,957 a tonne. That is a customs value, so it already

bundles in sea freight and insurance. Since steel-grade limestone costs almost double the cement grade, the calculated price of imported steel-grade limestone comes to Rs 3,362 a tonne.

Jaisalmer's limestone averages Rs 595 a tonne at the mine across all grades, with the steel-grade share working out to roughly Rs 710. Adding royalty of around Rs 120 a tonne brings it to Rs 830. Freight then adds more than triple that figure again, close to quadrupling the delivered price.

Jaisalmer frequently supplies the steel plants at Bokaro in Jharkhand and Bhilai in Chhattisgarh, both hundreds of kilometres from any port, but it rarely gets orders from plants nearer the sea.

At nearly Rs 1.4 per tonne-kilometre for limestone, moving it from Jaisalmer to Bokaro comes to almost Rs 2,600 a tonne, which makes the delivered domestic price slightly higher than the imported one. Landlocked plants still buy domestic, because for them imported limestone carries its own port-to-plant haul on top of the landed cost, and that is why they draw most of their supply from Katni or Jaisalmer.

Coastal plants face no such penalty. Tata Steel's works at Jamshedpur in Jharkhand sit just 260 km from Haldia port, and the company relies on imported steel-grade limestone.

In 2008 Tata Steel signed a joint venture with Oman's Al-Bahja Group to develop the Uyun limestone deposit near Salalah, with a projected investment of \$150 million. The company brought in Oman's sovereign investment arm as a partner, and by 2022 Tata held a 51 per cent stake.

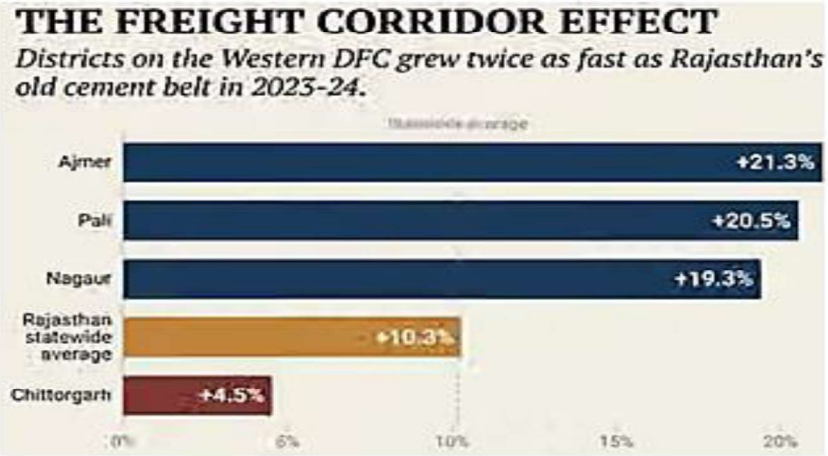
ArcelorMittal Nippon Steel India's Hazira plant in Gujarat runs the same way, importing limestone through a captive jetty licensed to handle 25 million tonnes of cargo a year.

What A Freight Corridor Does

Freight costs have kept Jaisalmer's steel-grade reserves largely untouched while shiploads of the same mineral arrive from the Gulf. How a dedicated corridor changes that arithmetic is evident from what has already happened 500 km to the south-east.

The Western Dedicated Freight Corridor's Rajasthan stretch — Rewari to Madar, covering Ajmer and Nagaur, dedicated in January 2021, and Madar to Palanpur, running through Pali and Sirohi, commissioned by mid-2022 — included three dedicated cement sidings and a combined loading capacity of 10 million tonnes on the Ajmer-Pali-Sirohi section, with freight rates projected to fall 15 to 20 per cent.

By 2023-24, with the corridor fully operational across the belt for over a year, Pali's limestone output had grown 20.5 per cent, Ajmer's 21.3 per cent and Nagaur's 19.3 per cent, each roughly double Rajasthan's statewide growth of 10.3 per cent that year.



Growth of the cement industry in Rajasthan.

The same state has also seen what happens in freight's absence. In 1988, following the Supreme Court-ordered closure of the Doon Valley's limestone quarries, Rajasthan State Mines and Minerals Limited began mining at Sanu in Jaisalmer, where SAIL's own laboratory and plant trials had found the limestone ideal for steel-melting-shop use.

Production grew from 65,000 tonnes in the first year to 1.67 million tonnes by the mid-2000s, all of it trucked 60 km overland to Jaisalmer station for want of a railway. A 2010 study found that over half the rock sized for steel use came out as fine reject. It was good enough for cement but not worth hauling by road, so it kept piling up at the mine.

Fourteen years later, in March 2024, the company applied for environmental clearance to expand handling capacity at Sanu from 3.30 to 3.848 million tonnes a year, specifically to begin recovering 0.548 million tonnes annually from those old backfilled reject dumps. The rail line to Sanu had meanwhile become operational in August 2020, with the first trains sent to Bhilai and Bokaro.

Why Katni Still Wins

Connectivity is also why Katni outproduces Jaisalmer despite holding smaller reserves. India produced 8.88 million tonnes of steel-grade limestone in 2023-24, of which Katni accounted for 3.69 million tonnes and Jaisalmer 2.49 million. The gap has held for several years, and the Sanu rail line has made no difference to it.

The answer lies in geography and in infrastructure that predates independence. Katni sits on a railway junction dating to 1886, with a direct line to Bilaspur completed the following decade, long before the Bhilai steel plant existed. Katni to Bhilai is 450 km by rail. Jaisalmer to Bokaro is 1,853 km. Katni is likewise far closer to the steel plants of Odisha and Jharkhand.

Jaisalmer makes Rajasthan India's largest limestone-producing state by a wide margin, at 22.9 per cent of the national total, ahead of Madhya Pradesh's 13.8 per cent and Andhra Pradesh's 13.5 per cent.

Jaisalmer's steel-melting-shop grade gives Rajasthan a role in the steel industry as steel output is rising continuously. Crude steel production rose 10.7 per cent to 168.4 million tonnes in 2025-26, capacity is closing in on 220 million tonnes, and the government wants 300 million tonnes by 2030-31. Demand for steel-grade limestone will rise with it.

For now, that demand is being met through imports. India's limestone imports have risen from 22.8 million tonnes in 2020-21 to 33.8 million in 2023-24, a 48 per cent jump in three years, arriving almost entirely from the UAE and Oman.

India's cement and steel industries have a common supply base in one district. Whether they can use it depends on whether the freight problem is solved in time to meet the demand already coming.

Source: MRAI News Updates: 05th August, 2026

Scrap Share Rises in India's Steel Metallic Mix in Jan-Jun'26

India's steel metallic mix continued to shift towards domestic raw materials in the first half of CY'26 as improving scrap collection reduced reliance on imports while sponge iron retained its position as the dominant metallic for the country's induction furnace (IF) sector. Higher crude steel production, favourable domestic scrap availability and changing procurement economics enabled steelmakers to optimise their metallic charge without altering India's broader steelmaking mix.

