Grantham Research Institute on Climate Change and the Environment

LSE Global School of Sustainability

August 2026

Policy brief

Decarbonising the aluminium sector in India: implications of the Carbon Credit Trading Scheme

Summary

- Few industrial materials are as crucial to the low-carbon transition in India as aluminium, which is essential in the manufacture of solar panels, and electric vehicle (EV) battery housings and transmission cables. But producing primary aluminium creates emissions of around 18–24 tonnes of carbon-dioxide-equivalent (tCO_2e) in India, making it one of the most emission-intensive industrial processes in the world.
- The Indian Carbon Credit Trading Scheme (CCTS) is a welcome first step towards decarbonising India's aluminium sector, but it currently functions more as a baseline-setting exercise than a transformative decarbonisation instrument.
- Delays in notifying aluminium smelters with their targets and subsequent pro-rata reductions have led to missed opportunities to cut emissions. In the first four sectors notified of their targets under the CCTS, which include primary aluminium, the delays resulted in a lost opportunity.
- The CCTS must address two distinct decarbonisation challenges in the aluminium sector within a single framework. Smelting emissions are structurally tied to power supply, while emissions from alumina refineries and secondary/downstream producers are largely thermal-based and could be reduced by adopting established technologies.
- Meaningful decarbonisation requires future CCTS targets, which are set to be more ambitious. Future targets need to signal structural transformation that moves beyond incremental efficiency towards deeper decarbonisation, especially of the power supply for smelters and the adoption of other key technologies.
- India must implement complementary policies which facilitate increased access to renewable energy and support breakthrough technologies. Critical needs include reforms to improve access to reliable and cost-competitive renewable power, incentives for fuel switching in refineries and support for adopting inert anodes.
- Strengthening the domestic scrap ecosystem is vital. Recycled aluminium requires ~95% less energy than primary aluminium production. India needs stronger domestic scrap collection, segregation and quality standards to reduce its reliance on imported scrap, increase recycled aluminium production and lower sectoral emissions.

Policy briefs provide analysis on topical issues, presenting specific recommendations to inform ongoing policy debates. Drawing on the Grantham Research Institute's expertise, they summarise either our research findings or the state of knowledge about a particular issue.

This policy brief has been written by **Sangeeth Selvaraju** and **Parth Kumar**.

Introduction

Few industrial materials are as crucial to the low-carbon transition in India as aluminium. Aluminium is indispensable in the manufacture of solar panels, and electric vehicle (EV) battery housings and transmission cables. But producing primary aluminium creates emissions of around 18–24 tonnes of carbon dioxide-equivalent (tCO_2e)[1] (NITI Aayog, 2026) in India, making it one of the most emission-intensive industrial processes in the world. In this brief, we explore the reasons for the high emissions intensity of Indian aluminium, and the role of the Carbon Credit Trading Scheme in decarbonising India's aluminium sector.

India is a global leader in aluminium production

India is the second-largest primary aluminium producer in the world with capacity and production of approximately 4 million tonnes per annum as of 2024–25 (Ministry of Mines, 2025; Press Information Bureau, 2025), equivalent to around 6% of global output (International Aluminium Institute, 2024). In addition to this primary production, it is estimated that India has 2–2.2 million tonnes per annum capacity to produce secondary or recycled aluminium in the future (JMK Research, 2025). The sector contributes about 2% of manufacturing gross domestic product (GDP) and employs more than 1 million people across the value chain (Saraswat and Ghosh, 2018; Vedanta Aluminium, 2022). In 2023, the sector contributed 2.8% of India's greenhouse gas emissions or 83 million tonnes of CO_2e (NITI Aayog, 2026). Demand for aluminium in India is projected to grow from 4 million tonnes today to over 37 million tonnes by 2070 driven by urbanisation, clean energy development and a rapidly expanding electric vehicle fleet. This is nearly three times the expected global growth rate for aluminium production (NITI Aayog, 2026).

