

New steel-making technology can make India industrialise without the need to carbonise

Green Steel Wheels Rolling



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Last year, the European Commission announced it would apply a levy on imports from 2026 in five sectors — iron and steel, cement, fertilisers, aluminium and electricity generation — from non-EU countries considered having less strict climate rules. This development, among others, provides India an opportunity to take advantage of utilising disruptive climate technologies in its steel industry.

As with any industrialising economy, the steel sector is of vital importance to India's economy, contributing around 2% to the country's GDP and employing around 2.5 million people in the steel and related sectors. India is currently the world's second-largest steel producer with more than 100 million metric tonnes per annum (MMTPA) capacity, with ambitions to reach 300 MMTPA capacity by 2030. It is also the world's third-largest steel consumer.

The iron and steel sector is responsible for 7% of global energy-related emissions. India contributes almost 9% to global steel industry emissions. Its average emission intensity is 2.5 tonnes CO₂ per tonne of crude steel against a global average of 1.85 tonne.

However, India's steel consumption per capita is only 27% of the world average. It is obvious that Indian steel demand is going to radically increase in the coming decade. But if this demand is met by carbon-heavy steel, then the Indian steel industry runs

the risk of carbon taxes in the EU from 2026, effectively shutting down India's exports.

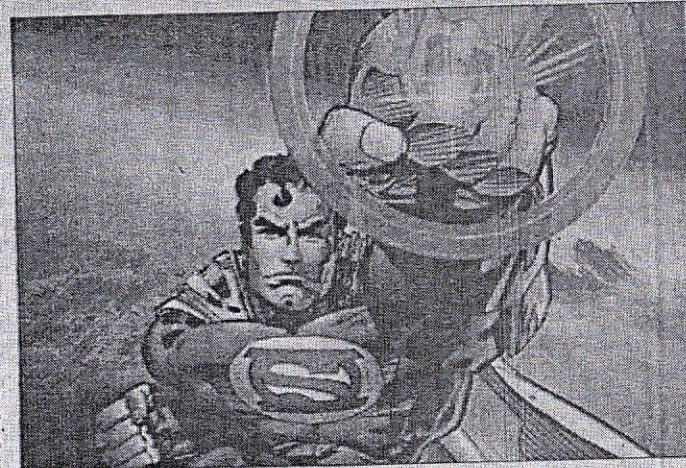
Without sustainable steel, there cannot be a sustainable India. A June 2022 NITI Aayog report, 'Harnessing Green Hydrogen: Opportunities for Deep Carbonisation in India' (bit.ly/3zmYEaA), envisages India creating the world's largest production capacity of green steel at 15-20 million tonnes by 2030, a pioneering effort to make green steel mainstream for the world.

In light-emitting diode (LED) lighting, India demonstrated that it can push a disruptive technology from the early adoption phase to ubiquitous deployment in record time. Similarly, India has the opportunity now to accelerate innovation and scale up deployment of green steel via green hydrogen production technology. This is critical as electricity accounts for less than a quarter of India's energy economy.

A Better Carbon Copy

There is an urgent need to prepare the rest of the energy economy fuelled by \$160 billion of imported hydrocarbons for deep decarbonisation. These are the hard-to-abate sectors like refineries, fertiliser, steel, cement and long-distance transportation. There is a pioneering role being played to bring together 23 credible industrial players, including IBERDROLA, Volvo and AP Møller-Mærsk, to commit to buy 100% net-zero steel by 2050 along with ambitious 2030 commitments. This will be an encouraging market signal for value-chain steel manufacturers to go green.

When it comes to net-zero, green steel — in addition to modifications required in the production technology — stakeholders fully understand that procurement of green steel requires a green premium to be paid by the consumer. This is what happened



Up, up and decarbon away

in the solar sector where prices radically fell from ₹22/kWh to less than ₹2/kWh. Technology innovation and scale were responsible for prices falling sharply.

Industry in India is highly dynamic and has immense capability to innovate. One can be optimistic that Indian companies will adopt green steel in a phased manner and ensure they are an integral part of global supply chains.

The main production routes for steel in India are coal-based blast furnace (45%), electric arc furnace (26%) and induction furnace (29%). On the other hand, natural gas-based steel is affected by the limited availability of domestic gas supplies and the high cost of imported gas. This necessitates alternate solutions. The steel industry is at an inflection point to reduce emissions.

Decarbonisation of steel to reach net-zero requires the following three critical steps:

- ▶ Improving efficiency across operations.
- ▶ Use of renewable electricity wherever feasible.
- ▶ Use of zero-carbon-reducing agents such as green hydrogen.

Globally, green hydrogen is considered as a technically viable option to achieve zero-carbon emission in the

iron ore-reduction process, which is highly carbon-intensive. Groups such as H2 Green Steel (H2GS) in Sweden and GravitHy, a consortium that involves Britain's Primetals Technologies, US' Plug Power and France's Engie, are pioneering hydrogen-based direct reduction of iron (H-DRI) technology that uses pure green hydrogen. This makes the iron ore-reduction process to steel emissions-free.

No More Carbon Dating

Based on estimations, the delivered costs of hydrogen would need to be \$2.50-3.50 per kg to be competitive with coal-based steel. This is a highly viable proposition. With proactive collaboration among innovators, entrepreneurs and government, green hydrogen has the potential to drastically reduce CO₂ emissions in steel manufacturing, fight climate change and put India on a path towards net-zero energy imports.

It will also help India export high-value green steel products, making it one of the first major economies to industrialise without the need to carbonise. It also has the potential to make India the champion of green steel manufacturing.

The writer is India's G20 sherpa

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