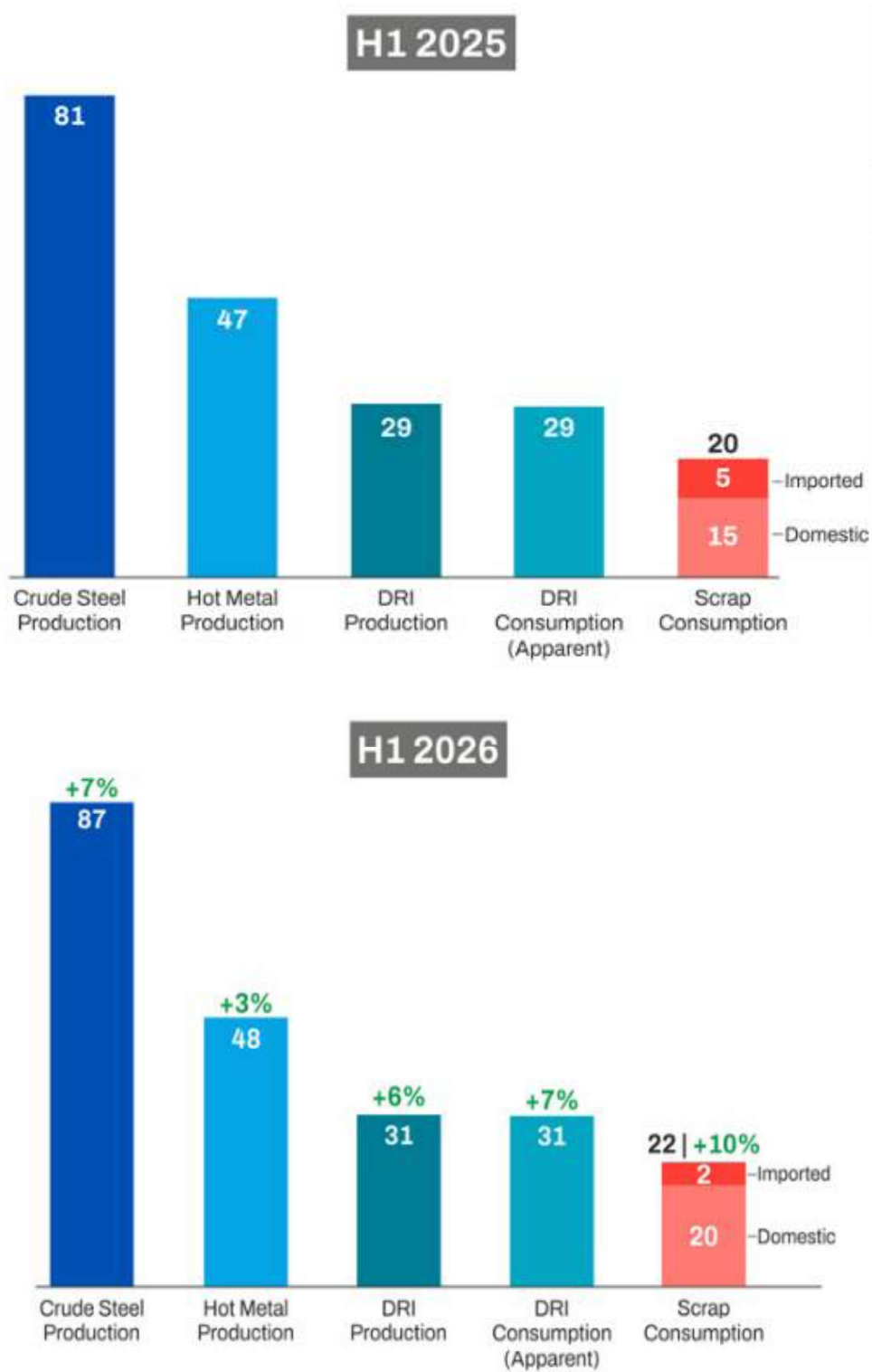
Crude steel production increased 7% y-o-y to 87 million tonnes (mnt) during January-June 2026. Scrap consumption registered the fastest growth among key metallics, rising 10% to 22 mnt, while direct reduced iron (DRI) consumption increased 7% to 31 mnt. Hot metal production rose at a slower pace of 3% to 48 mnt, indicating secondary producers increasingly balanced scrap and DRI consumption while integrated producers maintained steady blast furnace output.

Domestic scrap replaces imports

The biggest change in H1 came from scrap procurement. Domestic scrap consumption increased to 20 mnt from 15 mnt a year earlier, while imported scrap declined to 2 mnt from 5 mnt, reflecting improved domestic collection and processing as well as weaker import economics. The shift enabled mills to source a

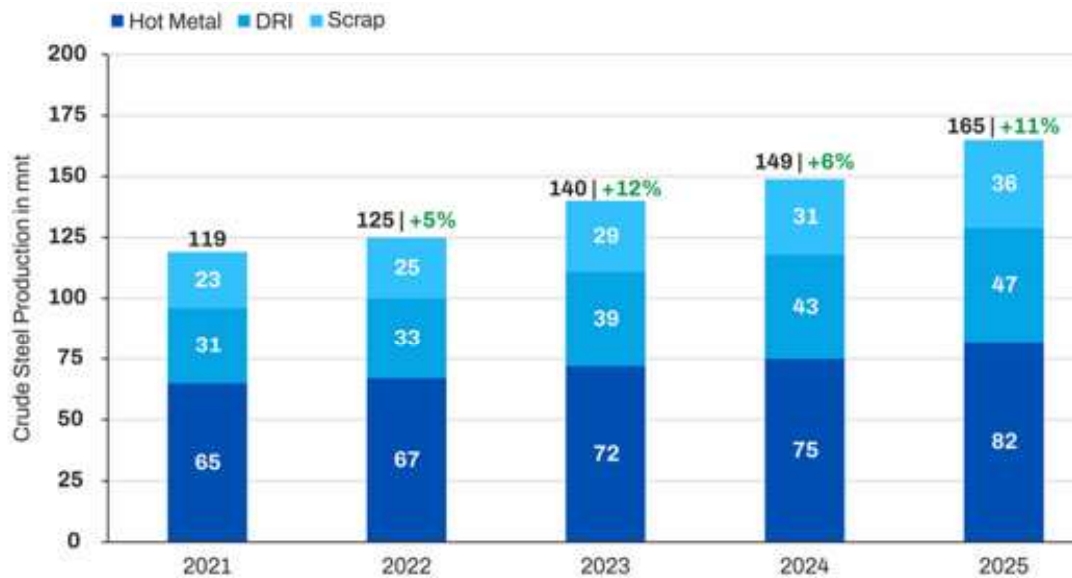
larger proportion of their scrap requirement locally, reducing exposure to volatile international prices and freight costs.

Indian metallic mix scenario for H1 2025 Vs. H1 2026



H1: Jan-Jun | All above figures are rounded off | Quantity in million tonnes (mnt) | % change in year-on-year (y-o-y)

India's metallic mix in steel production



All above figures are rounded off | Quantity in million tonnes (mnt) | % change in year-on-year (y-o-y) | Source: BigMint

Improved domestic availability also supported higher scrap utilisation across electric arc furnace (EAF) and induction furnace producers, allowing mills to adjust their metallic mix according to prevailing economics. Organised recycling, better procurement networks and greater availability of industrial scrap strengthened domestic supply through the review period.

Sponge iron remains central to steelmaking

Despite the stronger growth in scrap consumption, sponge iron continued to dominate India's metallic mix owing to its ample availability, competitive pricing and widespread use in the country's induction furnace sector. DRI production increased 7% to 31 mnt during H1, broadly matching apparent consumption.

Procurement patterns, however, shifted through the second quarter as pellet price volatility, raw material shortages and fluctuating downstream demand influenced metallic selection. Capacity utilisation remained around 65-75%, with production aligned to billet demand. Towards the end of H1, improving billet bookings supported sponge iron demand, while pig iron emerged as an alternative metallic during May-June amid stronger overseas demand and easing geopolitical tensions.

