Greening Indian Steel through Trade: Insights from TULIP's India trip

10 June 2025

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Context

India is currently the world's second-largest steel producer after China. Unlike China, whose steel production is projected to contract and ultimately decline as domestic demand plateaus, Indian steel production is projected to double by 2030 (compared to a 2019 baseline) and quadruple by 2050. This reflects an increase in domestic demand mainly from the construction, infrastructure, and automobile sectors. While critical for India's economic growth and security, the projected increase in steel production also raises serious environmental concerns.

The Indian steel sector consumes 25% more energy per ton produced than the global average and ranks highest in greenhouse gas (GHG) emissions, approximately 30% above the global average. This reflects, inter alia, high levels of coal use, both in energy generation and steel production, old furnaces, and limited availability of scrap steel.

Given the importance of greening India's steel industry for a sustainable future, and to meet the country's climate objectives, TULIP Consulting has been commissioned to produce a study on how trade and international cooperation can be leveraged to promote environmental sustainability in the Indian steel sector. To better understand the steel decarbonisation ecosystem and landscape, TULIP's Founding Director Colette van der Ven, and Sustainable Trade Policy Lead Sanvid Tuljapurkar, started the work by visiting Delhi and Kolkata during the last two weeks of May 2025.

Stakeholder engagement in India

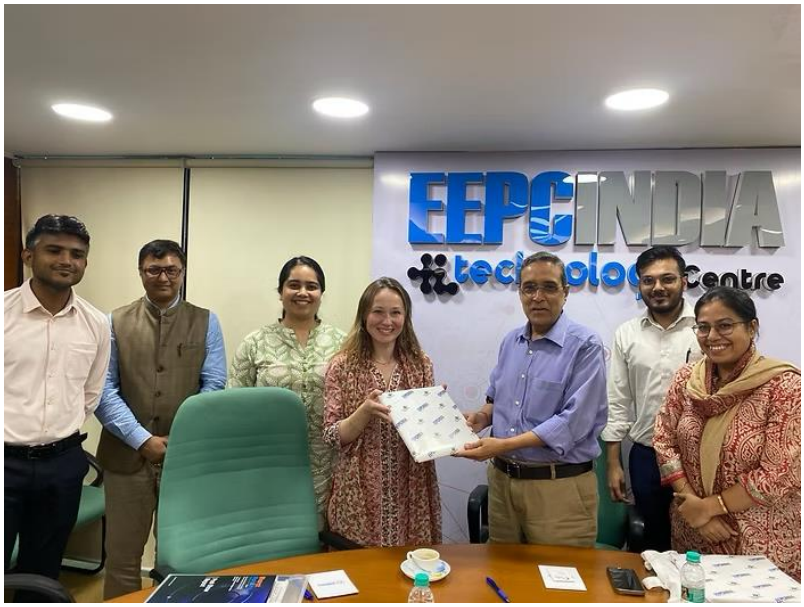
TULIP's team met with various joint and additional secretaries from the Ministry of Commerce and Industry, the Ministry of Steel, the Ministry of New and Renewable Energy, and the Bureau of Energy Efficiency to gain a deeper understanding of the numerous initiatives the government is rolling out related to greening India's steel industry. The government's commitment to greening the steel sector is reflected in the Green Steel Roadmap and Action Plan, published by the Ministry of Steel, which outlines a pathway to decarbonise steel production in line with India's net-zero commitments by 2070. The Ministry of Steel has also unveiled India's Green Steel Taxonomy, which defines green steel as steel with less than 2.2 tonnes of CO_2 per tonne of finished steel, and includes a star-rating system. A Green Steel Public Procurement Policy is also being developed. Another crucial government initiative for steel decarbonisation is India's National Green Hydrogen Mission, which aims to develop green hydrogen production capacity of at least 5 MMT per annum along with a renewable energy capacity addition of around 125 GW. This could result in abatement of nearly 50 MMT of annual greenhouse gas emissions by 2030. Additionally, the Bureau of Energy Efficiency is developing a Carbon Credit Trading Scheme, which will include both mandatory and voluntary commitments, including for the steel sector.

