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What does the Carbon Credit Trading Scheme mean for the Indian steel sector?

Policy brief

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

Summary

- India's Carbon Credit Trading Scheme (CCTS) sets mandatory emissions intensity targets for 253 steel units, covering most steel production in the country.
- Its introduction marks a shift from an efficiency-based to an emissions-intensity-based metric.
- While a good first step, the reduction targets by and large remain unambitious.
- Large steel producers need make only 2% annual emissions reductions, which is insufficient to drive the technological transformation required for deep decarbonisation.
- The CCTS will nonetheless likely drive efficiency improvements in existing high-emitting steel units. However, the targets are not yet ambitious enough for the high-emitting units to incorporate best available conventional steel-making technologies.
- The next cycle of targets could aim to nudge firms towards adopting the best available or most efficient conventional steel-making technologies.
- Despite its limited ambition, the CCTS is a key part of the overall policy package to decarbonise the iron and steel sector in India, in combination with the green steel taxonomy and the Ministry of Steel's low-carbon steel subsidy programme.
- It will be vital to coordinate between the different policy levers to target interventions that require varying degrees of financial support in order for truly low-carbon steel projects to become commercial.

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This policy brief analyses draft emissions intensity targets for the iron and steel sector in India, as set out in the recently introduced Carbon Credit Trading Scheme (CCTS), and discusses the implications for the broader trajectory of low-carbon steel policy. The carbon market is one key part of the policy package for low-carbon steel.

From energy efficiency to emissions intensity targets

The Indian Carbon Credit Trading Scheme was launched in 2023 by an amendment to the Energy Conservation Act of 2001.[1] It aims to support the country's climate commitments with a particular focus on decarbonising the hard-to-abate sectors. It is planned that the CCTS will replace the existing Perform, Achieve and Trade (PAT) scheme through a gradual transition from the PAT to CCTS.

The CCTS brings important changes. The PAT sets energy efficiency goals, measured in tonnes of oil equivalent. In its first cycle (2012–2015), the PAT was applied to eight sectors. Over time its coverage was expanded to 13 energy-intensive sectors. The CCTS will cover nine industrial sectors that were previously in the PAT scheme: aluminium, chlor-alkali process, cement, fertiliser, iron and steel, pulp and paper, petrochemicals, petroleum refining, and textiles. Instead of an energy efficiency measurement, the CCTS sets a greenhouse gas emissions intensity goal per unit of production.

Compliance with the CCTS will be mandatory for iron and steel

The emissions intensity targets will be set by the Indian government, via the Bureau of Energy Efficiency (BEE) at the Ministry of Power.[2] Intensity targets will be set for a period of three years, and it is expected that they will be revised in a more stringent direction at each review. The targets themselves were produced by the Ministry of Environment, Forest and Climate Change (MoEFCC).

If an iron and steel (or other) unit already meets its mandated target, then it does not need to take further action with regard to the CCTS scheme. If the unit demonstrates greater ambition and can reduce its emission intensity below the mandated threshold, it can generate a carbon credit certificate (CCC) and trade this certificate with units that are unable to meet their mandated threshold. In short, the CCTS includes a certificates market similar to many other emissions trading schemes. If a unit is unable to meet the threshold and cannot secure a certificate for the requisite volume of emissions, it pays a penalty.

The institutional framework overseeing the carbon market includes the National Steering Committee for the Indian Carbon Market (NSCICM), which is co-chaired by the Secretary of the Ministry of Power and the Secretary of the MoEFCC. The BEE will act as the administrator and set targets and trajectories, as it does for the PAT scheme. The Ministry of Power will consider BEE and the steering committee's recommendations and the MoEFCC will provide the targets. The Central Electricity Regulatory Commission (CERC) will oversee the trading of certificates.

For the iron and steel sector, draft emissions intensity targets were released in June 2025 for 253 units. These targets will come into force in the 2026 financial year.