Structural shift continues

India's metallic mix continues to evolve gradually rather than undergoing a structural shift away from sponge iron. Faster growth in domestic scrap consumption reflects improving collection efficiency and organised recycling, but sponge iron remains indispensable to India's expanding secondary steel sector because of its consistent availability and cost competitiveness. The combination of higher domestic scrap usage and stable DRI consumption indicates that steelmakers are increasingly optimising raw material procurement while relying less on imported metallics.

Outlook

India's metallic mix is expected to become increasingly domestic in the coming quarters as improvements in scrap collection and processing continue to reduce import dependence. However, with crude steel production expanding steadily and domestic scrap availability still constrained relative to demand, sponge iron is likely to remain the country's principal steelmaking metallic while scrap assumes a larger role in incremental steel production.

Source: BigMint Bureau, 05 Aug 2026

Recycling and Green Steel

Green Steel and the decarbonisation of steel have become an increasingly prominent topics for global steel industry. It is an issue on which the recycling industry has a pivotal role.

Some 630 million tonnes of recycled steel are used each year in global steel production, thereby preventing almost 950 million tonnes of CO₂ emissions. Looking to the future, recycled steel will continue to enjoy great demand.

Rapid material analysis and sorting are very crucial to recycling business. Generative AI is being adopted faster and recyclers must either embrace the AI revolution or get left behind. This could mean computer vision systems identifying and sorting

electronic components, robotic arms dismantling devices and automated robots extracting lithium batteries.

The recycling industry has a well-earned reputation for demonstrating innovation and resilience in an ever-changing world.

Important Facts

Ferrous metals have magnetic properties. Steel, an iron alloy containing carbon, is by far the most recycled material in the world. As per 2018 figures, total crude steel production was 1.8 billion tonnes, with verified data for 81% of global steelmaking, indicating an associated steel scrap use of just under 470 million tonnes. A further 70 million tonnes of scrap is consumed by the world's iron and steel foundries each year. Global external steel scrap trading - including internal EU-28 trade - amounted to 105.4 million tonnes in 2018 for an increase of 2.6% over 2017.

The most commonly recycled items are scrap from industrial processes, and also end-of-life products such as containers, vehicles, appliances, industrial machinery and construction materials.

Proportion of steel scrap used in domestic steel production (2018):

China	20.2%
EU-28	55.9%
USA	69.4%
Japan	35%
Russia	42.5%
Turkey	80.7%
Republic of Korea	41.4%

Throughout the world, use of scrap metal is an integral part of the modern steelmaking sector, improving the industry's economic viability and reducing its environmental impact. Compared to ore extraction, the use of secondary ferrous metals significantly reduces CO₂ emissions, energy/water consumption and air pollution. At the same time, the recycling of steel makes more efficient use of the Earth's natural resources.

Recycling Process

In general, metal recycling is a pyramid industry with many small companies at the bottom feeding scrap to large multi-nationals at the top. Steel recycling involves some, or all, of the following steps:

Sorting: Magnets attract steel and so, through the use of magnetic belts, this metal can be easily separated from other recyclables such as paper in a recycling facility. Different kinds of steel do not need to be separated always.

Shredding: Shredders incorporate rotating magnetic drums to extract iron and steel from the mixture of metals and other materials.

Media separation: Further separation is achieved using electrical currents, high-pressure air flows and liquid flotation systems.

Shearing: Hydraulic machinery capable of exerting enormous pressure is used to cut thick, heavy steel recovered from, for example, railways and ships. Other cutting techniques, such as the use of gas and plasma arc torches, are sometimes employed.

Baling: Iron and steel products are compacted into large blocks to facilitate handling and transportation.

Recycling Facts

- Recycling one tonne of steel saves 1100 kg of iron ore, 630 kg of coal and 55 kg of limestone.
- Recycling one tonne of steel saves 642 kWh of energy, 1.8 barrels (287 litres) of oil and 2.3 cubic metres of landfill space.
- Steel recycling uses 74% less energy, 90% less virgin material and 40% less water; it also produces 76% fewer water pollutants, 86% fewer air pollutants and 97% less mining waste.
- A BIR-commissioned study conducted by Imperial College London has concluded that CO₂ emissions are reduced by 58% when using ferrous scrap in steelmaking rather than virgin ore.

Source: Extract from BIR Annual Report 2024

Global Recycled Steel Use Reaches 630 million tonnes in 2025

Global crude steel production totalled 934.3 million tonnes in the first half of this year for a decrease of 2.2 percent over the corresponding period in 2024, according to [worldsteel](#). From the regional perspective, the only year-on-year increase in crude steel production was recorded by Africa.

The biggest producer in the first six months of this year was Asia/Oceania at 693.9 million tonnes (down 1.9 percent from January to June 2024). Also registering lower totals were: the EU-27 (-3.3 percent to 65.4 million tonnes); Other Europe (-7.1 percent to 20.8 million tonnes); the Middle East (-5.4 percent to 27.5 million tonnes);

North America (-0.6 percent to 53.2 million tonnes); the CIS (-5.4 percent to 41.6 million tonnes); and South America (-0.4 percent to 20.5 million tonnes).

Bureau of International Recycling (BIR) - Ferrous Division is now using the term "recycled steel" rather than "steel scrap" in order to resonate more effectively when highlighting the importance of the material for global steelmaking.

From BIR's calculations and those of worldsteel, it can be concluded that some 630 million tonnes of recycled steel are used each year in global steel production, thereby preventing almost 950 million tonnes of CO₂ emissions while also saving energy and conserving natural resources. The term "recycled steel" also reinforces the importance of the material for "green" steelmaking.

World DRI production increases by 4.3 percent

For "green" steelmaking, it is also important to follow global trends affecting the use of direct reduced iron (DRI). Global DRI production climbed 4.3 percent year on year in the first half of 2025 to 64.24 million tonnes, and the two largest producers were India with an increase of 8.7 percent to 29.201 million tonnes and Iran with a decrease of 2.2 percent to 16.30 million tonnes.

Recycled steel usage

Recycled steel usage lowered in China, the EU-27, the U.S., Japan, and South Korea in the first half of 2025 whereas increases were registered in India and Turkey. China's crude steel production fell by 3 percent in the first six months of this year to 514.8 million tonnes but its recycled steel usage tumbled a significantly steeper 11.4 percent to 109.01 million tonnes. However, the nation retained its position as the world's largest consumer of recycled steel.

The following also recorded larger declines in recycled steel usage when compared to crude steel production during the first half of this year:

- EU-27 (-4.2 percent to 39.403 million tonnes for recycled steel consumption versus -3.3 percent to 65.4 million tonnes for steel production);
- U.S. (-9.1 percent to 26.71 million tonnes for recycled steel consumption versus an unchanged steel production of 39.9 million tonnes);
- Japan (-6.7 percent to 14.894 million tonnes of recycled steel usage as against a 5 percent drop in steel production to 40.6 million tonnes); and
- South Korea (an 11.3 percent slump in recycled steel usage to 10.242 million tonnes compared to a dip of 2.8 percent in steel production to 30.6 million tonnes).

On the positive side,

- India reported a 15.3 percent leap in its recycled steel usage in this year's January to June period to 19.65 million tonnes as against an increase of 9.2 percent in its crude steel production to 80.9 million tonnes.
- Turkey was increasing its recycled steel usage by 2.2 percent to 16.051 million tonnes despite a 1.7 percent dip in its steel production to 18.3 million tonnes.

In total, during the first half of 2025, recycled steel usage in key countries and regions was 6.9 percent lower year on year at 235.96 million tonnes; this usage figure represents data for 76 percent of global steelmaking.