Currently, around 57% of the world's primary aluminium is made in China. Therefore, the emissions intensity of Chinese aluminium smelting is central to whether the global sector can achieve net zero. India is the second largest producer at 6%, with Russia, the UAE and Canada collectively accounting for another 12%. Although the remaining producers, including Norway and Iceland, are comparatively small, their use of hydropower-based smelting means they are important benchmarks for the form that low-carbon aluminium production can take.

In India, electrical infrastructure and transport together consume over 60% of aluminium by end use. Both sectors are set to grow quickly given the energy transition build-out and targets for vehicle electrification. This demand-side growth is welcome, but it also raises the stakes on the supply side: aluminium production powered by high-carbon assets will lock-in further high-carbon emissions.

The high emissions intensity of Indian aluminium

The gap in emissions intensity between India and comparable aluminium producing countries is stark. With an intensity of around 19.6 tCO_2e per tonne of output (tCO_2e/t), Indian producers are about 40% above the global primary average of 14.8 tCO_2e/t and 30 to 40 times more carbon-intensive per tonne than smelters in Norway and Iceland.[2] The reason is simple: approximately 96% of the energy going into Indian aluminium production comes from thermal captive power plants (CPPs): these are

"Producing primary aluminium creates emissions of around 18–24 tonnes of carbon dioxide-equivalent in India, making it one of the most emission-intensive industrial processes in the world."

1. Niti Ayog's 2026 *Roadmap for Aluminium Sector Decarbonisation* describes the emissions intensity of Indian primary aluminium production as around 20-21 tCO_2e, compared with a global average of 15 tCO_2e.

2. The majority of the emissions linked to aluminium production come from smelting, which requires significant quantities of electricity, and a much smaller share from refining. The 30–40 times figure is therefore a smelting-only comparison driven by captive-power electricity; the Bayer refining stage, which contributes roughly 10% of total primary-aluminium emissions, is not reflected in that ratio (Global Efficiency Intelligence, 2022; International Aluminium Institute, 2024).

facilities that generate electricity for their own industrial use, which were built by aluminium smelters to guarantee uninterrupted power supply (Global Efficiency Intelligence, 2022; International Aluminium Institute [IAI], 2024).

Table 1. Key aluminium benchmarks for India, China, the EU, Canada and UAE

Indicator	India	China	EU	Canada	UAE
GHG intensity (tCO_2e/t aluminium [Al])	~19.6	~11.5	~6.0	~2.5	~7.6
Primary production (Mt, 2023)	~4.0	~42.0	~3.5	~2.9	~2.7
Secondary (recycled) share of total aluminium output[3] (%)	~27%	~20%	~54%	~40%	~15%
Share of captive thermal power	~96%	~60%	<5%	~2%	~0%

Note: Greenhouse gas (GHG) intensity = alumina refining + smelting (electrolysis), including anode and perfluorocarbons (PFC) process emissions; Scope 1 and 2 emissions. It excludes bauxite mining and downstream casting. Country values from Global Efficiency Intelligence (2022); India's come from Sharma et al. (2025) on the same boundary.

IAI's 14.8 tCO_2e/t global average is a 'cradle-to-gate' lifecycle assessment and is therefore a marginally broader boundary.

Sources: Sharma et al. (2025); International Aluminium Institute (2024); Global Efficiency Intelligence (2022); Council on Energy, Environment and Water [CEEW] (2024).

"The contrast with Canada and the EU is striking: both have similar or larger installed capacity to India, but emissions intensities which are far lower."

The contrast with Canada and the EU is also striking: both have similar or larger installed capacity to India, but emissions intensities which are far lower: 2.5 tCO_2e/t and 6.0 tCO_2e/t respectively, compared with India's 19.6 tCO_2e/t. Canada's aluminium smelting is driven by hydroelectric power and the EU's by a largely fossil-fuel-free grid. The UAE, with emissions of around 7.6 tCO_2e/t (Emirates Global Aluminium [EGA], 2025), has recently invested in gas-powered smelting, which is less emissions-intensive than India's reliance on CPPs.

Photo: Zoshua Colah/Unsplash

3. Secondary share = secondary production ÷ total aluminium production (primary + secondary). India's figure (CEEW, 2024) is production-basis; the Material Recycling Association of India (MRAI, 2025) reports around 40% on a supply basis, including imported scrap. A large share of Indian 'secondary' output is downstream remelting of purchased primary ingots, rather than end-of-life scrap recycling, so it overstates genuine recycled content; true old-scrap recycling is lower and import-dependent.