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1. See https://icapcarbonaction.com/system/files/ets_pdfs/icap-etsmap-factsheet-125.pdf
2. See https://beeindia.gov.in//programmes/carbon-market

Plotting the CCTS emissions intensity targets for iron and steel

The CCTS thresholds set by the government and BEE are central to assessing whether progress is being made on decarbonisation in the iron and steel sector across India.

The charts below show the distinctive emissions profile of Indian steel plants today. We can categorise steel plants into three groups based on their output size in 2024: small, medium and large (see also Table 1, p7).

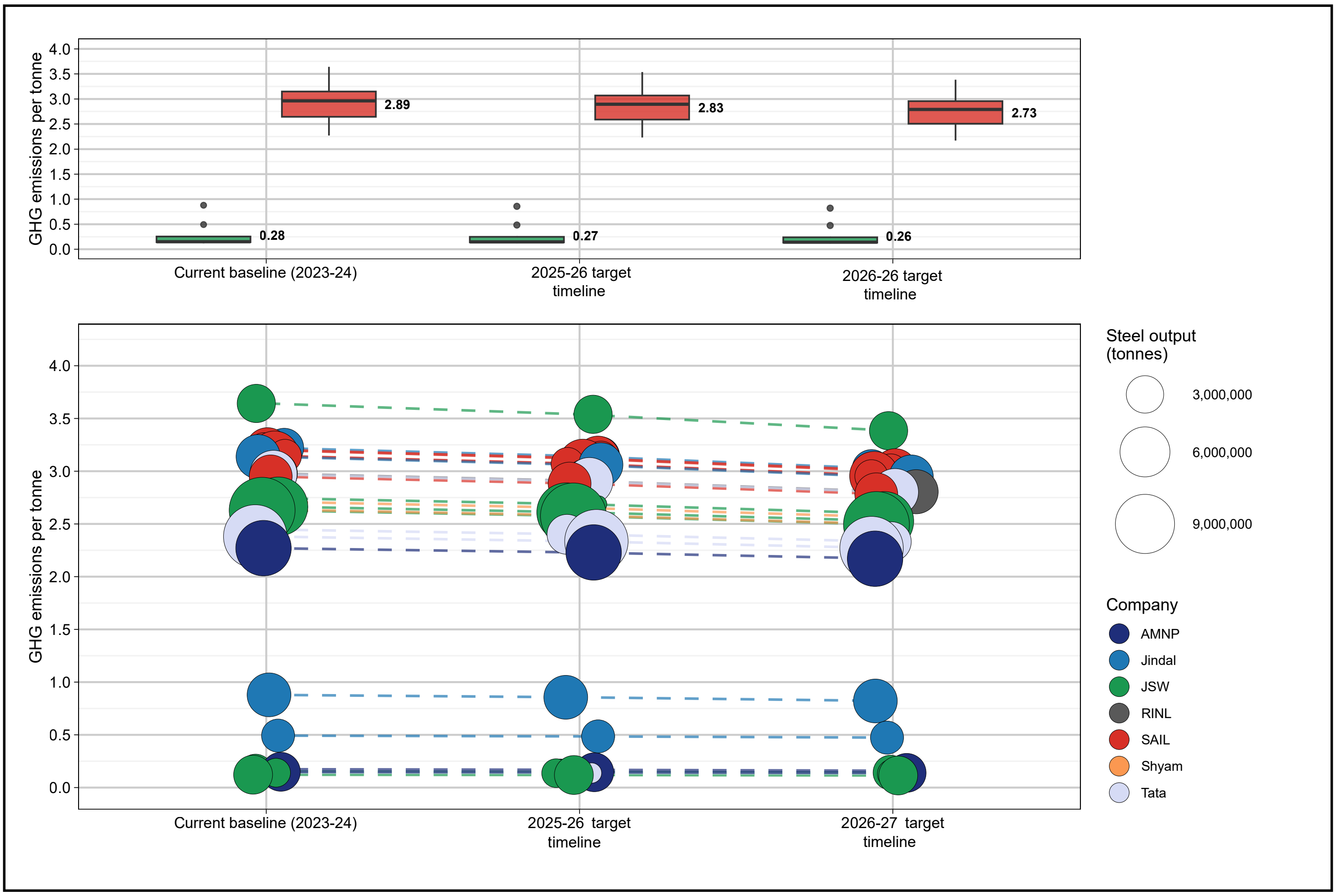
Figure 1, for large plants, shows a cluster of high emissions intensity, likely due to blast furnaces-basic oxygen furnaces (BF-BOFs), and a smaller number of lower-emissions plants. These include one scrap-based electric arc furnace (EAF), stainless steel and coated steel plants. The two plants owned by Jindal Steel in the lower-emissions cluster are both stainless steel plants. Among the remaining six plants in the lower-emissions cluster, the EAF was formerly owned by Bhushan Steel and is now owned by Tata Steel BSL Limited. The remaining five plants produce coated steel or some other form of processed steel.