The private sector, especially the dominant players such as Tata Steel, Jindal Steel and Power, the JSW Group, and ArcelorMittal, are also undertaking numerous initiatives related to greening steel - including adopting more ambitious net-zero targets, creating pilot projects on green hydrogen, using artificial intelligence to enhance energy efficiency, and developing formal scrap recycling facilities. In addition to interviewing the dominant steel producing companies, TULIP's team also met with small and medium enterprises (SMEs), and industry associations, including the

Indian Steel Association (ISA), Alloy Steel Producers Association (ASPA), Confederation of Indian Industry (CII), Federation of Indian Chambers of Commerce and Industry (FICCI), and Engineering Exports Promotion Council (EEPC), to map green steel initiatives and challenges, and to enhance our understanding of the implications of trade measures such as the EU Carbon Border Adjustment Mechanism, trade defense instruments, the Trump administration's tariffs on steel and aluminium, and partnership instruments including the EU-India Trade and Technology Council, and the upcoming Clean Trade and Investment Partnerships (CTIPs).

Impact of CBAM

Most stakeholders agreed on the importance of decarbonizing the steel sector. For exporters to the EU, this was linked to remaining competitive under the Carbon Border Adjustment Mechanism (CBAM), which will require covered industries including steel to pay a tax on the carbon emitted during production. However, CBAM alone appears to be an insufficient lever to decarbonise Indian steel, with approximately 90% of Indian steel being produced for the domestic market, and only 3-5% destined to the EU. Moreover, dominant Indian steel producers are already producing greener steel, and are planning to ship the green steel to the EU (although future EU regulation will likely address such practices).



Certain stakeholders, especially small and medium-sized enterprise (SME) exporters, highlighted that CBAM and other trade-related climate regulations adopted by India's trading partners continue to pose challenges, given the obstacles to greening the steel industry. This includes limited availability and access to cost-efficient, commercially viable technologies for green steel production. While a range of promising solutions are being developed, including the integration of green hydrogen in steelmaking and the use of biochar as a reductant, these technologies remain at early stages of commercialisation and are often prohibitively expensive.

In the Indian context, another key challenge is the dominance of the Blast Furnace-Basic Oxygen Furnace (BF-BOF) steelmaking route, which is harder to decarbonize than the Direct Reduced

Iron-Electric Arc Furnace (DRI-EAF)/ Direct Reduced Iron-Induction Furnace (DRI-IF) route. The BF-BOF is likely to remain the primary production route in the near term, as breakthrough technologies to decarbonise this steel-making route, including Carbon Capture Use and Storage (CCUS) technologies, are not yet commercially viable. As such, short-term decarbonisation efforts centre on more accessible and incremental approaches, including the adoption of energy efficiency measures within existing production processes and the increased use of higher-quality raw materials to reduce emissions intensity.

Expanding the DRI-EAF steelmaking route in India, which is less carbon-intensive than the BF-BOF route, is limited due to the scarcity of available scrap. Domestic scrap supply is insufficient, reflecting low levels of per capita steel consumption in India, especially before the 1990 market liberalisation initiatives, and trade restrictions from key scrap-producing jurisdictions such as the EU, under the EU New Regulation on Waste Shipments, and with possible additional restrictions as noted in the European Steel and Metals Action Plan.

Other CBAM-related issues that were raised included difficulties in measuring direct emissions and the need to resort to punitive default values. For the DRI process, default values have been estimated to be almost double the actual CO2 emissions. SMEs also pointed to difficulties in developing a CBAM-compliant Monitoring Reporting and Verification (MRV) infrastructure, and costs associated with auditing.

Trade beyond CBAM

Beyond CBAM, other trade measures including the EU's Ecodesign for Sustainable Products Regulation (ESPR) will also have trade implications for Indian steel exporters, as the 2025-2030 Working Plan identifies steel as a priority sector for circular design standards. Awareness about the implications of the ESPR for the Indian steel industry is, however, limited.

While trade measures can act as non-tariff barriers to India's exports, it can also play a key role in accelerating the decarbonisation of the steel sector - including through technology transfer, co-development of low-carbon solutions, harmonising standards and definitions, enhancing

access to scrap metal, targeted capacity building, attracting investment in green infrastructure, and enhanced financing mechanisms. Moreover, the global push towards greening steel presents possible export opportunities for India, especially in the renewable energy sector.

Various existing platforms already seek to address some of these issues, including the India-Sweden Leadership Group for Industry Transition (LeadIT) and the EU-India Trade and Technology Council (TTC); however, efforts must extend beyond these initiatives.

TULIP will continue to explore these and other ideas in the upcoming months as it develops a technical study focused on trade and the challenge of greening India's steel industry.