Understanding the source of emissions to inform policy

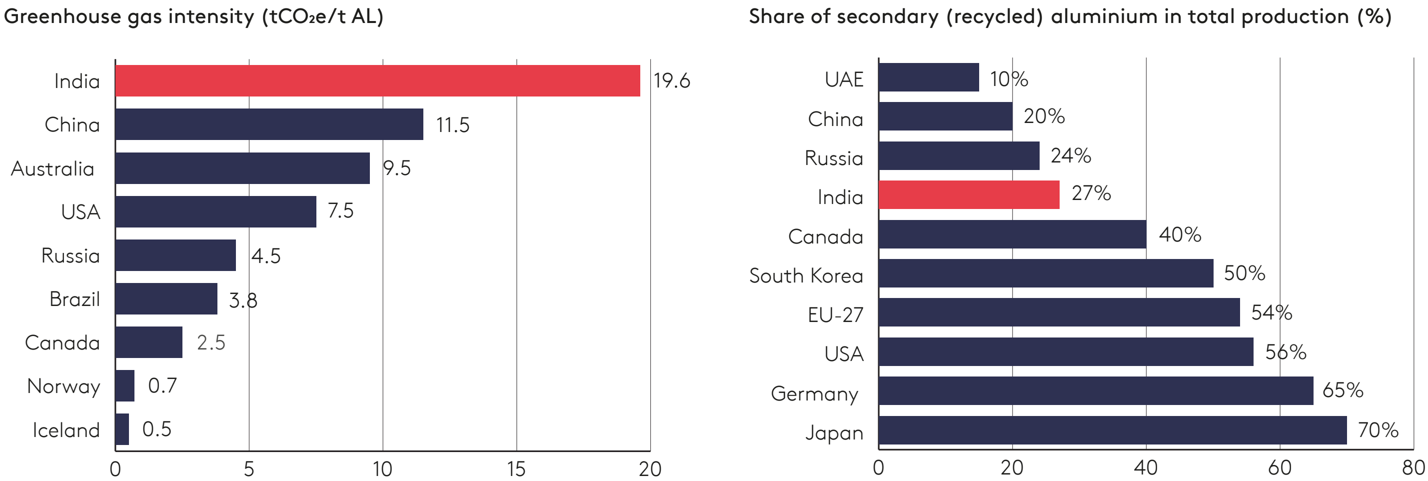
It is important to break down the emissions within the Indian aluminium production process to understand where policy can make a difference. In Indian aluminium production, electricity use in the electrolysis stage alone accounts for roughly 80% of total emissions, at around 15.66 tCO_2e/t Al (Sharma et al., 2025). The Bayer refining stage, which converts bauxite to alumina before smelting, adds another ~2.0 tCO_2e/t Al, mostly from heat-related fuel combustion. Direct process emissions from anode consumption (~1.53 tCO_2/t Al) and perfluorocarbons (~0.27 tCO_2e/t Al) are relatively small, but not trivial. The implication is clear: any serious effort to decarbonise Indian aluminium must start with the power supply to the smelter.

Figure 1 highlights a different aspect of aluminium emissions intensity: recycled or 'secondary' aluminium requires around 95% less energy per tonne than primary smelting. The share of recycled metal in total production is therefore one of the most important structural variables for sectoral emissions. In Japan, Germany and the US, more than 50% of aluminium in production is secondary. India sits at around 27%, with production dominated by a fragmented sub-sector of small and medium-sized firms that rely on imported scrap.

Currently, around 80% to 85% of aluminium scrap consumed by the secondary sector in India is imported. This is because India has limited availability of scrap compared with developed economies, a weak and informal domestic collection infrastructure, and related poor scrap quality. With sustained policy attention, enabling infrastructure and focussed incentives and targets, the domestic generation of high-quality aluminium scrap can be accelerated, reducing India's dependence on imports. With emerging policies such as the EU's New Waste Shipment Rules, which will restrict exports of non-hazardous materials such as aluminium scrap, and rising export tariffs on aluminium around the world, a domestic ecosystem for generating aluminium scrap is clearly needed.