From an emissions perspective, the lower-emissions cluster is not particularly significant to decarbonising the Indian steel sector, as finished-steel processing inherently has lower emissions. For the high-emissions

Notes: The numbers next to the boxplots in the top figure are the mean. The medians of the lower-emitting cluster (likely EAFs) are: 0.15, 0.15, 0.14. (See further Box 1.) AMNP is Arcelor Mittal Nippon Steel. RINL is Rashtriya Ispat Nigam Limited. SAIL is Steel Authority of India Limited. JSW is Jindal Southwest. Jindal is also known as JSPL.

Source: Author, created from data from MOEFCC (2025)

Figure 1. Emissions performance and emissions intensity targets for large steel plants in India (greenhouse gas emissions/tonne of steel)



plants, the CCTS will require an average annual emissions reduction of 0.06 tonnes of carbon dioxide equivalent per tonne of equivalent product (tCO_2/ts),[3] approximately a 2% reduction in emissions. This initial target is not very ambitious. The boxplot in Figure 1 shows the median and the text next to the boxplot is the mean, which are close to each other, indicating a symmetrical distribution. These values can be interpreted as representing the overall change in this segment of the steel sector.

The highest-emitting plant shown in the top cluster is a former Bhushan Steel plant, now owned by JSW Steel, with a baseline emissions intensity of 3.64 tCO_2/ts. The lowest-emitting large units in the same cluster are the Arcelor Mittal Nippon Steel (AMNP) plant in Hazira, which features a combination of blast furnaces, direct reduction of iron (DRI), EAF, and conarc furnaces; and the Tata Steel plant at Jamshedpur. The AMNP plant emits 2.27 tCO_2/ts in the baseline year, with a target of 2.17 tCO_2/ts in the final year. The Tata Steel plant emits 2.38 tCO2/ts in the baseline year, with a target of 2.27 tCO_2/ts.

Turning to Figures 2 and 3 (for medium-sized and small plants), the data are more challenging to break down by technology, as each site likely employs a mix of production processes.