The respective shares of recycled steel usage in crude steel production were

- 21.2 percent for China,
- 24.5 percent for India,
- 33.4 percent for South Korea,
- 36.7 percent for Japan,
- 60.2 percent for the EU-27, and
- 66.4 percent for the U.S.
- Worthy of particular note was recycled steel's 87.7 percent share of crude steel production in Turkey.

Turkey's overseas recycled steel purchases reduced by 5.8 percent

The first half of this year brought a 5.8 percent reduction in Turkey's overseas recycled steel purchases to 9.40 million tonnes. However, the country remained the world's foremost recycled steel importer, with its main suppliers being the U.S. (-18.8 percent year on year to 1.723 million tonnes) and the Netherlands (+14.6 percent to 1.503 million tonnes).

India remained the world's second-largest recycled steel importer in the first six months of 2025 (+18 percent to 4.580 million tonnes), with its list of suppliers headed by the U.S. (+30 percent to 0.92 million tonnes) and the U.K. (+7 percent to 0.47 million tonnes).

Higher recycled steel imports were also recorded in the first half of this year by Pakistan (+181.6 percent to 3.107 million tonnes), the EU-27 (+4.3 percent to 2.478 million tonnes), the U.S. (+6.7 percent to 2.25 million tonnes), and Thailand (+285.1 percent to 2.23 million tonnes). By contrast, year-on-year import declines were posted in the first half of 2025 by Vietnam (-62.7 percent to 0.98 million tonnes), Taiwan (-40.3 percent to 0.95 million tonnes), and South Korea (-19.9 percent to 0.90 million tonnes).

EU-27 still the world's top recycled steel exporter

The EU-27 maintained its position as the world's leading recycled steel exporter in the first half of this year despite a decrease of 2.8 percent to 8.304 million tonnes. The main buyers were Turkey (+10.7 percent to 5.67 million tonnes) and Egypt (-47.1 percent to 0.56 million tonnes).

Despite a decline in its recycled steel shipments in January to June this year (-16.6 percent to 6.000 million tonnes), the U.S. remained the world's second-largest recycled steel exporter; its main customers were Turkey (-12.9 percent to 1.854 million tonnes) and Bangladesh (-16.9 percent to 0.76 million tonnes).

Overseas shipments of recycled steel increased in the first half of this year out of Japan (+19.5 percent to 3.819 million tonnes), Mexico (+27.4 percent to 0.702 million tonnes), and Singapore (+32.6 percent to 0.562 million tonnes). Conversely, the January to June period brought recycled steel export declines for the U.K. (-25.4 percent to 3.124 million tonnes), Canada (-13.2 percent to 1.908 million tonnes), Australia (-46.8 percent to 1.111 million tonnes), and Hong Kong (-8.8 percent to 0.535 million tonnes). The world's leading exporters are major net recycled steel exporters, with surpluses in the first half of this year of 5.8 million tonnes for the EU-27 and of 3.8 million tonnes for the U.S.

It can also be noted that U.S. and EU export prices followed a largely parallel course in the first six months of this year.

Source: MRAI News Updates: 30 October, 2025

India Needs Targeted Public Finance to Scale Green Steel

India's planned steel capacity expansion presents an opportunity to adopt cleaner technologies if supported by the right financing pathways.

India needs to deploy public capital strategically to bridge the financing gap for green steel projects — which are technically proven but still considered risky for private finance — and to avoid carbon lock-in from its planned capacity expansion.

With planned steel capacity expansion to 300Mt, technology choices made now will influence emissions for 30–40 years. Steel plants typically operate for decades once constructed, making early public finance intervention important.

Carbon lock-in occurs if steel plants with 30–40-year lifespans are built with conventional technology, locking in emissions until 2060–70. This could affect India's net-zero goals.

Beyond climate implications, traditional blast furnaces use metallurgical coal as a primary energy source, largely imported from Australia. As India adds more BF-BOF

capacity, the country's net coal imports are expected to nearly double by 2035, posing an energy security challenge.

While venture capital and private equity typically fund emerging technologies, these sources may not be well-suited for green steel given its low technology readiness level, massive capital requirements, and extended payback periods.

Nearly \$24 billion has been injected into steel decarbonisation projects. Virtually every major green steel initiative globally has relied on substantial public finance to reach viability. The Indian government is also formulating a National Mission for Sustainable Steel with an estimated 5,000 crore Indian rupees (\$600 million) outlay aimed at decarbonising steel production. The programme is likely to offer production-linked incentives, concessional loans, or risk guarantees to steelmakers, with up to 80% of funds expected to support secondary steel mills.

Another key pillar under development is Green Public Procurement. A draft GPP policy would mandate that 25–37% of steel used in public projects be low-carbon, creating an assured domestic market for green steel. However, implementing GPP has been challenging — a proposal to establish a centralised agency for bulk procurement of green steel was rejected by the Ministry of Finance in 2024. Under the Carbon Credit Trading Scheme, set to begin trading in October 2026, emissions intensity targets will be imposed across nine industrial sectors, including steel. While this could reward cleaner steel production, its impact will depend on carbon pricing levels which will be driven by target stringency.

These measures signal government intent, but the scale of proposed funding remains modest.

Markets differentiate between green steel types. Gas-based Direct Reduced Iron projects like Cleveland-Cliffs in the US and ArcelorMittal in Germany failed to secure buyer premiums and were cancelled despite grants, while integrated hydrogen-based projects like Sweden's Stegra secured long-term offtakes with 20–30% premiums.

The market data shows buyers will pay premiums for steel with end-to-end green credentials spanning renewable energy, hydrogen production, and steelmaking.

India's approach will differ from the West — focusing on maximising impact through instrument design rather than large direct subsidies. Ultimately, India's green steel transition demands strategic public capital deployment that ensures judicious use of taxpayers' money, while spurring innovation and investment from industry, global financiers, and technology providers.

Source: The Institute for Energy Economics and Financial Analysis (IEEFA), 01 Dec.2025

Helios' Solution for Decarbonizing Steelmaking

Inspired by work on lunar resource extraction, the Helios Cycle claims to create zero direct emissions and uses 30% less energy than traditional methods of extracting iron — offering transformational potential for the heavy-emitting steel industry.

The steel industry, a cornerstone of modern civilization, faces significant challenges. As one of our most used materials, steel, and its production, is a massive global enterprise — with over 1.8 billion metric tons produced annually. However, this industry is also a massive polluter — responsible for approximately 11 percent of the world's total greenhouse gas output. Traditional steelmaking processes, which rely heavily on carbon-intensive equipment such as blast furnaces, emit around 1.8 tons of CO₂ for every ton of steel produced. Additionally, the quality of iron ore — a primary raw material — is declining globally, leading to more energy-intensive and costly extraction and refinement processes.

Israeli startup Helios, originally set out to solve the challenges associated with space exploration, found itself with a solution to address Earth's pressing environmental issues — particularly, in the steel industry.

A journey from space to Earth

Helios initially focused on lunar resource extraction.

The promoter, a space geek, wanted to know why we haven't done more since astronauts last landed on the moon in 1972. What's happened since then? Why haven't we been back? Why are there no bases on the moon? Is it just funding? Geopolitics? Lack of technology?"

He found that the answer was multifaceted — there were significant technical and logistical challenges that had hindered progress. One issue was the sheer complexity and cost of sending essential resources, such as oxygen, from Earth to sustain lunar missions. Therefore, producing oxygen directly from lunar regolith (the Moon's surface material) could drastically cut costs and facilitate deeper space exploration. This discovery led him and his team to focus on developing technologies that could leverage lunar resources efficiently.