> "In Japan, Germany and the US, more than 50% of aluminium in production is secondary. India sits at around 27%, with production dominated by a fragmented sub-sector of small- and medium-sized firms that rely on imported scrap."

Figure 1. Average greenhouse gas emissions intensity of aluminium and share of scrap for major producers, by major producing country (2022–23)



Note: India figure includes scope 1 and 2 emissions from captive power.
Sources: Global Efficiency Intelligence (2022); CEEW (2024); International Aluminium Institute (2024); Sharma et al. (2025); NITI Aayog (2026)

Indian Carbon Credit Trading Scheme (CCTS) and the aluminium sector

The Indian Carbon Credit Trading Scheme (CCTS) aims to support the country's climate commitments with a focus on decarbonising hard-to-abate sectors. Launched in 2023 by an amendment to the Energy Conservation Act 2001, the CCTS is intended to gradually replace the existing Perform, Achieve and Trade (PAT) scheme.

The CCTS introduces important changes to the current scheme. The PAT scheme sets energy efficiency goals, measured in tonnes of oil equivalent. In its first cycle (2012–15), PAT started with eight energy-intensive sectors. Over time, it expanded to cover 13 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.

For the aluminium sector, compliance with the CCTS will be mandatory. The sector has already been notified of the emissions intensity targets for the next two years by the Ministry of Environment, Forest and Climate Change, on the recommendations of the Bureau of Energy Efficiency at the Ministry of Power. Intensity targets will be set on an annual basis, and are expected to be made more stringent at each annual review.

If an aluminium producer already meets its mandated CCTS target, then it does not need to take further action. If the producer is more ambitious and can reduce its emission intensity below the mandated threshold, it can generate a carbon credit certificate (CCC). It can then trade this certificate with producers that are unable to meet their mandated threshold. In short, the CCTS includes a certificates market similar to other emissions trading schemes. If a producer is unable to meet the threshold and cannot secure a certificate for the volume of its emissions, it may have to pay a penalty.

The institutional framework overseeing the carbon market includes the National Steering Committee for the Indian Carbon Market, co-chaired by the Secretary of the Ministry of Power and the Secretary of the Ministry of Environment, Forests and Climate Change. The Bureau of Energy Efficiency administers the scheme, and is responsible for developing methodologies, setting sectoral targets and trajectories, and managing implementation, similar to its role under the PAT scheme. Based on these recommendations, the Ministry of Power notifies the operational framework and rules for the scheme, while the Ministry of Environment, Forest and Climate Change is responsible for issuing carbon credit certificates. The Central Electricity Regulatory Commission regulates the trading of carbon credit certificates, including oversight of power exchanges where trading takes place.

Currently, there is a delay in notifying the covered sectors of their targets. The compliance period under the CCTS officially started in April 2025, but the first four sectors (primary aluminium, chlor alkali, pulp and paper, and cement) were notified of their targets in October 2025. The next four sectors (petroleum refineries, petrochemicals, textile and secondary aluminium) received their targets in January 2026. The targets for the iron and steel and fertilizer sectors are still being decided. A total of 490

"Instead of an energy efficiency measurement, the CCTS sets a greenhouse gas emissions intensity goal per unit of production."

industrial entities have been notified of their targets but due to the delay in target setting, the targets for these entities were reduced on a pro-rata basis. Analysis by the Centre for Science and Environment (Kumar, 2025) highlighted that in the first four notified sectors alone, which include primary aluminium, the opportunity was lost for reducing more than 2 million tonnes of emissions in the next two years.

The aluminium sector was notified of its emissions intensity targets for primary aluminium in June 2025 for 13 producers. Following that, the targets for three secondary aluminium producers were provided in January 2026. These are largely downstream manufacturers producing semi-finished and finished aluminium products, with only one producer having a partial recycling facility. The large number of secondary producers (mostly micro-, small- and medium-sized) are not a part of the scheme; therefore, this category under the CCTS can be referred to as downstream/secondary aluminium.