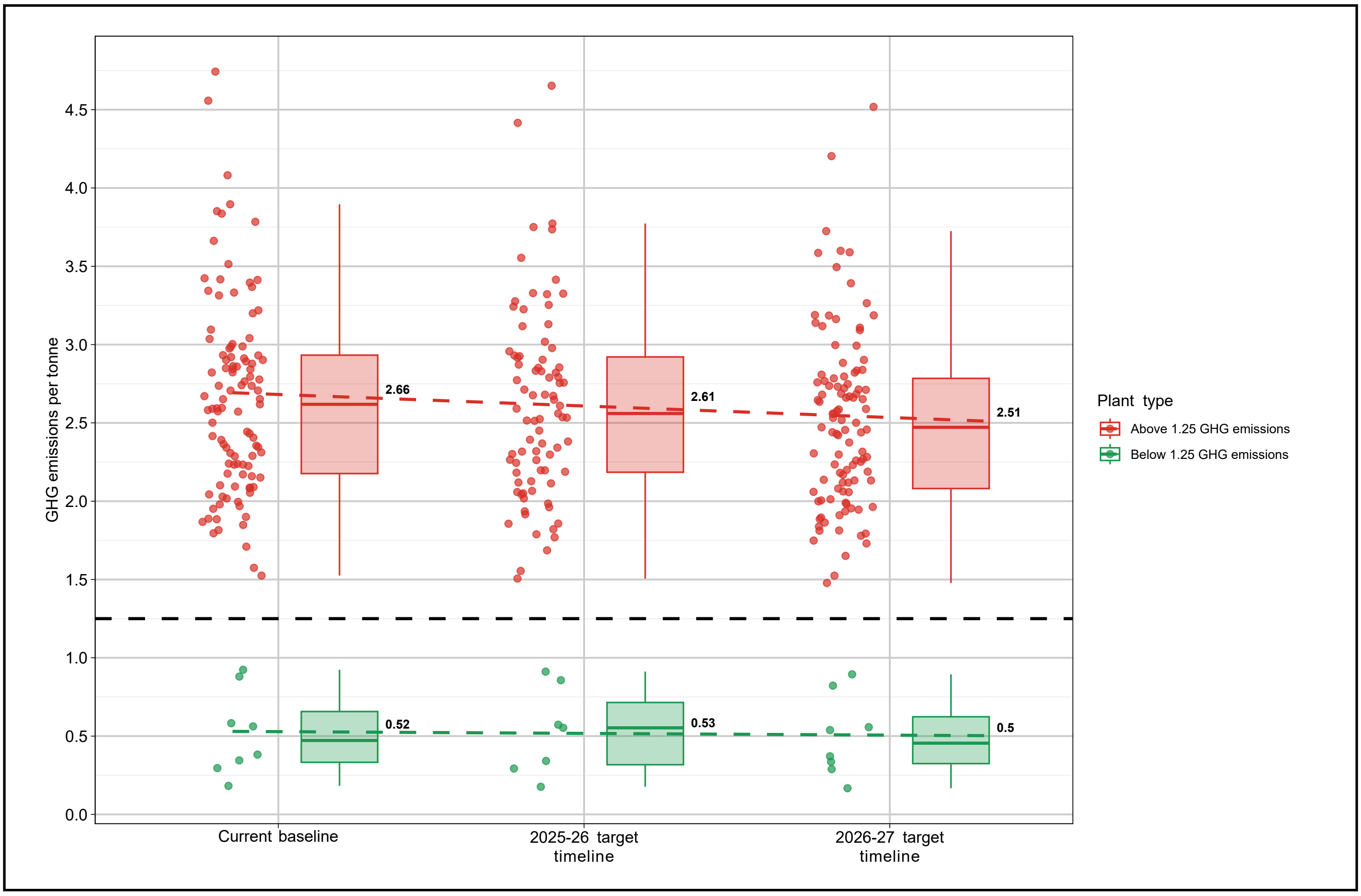
Figure 2 shows medium-sized plants. Here we have assumed 1.25 tCO_2/ts to be the emissions intensity threshold. We have used this threshold as

3. The CCTS iron and steel emissions include Scopes 1 and 2 and some of Scope 3 emissions. The emissions included are gate-to-gate emissions.

Notes: The numbers next to the boxplot are the mean; the middle line of the boxplot is the median. The lower cluster in green (the below 1.25 tCO2/ts emissions cluster) has missing data for the 2025–26 target, as many units have not been given an intermediate target. Thus, they have a higher mean and median. (See further Box 1.)

Source: Author, created from data from MoEFCC (2025)

Figure 2. Emissions performance and emissions intensity targets for medium-sized steel units in India (greenhouse gas emissions/tonne of steel)