Oxygen is going to be by far the most needed consumable on the Moon, primarily for burning propellant. Therefore, if you can produce that oxygen on-site — rather than sending everything from Earth — you can save billions of dollars. The most accessible oxygen on site is in the minerals on the ground.

While originally intended to support life and propulsion on the Moon, Helios's technology soon revealed its potential for an application on Earth: the steel industry.

The core of its innovation involved a method for extracting oxygen from lunar soil, which could also be used to improve iron production here on Earth. By adapting this lunar technology, Helios discovered a novel way to produce iron without the high carbon emissions typical of traditional steelmaking processes. This breakthrough led Helios to pivot its focus to explore how its technology could transform iron production to address environmental challenges in the steel industry.

Reinventing iron production

Iron production has remained largely unchanged for millennia, relying heavily on carbon to extract iron from its ore. This method, while effective, releases vast amounts of carbon dioxide into the atmosphere.

Traditional steelmaking process starts with iron ore, which is essentially iron chemically bound to oxygen. This iron ore is then fed into a blast furnace, where it is subjected to extremely high temperatures. To separate the oxygen from the iron, carbon is added/injected into the furnace. The carbon reacts with the oxygen in the ore, effectively pulling the oxygen away from the iron. What you're left with is liquid iron — which is then used to produce steel — and carbon dioxide, which is released into the atmosphere as a byproduct.

Helios has developed a process that substitutes carbon with sodium, a common and abundant element found in table salt. This approach, called the Helios Cycle™, operates at significantly lower temperatures — 250-350°C, similar to typical kitchen oven temperatures — compared to the 1,200-2,000°C required by traditional steelmaking methods.

By replacing the carbon with sodium to extract oxygen from iron ore, the Helios Cycle eliminates CO₂ emissions and operates more efficiently — reducing both energy use and production costs by 30 percent — making it a more sustainable and cost-effective alternative to conventional steel production.

The steel industry's challenge isn't just emissions — it's also the declining quality of iron ore. Mining industry uses a costly, carbon- and energy-intensive process called beneficiation to upgrade ore quality.

Helios' technology allows for the processing of lower-quality ores — those typically considered unsuitable for use in traditional methods, due to their lower iron content or higher impurity levels. In conventional steelmaking, these ores would need to undergo a beneficiation process. By using Helios' process, these lower quality ores can be used directly, bypassing the need for such energy-intensive beneficiation steps.

Compared to hydrogen-based methods, which also hold great promise for decarbonizing steel production, Helios' approach also has advantages. Hydrogen technologies struggle with high production costs, complex storage and infrastructure needs, and can still be carbon intensive. In contrast, Helios' use of sodium is more energy-efficient, sidesteps these hydrogen-related challenges, and benefits from sodium's wide availability and low cost — making it a more practical and scalable solution.

Scaling for impact

Helios plans to build its first pilot plant next year, capable of producing several thousand tons of iron annually, to demonstrate the technology's viability and set the stage for commercial production. After the pilot, Helios plans to start building its first commercial units — with the first expected around 2028.

In the meantime, Helios' potential for impact continues to grow — the startup has attracted over \$6M in seed funding; and just last month, the company forged a partnership with Australian steel manufacturer BlueScopeX and was named a winner in the World Economic Forum's UpLink Sustainable Mining Challenge. Helios also recently secured its membership in the World Steel Association (WSA) — an exclusive network of the largest and most established steelmakers in the world, representing nearly 90 percent of global steel production. Membership is a mark of credibility and influence within the industry. Helios is the first and only technology company accepted as a member that is not a steelmaker — they acknowledge that The Helios Cycle aims to be the technology that not only decarbonizes but can commercially compete with current iron production methods.

The global steel industry is on the brink of unprecedented transformation over the coming decades, necessitating a diverse portfolio of technologies to achieve a smooth transition to a low-emission future.

In the medium term, the emergence of technologies such as carbon capture, storage and hydrogen will be pivotal — and innovative and radically new technologies show significant promise. These include direct electrolysis and the Helios cycle, with sodium reduction being an exciting innovation with an incredible story that could potentially revolutionize steel production. Having multiple viable technologies will greatly ease the industry's transition toward sustainability, as their success will broaden the technological options available to the industry. The more options we have, the more likely a successful transformation will be — ultimately, paving the way for a more sustainable steel industry.

Thus Helios Green Iron (HGI™), produced using the Helios' ironmaking technology — the "Helios Cycle™", stands at the forefront of a transformative era in the iron and

steel industry. The Helios Cycle™ emits zero direct emissions, offering superior advantages not only compared to traditional methods but also compared to other innovative low-emission iron technologies.

If HGI™ production takes place in proximity to iron ore mines, a significant reduction of transport-related emissions can be achieved, constituting a further reduction in scope 3 emissions.

Conclusion

In conclusion, HGI™ represents a transformative leap forward for the iron and steel industry, offering a blend of environmental responsibility and economic opportunity. By utilizing HGI™ as feedstock, or adopting the Helios Cycle™ in internal production processes, not only can iron and steel manufacturers face the current regulatory challenges and capitalize on the existing market opportunities, but also prepare for the challenges and opportunities of tomorrow, while leading the transition towards a decarbonized economy.

Source: <https://heliosmatters.com>

Electra's New Demonstration Facility for Clean Iron

Electra, the US-based clean iron company, unveiled the site of its new demonstration facility in Jefferson County, Colorado. The 130,000 sq. foot facility will produce up to 500 metric tons of Electra's low-carbon, high-purity iron annually.

Steel is a crucial building material and accounts for 7% of global carbon-dioxide emissions each year—more than the impact of shipping and aviation combined. Electra, the Colorado-based startup showcased a technology that pushed the boundaries of known electrochemistry.

Steel production is one of the largest sources of emissions, driven primarily by the energy-intensive step of refining iron. Electra claims to reimagining the fundamentals of ironmaking, enabling a scalable, cost-effective pathway to low-carbon steel.

Steel production is a two-step process. The first one involves taking iron ore, which contains compounds of iron and oxygen, and treating it with something—typically coal—that can remove the oxygen, leaving behind iron with some impurities. More than 90% of carbon-dioxide emissions of steelmaking come from this first step. Then that iron is refined by oxidizing impurities, and mixed with small amounts of other metals to make different types of steels.

There are three main ways to make emissions-free steel:

- Capture emissions from conventional steelmaking and bury it deep underground, which has been deployed at a plant in the United Arab Emirates.
- Replace coal with a carbon-free fuel, such as renewables-powered hydrogen, which is what H2 Green Steel does. and
- Use carbon-free electricity to go from iron ore to iron, which is what Electra does, and then convert that into steel in existing electric-arc furnaces.

Carbon capture has failed to take off, with no further construction happening at large steel plants. H2 Green Steel expects to complete its 2.5-million ton plant in 2026, but its process is only price competitive with high-grade iron ore and thus limits its applicability to replacing all steel production. And, so far, none of the startups wanting to use only electricity for steel production have reached the commercial stage.

Electra is reinventing this age-old process with our patented low-temperature electrochemical-hydrometallurgical system to refine ore into high-purity clean iron.

Electra is developing an emissions-free iron without melting ore. Technology promises a step-change in the race to produce steel without a massive carbon footprint. Electra's goal is to have a 50,000-ton plant built by 2027 and the same site will be expanded to million-ton scale by 2029.

Electra claims it is reinventing iron production to tackle the nearly 10% of global carbon dioxide emissions produced from iron and steelmaking. Its patented technology uses chemistry and clean energy to transform a broad range of iron ore into responsible, resourceful, pure iron at scale.