> "With approximately 96% of India's aluminium smelters relying on captive coal-based power, the carbon intensity of electricity generation is directly embedded in each producer's greenhouse gases profile."

CCTS targets for aluminium: implications for wider policy

In this section, we analyse the notified targets for aluminium (which come into force in 2026) and discuss the implications for the broader trajectory of low-carbon aluminium policy in India. The carbon market is a key element of low-carbon aluminium policy in India. However, as Figure 2 shows, the bulk of aluminium carbon emissions come from large smelting facilities and the carbon market targets have been modest. In addition, there has been an easing of the targets for aluminium smelters since the initial draft targets were released.

Figures 2–4 present the emissions intensity targets prescribed under the CCTS for India's aluminium sector, disaggregated by sub-sector. Each chart plots individual aluminium producers by their baseline, mid-point and target-year intensity (tCO_2e/t), with the bubble size scaled to production volume.

Figure 2, covering primary aluminium smelters, reveals a wide dispersion in baseline emissions intensity, ranging from around 13 to 21 tCO_2e/t. This is due to various factors, but it particularly reflects the dominant role of captive thermal power in the smelting process. Primary smelting is extraordinarily electricity-intensive, requiring around 13–15 megawatts per hour per tonne of aluminium produced. With approximately 96% of India's aluminium smelters relying on captive coal-based power, the carbon intensity of electricity generation is directly embedded in each producer's emissions profile. This makes aluminium smelters structurally distinct from the other two sub-sectors: alumina refineries (Figure 3) and secondary aluminium producers (Figure 4), which operate at a very different order of magnitude – in the range of 0.5–1.4 tCO_2e/t – because their processes are thermal rather than electrochemical. In addition, secondary/downstream production involves operations such as cutting, hot and cold rolling, annealing, casting and scrap remelting, all of which require far less energy than primary aluminium smelting.

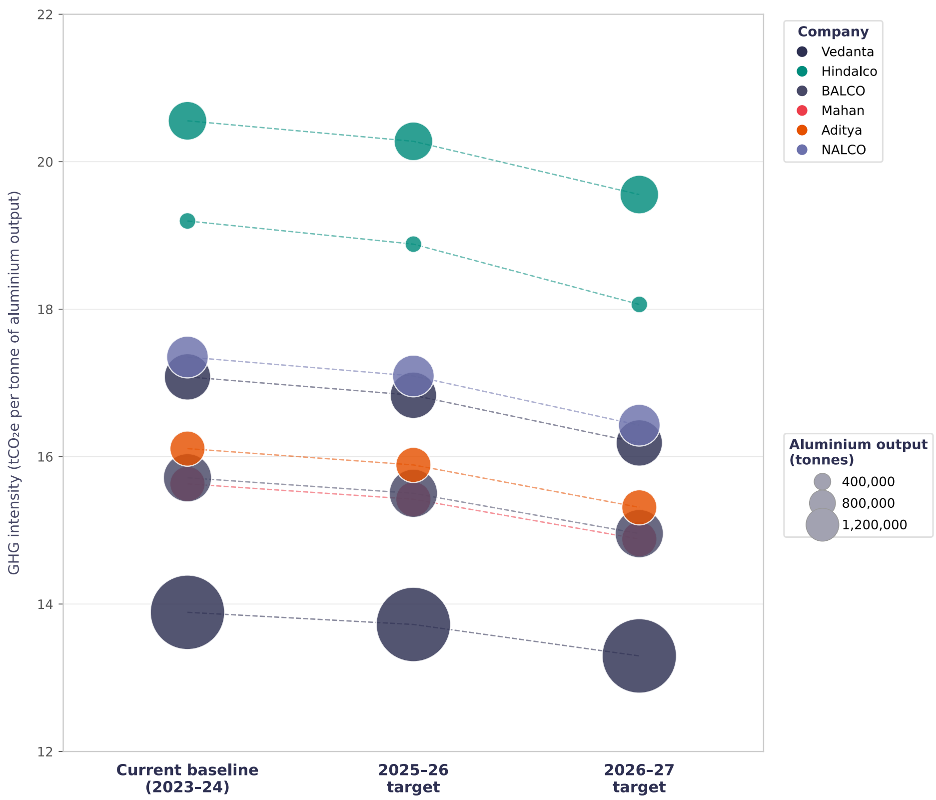
The wider implication is that the CCTS is effectively governing two distinct decarbonisation challenges within a single scheme:

- For smelters, meaningful emissions reduction is structurally contingent on a shift to renewable power sources, which cannot be driven by carbon intensity targets alone
- For refineries and secondary/downstream producers, the task of reducing emissions is relatively more achievable via process efficiency, but the notified targets seem to be insufficiently ambitious to drive structural change.