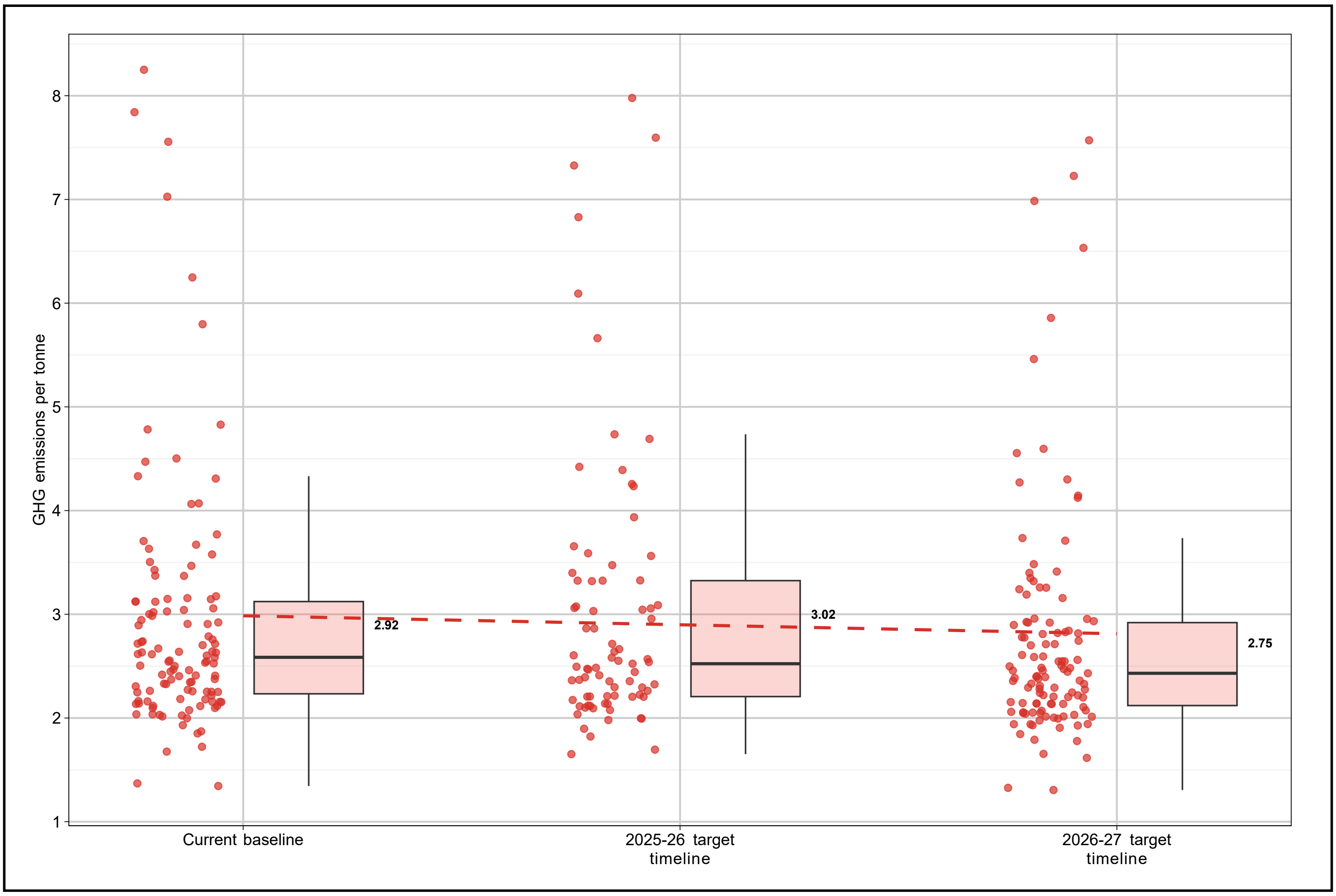
we are certain that all blast furnace-based steel-making and almost all natural gas-based DRI will also be above this threshold. This distinguishes the higher emitting steel units from other lower-emitting units. For medium-sized plants with an emissions intensity above 1.25 tCO_2/ts, there is likely a mix of DRI-based induction furnaces (IFs) or EAF, BF-BOF, or a mix of other production processes. Each of these units could have multiple production technologies for iron- and steel-making. Thus, drawing any conclusions or implications from the units on decarbonisation pathways is challenging. Under the CCTS, the average emissions reduction targets for this category of large steel producers are a 2% reduction in 2026 and a 4% reduction from 2026–2027. Medium-sized plants with emissions below 1.25 tCO_2/ts are likely to be a few scrap-based EAFs, speciality steel and finished steel processing plants; thus, again, their targets for emissions reduction are marginal.