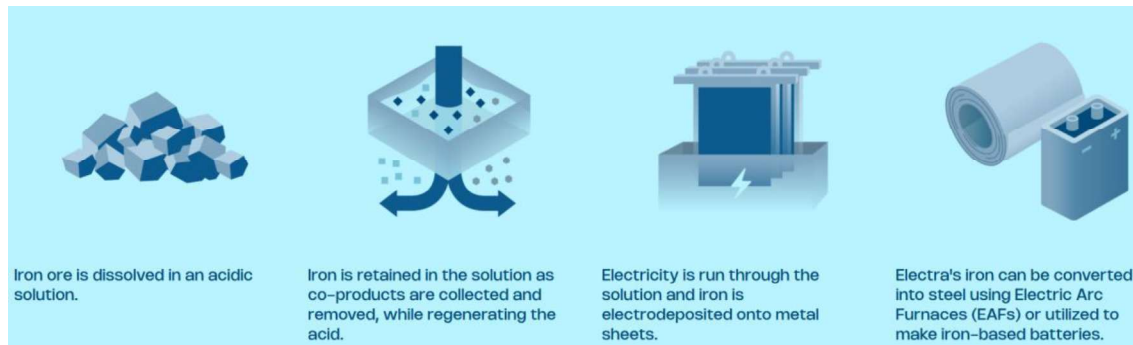
The facility is expected to begin operations in mid-2026 and will deploy the company's technology to convert iron ore into 99% pure iron using its proprietary low-temperature process powered by chemistry and clean energy.

The facility is supported by a new \$50 million grant from Breakthrough Energy Catalyst, a programme within Breakthrough Energy that funds and helps scale early commercial clean energy projects, and an \$8 million dollar tax credit from the Colorado Industrial Tax Credit Offering (CITCO) along with \$186 million in Series B funding announced earlier this year.

Electra's Process

Electra's process involves taking iron ore and heating it up to 400 deg C (752°F) with hydrogen. Then dissolving the ore in acid, which also separates out any sand. Running electricity through the iron ore-acid mixture at temperatures of about 60 deg C—cooler than coffee—which is enough to separate oxygen from iron oxide and

leave behind silvery-gray plates of emissions-free iron. The whole process takes between three and five days.



Electra's process

Process Features

Flexible Inputs

Compatible with intermittent renewable energy: Low-temperature process allows to synchronize production with the availability of cost-effective intermittent renewable energy.

Uses the widest range of iron ores: Traditional ironmaking uses the highest grades of ore as feedstock. Electra process unlocks new types of ores including previously mined, unused materials.

Valuable Outputs

Produces 99% pure iron: High-purity iron provides the highest economic value for EAF steelmakers and battery manufacturers.

Extracts co-products to maximize value: Full value refining process removes co-products like silica and alumina, reducing waste and preserving critical minerals.

Modular Design

Electra system is built in a network of connected cells — similar to stackable blocks — that can be replicated and combined to rapidly increase production.

Each repeatable, modular unit is built using readily available equipment and materials available at scale. This nimble, cost-effective approach is engineered for global scalability and commercial viability.

Electra's other competitors

US-based Boston Metal founded in 2012, which also like Electra, relies on electricity to make green iron, but still hasn't built a commercial scale plant.

Australia-based Element Zero says it can convert iron ore to iron using only electricity at less than 400 deg C. So far, it's only shown to work at small scale and doesn't expect to have a commercial scale plant until 2030.

The advantage that Electra and Element Zero have with their lower temperature process is that it allows them to start and stop the conversion of iron ore to iron without hassle. That's important, if the goal is to use solar and wind power when it's available. Boston Metal can't do that without molten metal solidifying and destroying their reactor.

All three startups aim to supply the carbon-free iron to a steelmaker that uses a mixture of scrap steel and virgin iron in an electric-arc furnace to make steel. And if that process is powered by renewables, the entire cycle from iron ore to steel can be emissions-free.

In 2022, Electra's 20 or so workers were able to make iron plates the size of office paper that weighed few kilograms. The company shared its space with a bakery. Electra then took over the bakery, has about 100 people working and produces carbon-free iron plates of more than 100 kilograms. A million-ton iron plant will contain hundreds or thousands of the kinds of plates.

One thing that gives electricity-driven iron production an advantage is that it can use any type of iron ore. There are billions of tons of such raw material sitting in dumps around the world, making it very cheap to acquire. The company claims that it can even separate out useful raw material, such as alumina which is used to make aluminum, from low-grade ores and create an additional source of revenue.

Currently, Electra consumes about the same amount of energy as a conventional iron-making process does. Electricity is more expensive than burning coal, and so lowering energy use is key to being price competitive. Ideally electrochemical iron-making processes should use a lot less energy than conventional methods.

Challenges ahead

There are a lot of challenges ahead. Even if a technology problem is solved, there will be whole lot of logistical challenges that will have to be conquered.

Companies relying on either hydrogen or only electricity will need to secure huge amounts of green power which can be tough, with governments around the world struggling to build enough solar and wind energy. And while hydrogen can be

retrofit into existing steel plants, the companies relying on electricity-powered iron production will have to build new plants from scratch. “It’s a bigger economic hill to climb.

Funding

Electra has forged partnerships with some of the world’s largest iron-ore producers (including BHP), steelmakers (including Nucor), and equipment manufacturers. Electra has raised \$85 million from investors including Bill Gates-backed Breakthrough Energy Ventures, Capricorn Investment Group, Singapore’s Temasek and Amazon’s Climate Pledge Fund.

The next round of funding worth \$150 million will enable it to acquire land for the commercial plant and fund the engineering design. After that, a million-ton plant would cost about \$1.6 billion, which means that they will have to raise a lot more money.

Electra’s other competitors Boston Metal, like Electra, which also relies on electricity to make green iron, and has raised \$262 million. Founded in 2012, it still hasn’t built a commercial scale plant.

H2 Green Steel was able to raise billions of dollars because it lined up an order book of about 1.2 million tons of emissions-free steel at a higher cost than conventional steel.

With new funding from Breakthrough Catalyst and purchase agreements from industry leaders for the demonstration facility, Electra is on track to reach commercial scale clean-iron production by the end of the decade.

Potential customers

The driver of the momentum is automakers, electrical-appliance brands, and equipment manufacturers willing to pay a premium price for emissions-free steel in a bid to meet their climate commitments. Without customer demand, it's hard to get investors. Big brand names are willing to pay up to 50% price premium for low-carbon steel.

Many of the startups have secured blockbuster investments. Sweden-based startup H2 Green Steel raised \$1.6 billion in equity, one of the biggest funding rounds for startups in 2023. Electra plans to supply its green iron to steelmakers to turn it into green steel, while H2 Green Steel is planning a large-scale plant that will be up and running by 2026.

Electra aims to emulate the Swedish startup and is working to secure orders from automakers and electrical-appliance makers.

Clean iron produced at Electra's demonstration facility is already contracted for delivery to several strategic partners to qualify the material for use in steel applications. Signed purchase orders include Nucor, the largest steelmaker in the United States and early investor of Electra, Toyota Tsusho, the global steel trading company, and INTERFER Edelstahl Group, the European steel and metals distributor.

Nucor will use Electra's clean iron in its electric arc furnace (EAF) steelmaking, a long-established, lower-emission alternative to traditional blast furnace methods, at their sheet mills.

The advanced purchase commitments with Electra are a clear demonstration of Nucor's belief in their clean iron technology and its dedication to accelerating the adoption of sustainable steelmaking. This facility lays the groundwork for a new era of low-carbon materials.