The relatively modest reduction trajectories across all three sub-sectors suggest that the CCTS in its current form is a baseline-setting exercise, rather than a transformative decarbonisation instrument. This highlights the need for complementary policies on renewable energy access, technology support for inert anode adoption and stronger incentives for scrap collection and secondary production.

“The emissions intensity targets for India’s primary aluminium smelters under the CCTS are primarily aimed at incremental operational efficiency gains, rather than structural decarbonisation.”

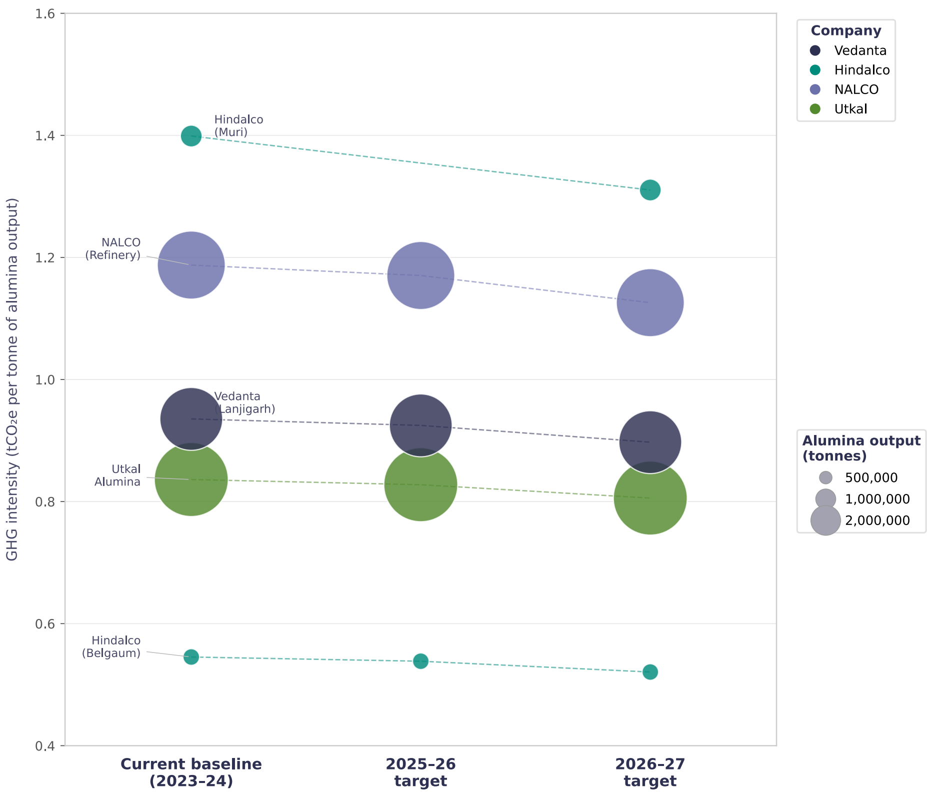
Figure 2. Aluminium smelting producers: greenhouse gas emissions targets under the CCTS



Source: Targets released by the Ministry of Environment, Forests and Climate Change

Figure 2 plots the emissions intensity targets for India’s primary aluminium smelters under the CCTS, with each bubble representing an individual producer scaled by output volume in 2023–24. Baseline intensities range from approximately 13 to 21 tCO_2e/t of aluminium produced, due to differences in ‘gate-to-gate’ facilities, plant configuration, captive power generation and operational efficiency across the sector. While the Figure shows some variation in reduction pathways across facilities, the targets imply relatively modest improvements from baseline levels. This suggests that they are primarily aimed at incremental operational efficiency gains, such as improved potline current efficiency, better anode quality and lower perfluorocarbon emissions, rather than structural decarbonisation. It should be noted that the final targets with which smelters were notified were also relaxed from those set in the draft notification, following delays in implementation. This has further reduced the level of ambition for carbon reductions in this sub-sector, which constitutes the majority of emissions in India's aluminium industry.