Figure 3 displays the results for small steel units. In this figure, we make no distinction between lower-emission and higher-emission units, as we see a range rather than distinct clusters. The highest-emitting unit has an emissions intensity of 8.25 tCO_2/ts, and the lowest-emitting units are sponge iron plants, with emissions intensity of around 1.35 tCO_2/ts. Under the CCTS, the smaller units have an average target of around 6% emissions reduction through to the 2027 financial year. There are many

Note: The number next to the boxplot is the mean and the line cutting through the box is the median. The mean for the 2025–26 target is higher because many units have not been given an intermediate target; therefore, there is missing data. (See further Box 1.)

Source: Author, created from data from MoEFCC (2025)

Figure 3. Emissions performance and emissions intensity targets for small steel units in India (greenhouse gas emissions/tonne of steel)



missing data points for the intermediate years for the smaller units, which is likely intentional, to give these units additional time to meet their targets. Another possibility is that these missing data points are because these units already have PAT targets for that year and thus will transition to the CCTS in 2027.

Box 1. Method and data

The data used in this brief have been extracted from the draft note about CCTS target-setting published in June 2025 by the BEE and MoEFCC.

The note gives the following information for the iron and steel sector: unit name and address, production of the unit in the year 2023–24, baseline greenhouse gas emissions intensity for 2023–24 in tCO_2/ts, greenhouse gas emission intensity target for the compliance years 2025–26 and 2026–27. The data comprise 253 units of iron and steel plants, ranging from the smallest plant at around 90,000 tonnes of steel production, to the largest plant at around 12 million tonnes of steel production in 2023–24. The data for the year 2023–24 indicate total steel production of around 145 million tonnes. The World Steel Association's estimate is around 149 million tonnes (World Steel Association, 2025),[4] which indicates that the official data cover almost all India's steel production.

We classified the steel units into three groups by size, as follows:

- Small units: those producing under 100,000 tonnes of steel
- Medium-sized units: those producing between 100,000 and 1 million tonnes of steel
- Large units: those producing over 1 million tonnes of steel.

This results in 26 large steel units across seven firms, 113 medium-sized units, and 114 small units.

There are some limitations to this data, so we caution that this early analysis has had to make certain assumptions. As mentioned, for many small units the notification does not include an intermediate emissions intensity target for the years 2025–26, which is understandable given the challenges these units are likely to face (see TERI, 2023), or pre-existing PAT targets. Some medium-sized units also lack an intermediate target. Consequently, the charts may show slight distortions for the target year 2025–26, particularly for small and medium-sized units.

Importantly, the CCTS note does not disclose the technology that the 253 units are using for steel production. Given the vast heterogeneity of steel production in India (Mallett and Pal, 2022), this creates challenges in creating clusters based on dominant steel production technologies for analysis. As a reasonable proxy, we have assumed an emissions threshold of 1 tCO_2/ts for large units and 1.25 tCO_2/ts for medium-sized units. Our rationale is that units that fall below this emissions threshold are likely to be scrap-based EAFs or finished steel processing units, while units above the threshold are either BF-BOFs, coal-based DRI IF/EAFs or gas-based DRI EAFs. While we acknowledge the limitations of the clustering approach, we still find it helpful to compare the units based on their emissions profile.

Finally, it should be noted that in the large units chart (Figure 1), each bubble represents a single unit. Here, in the lower emissions cluster, there are six units in all three clusters. In the medium-sized units chart (Figure 2), the lower emissions cluster has eight units with one missing data point for the intermediate year. In the small units chart (Figure 3), there are 36 missing data points for the intermediate year.

4. While the two numbers are referring to two slightly different time periods, with the World Steel Association's being for the calendar year and the CCTS's for the fiscal year, the overall point holds as this covers more than 95% of steel production in India.