Once qualified, Toyota Tsusho America plans to sell Electra's clean iron to steelmakers and distribute green steel to automakers, creating a closed-loop system that supports widespread adoption of low-carbon materials.

INTERFER Edelstahl Group will use Electra's clean iron, following qualification, in specialty steel applications to help customers meet their decarbonisation goals.

As part of the unveiling, Electra announced its first Environmental Attribute Credit (EAC) purchases from Meta. Under the agreement, Meta will purchase verified EACs linked to the reduced emissions from Electra's clean iron. The contract with Electra is part of Meta's goal to reach net zero emissions in 2030 by addressing emissions sources throughout its supply chain, including the steel used to build and operate its infrastructure. Meta will also have the option to purchase EACs for CO₂ reduction from future Electra commercial facilities.

Meta's early-commitment to Electra's clean iron production helps advance low-carbon industrial materials and support the addition of new domestically-produced iron supply.

Meta is to collaborate with Electra to advance low-carbon iron and steel – critical data centre building solutions – made here in the US. Through this partnership and Meta aims to demonstrate a pathway for these innovative materials.

Source: Weekly news from Steel Times International, 19 November 2025

How Vietnam can Ensure Greener Steel

Vietnam's pledge to achieve net-zero carbon emissions by 2050 will require key reforms in many sectors, including in steel.

Decarbonising steel production will be critical in view of the industry's rapid growth in recent years. According to the World Steel Association, Vietnam surpassed Italy in 2024 with its production of 22 million tonnes, becoming the 11th largest steel producer globally.

In the first half of this year, finished steel output rose 9.7 per cent from the previous year to 16 million tonnes, suggesting that annual production may significantly exceed the previous year's level. This sustained growth consolidates Vietnam's position as one of ASEAN's leading steel producers.

The steel industry is an important pillar of Vietnam's economic development. It provides input for the country's rapid infrastructure expansion, it supports key manufacturing sectors such as construction and shipbuilding, and it contributes to export revenues and industrial employment.

The industry is led by privately owned *Hoa Phat Group*, which accounts for 40 per cent of national crude steel output. *Formosa Ha Tinh Steel*, a Taiwanese Vietnamese joint venture, is the second-largest producer, operating a major blast-furnace complex in central Vietnam. *Vietnam Steel Corporation* is an important state-linked holding company, *Hoa Sen Group* dominates coated and galvanised steel, and *Pomina Steel* and *Vina Kyoei* serve construction markets.

The sector is concentrated, energy-intensive, and a major source of industrial emissions. In 2023, Vietnam's steel industry emitted approximately 32 million tonnes of CO₂. This corresponds to about 8-9 per cent of Vietnam's national greenhouse gas emissions. With its fast growth, the sector is on a path to emit close to 40 million tonnes of CO₂ in the near future.

Vietnam's steel exports flow mainly to ASEAN countries, China, and increasingly to the EU, which will require a growing share of steel with lower carbon content. The EU Carbon Border Adjustment Mechanism (CBAM) will impose carbon tariffs from 2026, making decarbonisation an economic necessity.

With growing global demand for low-carbon steel from automotive, construction, and manufacturing industries, Vietnam has an opportunity to position itself as a competitive green steel producer in Asia.

The hopes of green steel

Vietnam's steel sector emits carbon dioxide mainly because it depends on coal-based blast furnace-basic oxygen furnace technology, where coke serves both as fuel and as a chemical agent to reduce iron ore, releasing CO₂ in the process.

About 70 per cent of emissions come from this type of tech using imported coking coal, and 30 per cent from electric arc furnaces using scrap. All this makes steel one of the country's most carbon-intensive industries.

Emissions from steel production can be reduced in the near term. According to the International Energy Agency, improving material efficiency, such as reducing scrap losses through better collection and sorting, could cut industrial CO₂ emissions by more than 40 per cent by 2050, while deploying the best available technologies and energy-efficient upgrades can reduce energy use in existing plants by up to 20 per cent.

In the long term, green steel produced using green hydrogen, renewable electricity, or other low-carbon technologies instead of coal offers a pathway to decarbonise this hard-to-abate sector.

Transition strategies such as hydrogen blending and carbon capture, utilisation, and storage (CCUS) retrofits can help reduce emissions. The optimal pathway depends on regional conditions but scaling low-cost options now while preparing for CCUS and low-carbon hydrogen is essential for a resilient net-zero transition.

A number of countries are making notable strides in green steel production, offering valuable lessons for Vietnam's development strategy.

India, the world's second-largest steel producer, has begun a phased shift towards low-carbon steelmaking. Major companies such as Tata Steel, JSW Steel, and ArcelorMittal Nippon Steel India are investing in scrap-based electric arc furnaces, hydrogen-ready direct reduced iron technology, and carbon-capture pilots.

Tata Steel has tested hydrogen injection in blast furnaces, JSW plans up to \$13 billion in decarbonisation projects and renewable integration; and AM/NS India is investing about \$7 billion to make much of its Hazira output green steel. National policies, such as the steel scrap recycling policy, PLI scheme for speciality steel, and the national green hydrogen mission, are aligning incentives and pilot funding.

India's gradual, policy-supported transition offers a pragmatic model for emerging economies like Vietnam.

Oman provides another instructive example of how an emerging economy can leverage its natural advantages to attract green-steel investment.

The country is developing the Vulcan Green Steel project in Duqm, led by Jindal Steel Group, which will use aforementioned tech powered by solar and wind energy.

Backed by government incentives such as long-term land leases, reduced fees, and streamlined approvals, the project positions Oman as a regional green-industry hub connecting Asia, Europe, and Africa.

Although Oman lacks domestic iron ore, its renewable potential, hydrogen strategy, and proactive investment climate illustrate how clear policy direction and infrastructure planning can draw large-scale private investment, offering useful lessons for Vietnam as it pursues industrial growth within a low-carbon framework.

Costs and constraints

Vietnam's steel industry faces mounting pressure to decarbonise, but also confronts structural constraints. The country imports most of its iron ore and scrap steel, and local ore quality is low, a significant limitation for direct reduced iron production. This reliance on imports means that Vietnam's competitiveness in green steel will depend heavily on processing efficiency and access to clean energy rather than raw material advantages. At the same time, the country has several strengths to build upon. Vietnam's expanding renewable power capacity, particularly solar and wind, provides a foundation for decarbonisation.

The Power Development Plan VIII envisions substantial renewable energy zones. However, it remains to be seen if Vietnam's green hydrogen strategy can benefit steel and other challenging sectors to reduce emissions.

In the near term, expanding electric arc furnace capacity using scrap represents the most practical decarbonisation pathway. With 30 per cent of production already using this less emissions-intensive method, Vietnam has a foundation to build upon.

Increasing scrap collection and recycling infrastructure could enable a relatively quick shift away from coal-intensive blast furnaces. Natural gas-based direct reduced iron, using liquefied natural gas from Vietnam's expanding import infrastructure, offers a transitional route before green hydrogen becomes commercially viable.

Costs remain a challenge. A recent analysis suggests that green steel using hydrogen-based direct reduced iron costs approximately \$600-800 per tonne, compared to \$400-500 for conventional blast furnace steel.

While more costly, green steel will be able to access the EU markets without paying the CBAM's carbon tariff. This could make government support for green steel worthwhile, as it would allow access to EU markets.