Table 1. Number of units included in the analysis for the three time periods

	Baseline year (2023–2024)	Target 2025–2026	Target 2026–2027
Large units	26	26	26
Medium-sized units	113	90	113
Small units	114	79	114
Total units	**253**	**195**	**253**

What the CCTS targets mean for India's iron and steel sector

The targets introduced by the new CCTS reveal key characteristics of the approach that the Indian government has chosen to take to decarbonise India's iron and steel sector.

- There are varying levels of ambition across different production technologies and plant sizes. The data show a clear distinction between lower-emitting units, with baseline emissions below 1 tCO_2/ts, and higher-emitting blast furnace operations typically above 2 tCO_2/ts.
- While the scheme sets reduction targets for all units, the primary focus appears to be on incremental efficiency improvements for BF-BOFs, coal DRI IE/EAFs and gas DRI EAF steelmaking, rather than driving fundamental technological shifts and transformational investments in breakthrough technologies.

This approach also raises important questions about alignment with India's green steel taxonomy. The taxonomy currently does not differentiate between technology options but instead establishes a range for green steel at between 1.6 tCO_2/ts and 2.2 tCO_2/ts, utilising a tiered star system with three levels. However, the CCTS data clearly show that lower emissions technology/product clusters already operate at significantly lower emission intensities, with some units achieving as low as 0.14–0.15 tCO_2/ts, while BF-BOF operations face the challenge of reducing emissions from baselines often exceeding 2.5 tCO_2/ts. This technological divide suggests that the taxonomy's one-size-fits-all approach may not adequately incentivise the transformational changes needed in the sector. In this regard, the CCTS marks a step forward to a more differentiated approach.

"The approach taken by the CCTS also raises important questions about alignment with India's green steel taxonomy."

The green steel taxonomy would be creating, de facto, a state-supported green premium that is likely to be paid out to encourage lower-carbon steel production if the government's public procurement of green steel pays a premium. This puts resource shuffling concerns front and centre, begging the question, will lower-emissions clusters benefit more than the higher-emitting blast furnaces that should be the main focus of mitigation efforts?

Critically, too, market mechanisms and green premiums must be considered. If financial incentives are introduced for lower-carbon steel, logically, to deliver the policy goals of emissions reduction and futureproofing the fast-growing Indian steel sector, the incentives should be strategically directed towards the producers that demonstrate the greatest ambition in adopting low-carbon technologies and processes. The emissions impact from rewarding new ambition is likely to be more significant than the potential impact from rewarding those that achieve targets solely through marginal efficiency improvements, or by incentivising producers that are already operating within green steel taxonomy thresholds.

In short, we need to ask whether the current target structure could create a scenario where incremental improvements in traditional technologies receive the same recognition as breakthrough innovations in green steel production. The efficiency targets over the next few iterations of the CCTS are likely only to be able to bring about an emissions reduction for high-emissions BF-BOFs that will mean their emissions intensity remains well above 1.7 tCO_2/ts, as the world's most efficient BF-BOFs can only manage an intensity of 1.6 tCO_2/ts. Given the poor quality of raw materials and inputs in India, even the most efficient BF-BOFs are likely to manage an emissions intensity that remains over 1.7 tCO_2/ts. Even a 2% or 6% year-on-year reduction in emissions would only bring the emissions intensity to an eventual plateau, thus making it an incremental improvement, not a breakthrough one.

India now stands at a pivotal moment. The country can define a comprehensive transition pathway for its iron and steel sector before sectoral growth locks-in technology choices, emissions and business models. With domestic steel demand projected to grow significantly in the coming years, potentially doubling by 2030, and amidst global concerns about steel overcapacity, India has a unique opportunity to demonstrate climate leadership designed on its own terms.

Our analysis suggests that the country can capitalise on its growing market to drive innovation while maintaining industrial competitiveness. However, this leadership must strike a balance between pragmatism and ambition. While the CCTS represents a positive step forward from the energy efficiency-focused PAT scheme, achieving India's climate commitments will require more than emission intensity targets. The country's potential for achieving a successful global green steel transition requires a strategic mix of policy instruments that encourage breakthrough technological investments, support emerging green steel technologies, and clearly differentiate between transitional improvements and transformational change.

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