To get a competitive edge, many countries are now supporting green steel with fiscal incentives either to support green hydrogen or CCUS. For instance, the US 45V clean hydrogen production tax credit indirectly supports steel decarbonisation by

reducing the cost of green hydrogen inputs. This incentive can lower the cost of hydrogen-based steelmaking close to the cost of conventional coal-based steel. Canada's refundable CCUS tax credit, in place from 2022 to 2040, covers 37.5–60 per cent of eligible costs, including geological storage, offering long-term certainty for steel and other industrial emitters.

In Asia, Malaysia provides a 10-year investment allowance and 70 per cent income tax reduction for CCUS service providers, creating one of the region's most proactive industrial carbon management frameworks.

As of now, Vietnam does not provide subsidies or tax credits to support green steel. Its fiscal constraints limit the government's ability to provide large-scale, long-term subsidies comparable to those in wealthier nations. The steel industry's capital-intensive nature means that retrofitting existing facilities or building new green steel plants requires significant investment, often billions of dollars per facility. In private steel mills, the government cannot subsidise the costly retrofit of private steel mills, but it could encourage it with incentives that do not strain the public budget, such as accelerated depreciation or research and development tax credits. Vietnam can also foster a green steel industry despite limited fiscal space by focusing on regulatory and market-based tools. The government can create a predictable carbon-pricing framework through its forthcoming emissions trading system, recycle revenues into targeted incentives, and mandate low-carbon standards in public procurement.

Access to concessional and blended finance from multilateral partners, such as the Just Energy Transition Partnership, World Bank, Asian Development Bank, and decarbonisation funds, can de-risk private investment. Foreign investment by firms with the technology and experience would be very beneficial. Coupled with long-term renewable power contracts and growing export demand for low-carbon steel under the EU's CBAM, these mechanisms could go a long way to attract private capital without straining the budget.

Source: November 18, 2025, Vietnam Investment Review

Steel Supports the Future of Mobility

How is steel supporting the future of mobility?

We know that globally, mobility will continue to have an increased focus on sustainability. It is here that steel provides key benefits – on average, it is by far the most sustainable material for automotive Body in White design.

We are also engaged in a transition towards the use of more recycled content for automotive and decarbonization of the upstream, which helps maintain our

leadership position in this space as steel remains the material of choice for greener mobility.

What role does steel play in enabling EV affordability and accessibility?

Steel solutions remain the most cost –effective option for automakers, without sacrificing performance, which is why it is the preferred material for affordable EV design.

Steel solutions also enable flexibility in production and balance between models, which today are key benefits for EV manufacturers to offer competitive and affordable vehicles.

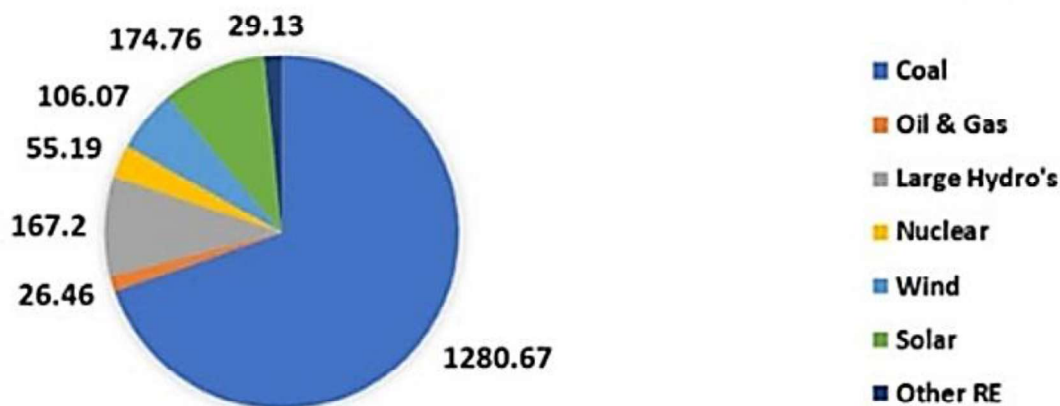
How does steel help automakers balance strength with lightweight design?

For decades, automotive steel has demonstrated its versatility with solutions that meet stringent crash requirements. Steel has an unmatched set of properties to ease the design and industrialization of vehicles and is a key driver for improving safety.

Vehicles are comprised of various steels that vary in strength in order to keep material part thicknesses to a minimum level. This enables maximizing lightweighting for components with strong crash requirements. Innovation like Laser Welded Blanks allow vehicle designers to tailor the properties and thickness of a unique part to achieve the best compromise for lightweighting.

Source: World AutoSteel Update, 26th October 2025

India's Electricity Generation Mix FY26



Interaction of IIM Delhi Chapter with M/s YOGI JI DIGI Pvt. Ltd. on 10.8.2026

A team from IIM Delhi Chapter interacted with YOGI JI DIGI Pvt. Ltd., located at Faridabad (Haryana) on 10.8.2026



Shri Navneet Singh, MD, YOGI JI DIGI and Shri Samir Bansal, Director, YOGI JI DIGI, took the team members around various units of their Works and explained the working of their various divisions.

The various areas of their units visited by the team included:

- Cold Rolling Mills
- Pickling Lines
- Metal Coating Lines for galvanised and galvalume products
- Colour Coating Lines
- Skin Pass Mill
- Electrical and automation solutions
- Design, engineering and fabrication
- Machining and Assembly Capabilities
- Zinc Magnesium Coating Lines
- Automotive grade galvanizing technology

The interaction widened the perspective of the team in the working of the various areas of their manufacturing capabilities.

Interaction with Inderprastha Engineering College

Shri K R Krishnakumar, Hon. Secretary and Shri R K Vijayavergia, Past Chairman IIM Delhi Chapter visited Inderprastha Engineering College (IPEC) located at Ghaziabad on 29th July 2026 on invitation from Dr. Lawakush Mishra, Assistant Professor, Dept. of Mechanical Engineering.

Dr. Lawakush Mishra happened to meet Mr Bhim Sain in ASSOCHAM Conference on 23.7.2026, and during discussion, showed interest in IIM and opening a Student Chapter at IPEC.

Dr. Lawakush Mishra is also Coordinator, Industry - Academia Cell & Working Professionals Programmes (B. Tech./ MBA) of IPEC. He interacts with different industries and professional bodies for tie up between Industry and Academia.

Inderprastha Engineering College (IPEC) has been founded as a self-financed institution with the objective of providing high-quality technical education in the Delhi-NCR region. Currently, it offers undergraduate programs (B.Tech. degree) in seven disciplines of engineering viz. Computer Science and Engineering, Computer Science and Engineering (Artificial Intelligence and Machine Learning), Computer Science and Engineering (Data Science), Electronics and Communication Engineering, Information Technology, Computer Science and Engineering (Artificial Intelligence), Mechanical Engineering, BBA and BCA. IPEC also offers postgraduate program in M. Tech. (Computer Science & Engineering), MBA and MCA.

The purpose of the visit was promotion of IIM Membership and also for exploring the possibility of opening of IIM Student Chapter in IPEC. Beside Dr. Lawakush Mishra, the team also met Dean and Principal Consultant. Role of IIM in promotion of metallurgical activities in India and working of IIM and its Chapters were explained. Though IPEC do not have metallurgical engineering course, it was explained that metal industries have enormous application of computer science and related disciplines in their production facilities. Graduates of computer science, IT and related fields have good scope of employment in metallurgical industries.

Possibility of creation of IIM Student Chapter was explored. The guidelines about the opening of the IIM Student Chapter were explained. *{Subsequently the guidelines were mailed also to the College authorities}.*

The matter is being followed up by IIM Delhi Chapter.