Figure 3. Refinery facilities: greenhouse gas emissions targets under the CCTS



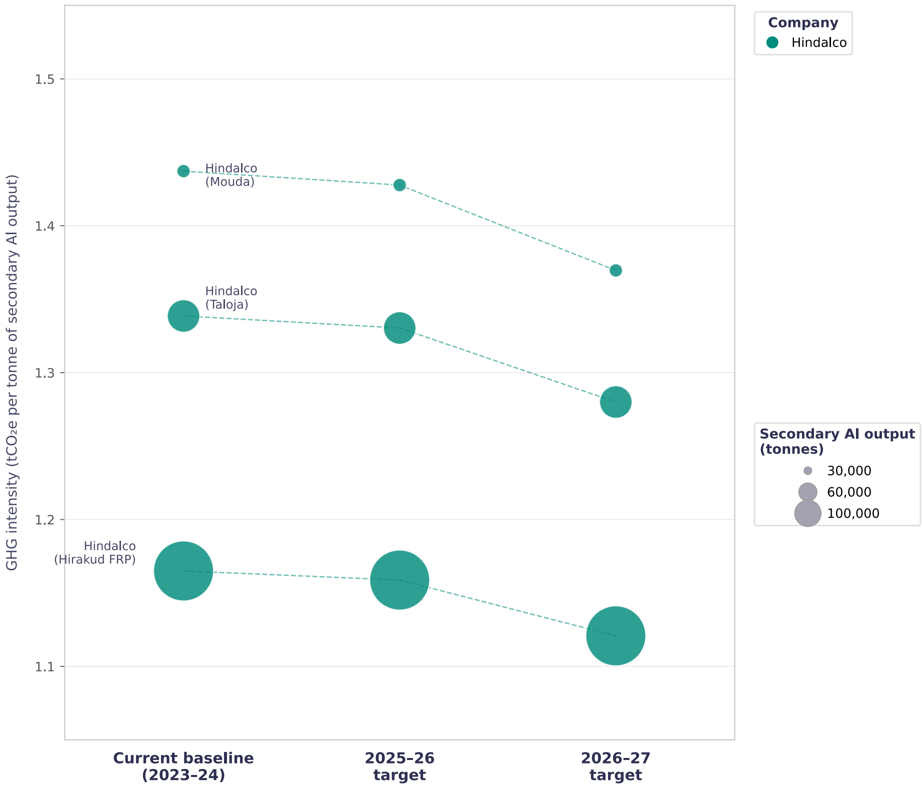
Source: Targets released by the Ministry of Environment, Forests and Climate Change

> "The targets for India's primary aluminium smelters imply relatively modest improvements from baseline levels."

Figure 3 presents the corresponding targets for alumina refineries, which operate at a fundamentally different order of magnitude, with intensities ranging from approximately 0.5 to 1.4 tCO_2e/t of alumina. The Bayer refining process is thermal rather than electrochemical, relying mainly on steam and heat for digestion and calcination. This accounts for its substantially lower carbon intensity relative to smelting. The range in carbon intensity across individual producers likely reflects variation in fuel mix (coal versus gas versus co-generation), heat recovery efficiency and the grade of bauxite feedstock, which affects the energy required per tonne of alumina output.

As with the smelters, the prescribed reduction trajectories appear modest, raising the question of whether the targets are calibrated to incentivise meaningful capital investment in process efficiency or fuel switching, or whether they largely codify business-as-usual improvement rates. Given that the abatement options for refineries, such as switching from coal to natural gas or biomass for process heat, improving heat integration or adopting mechanical vapour recompression, are technically mature and commercially available, there is a case that more ambitious targets would be both feasible and warranted for this sub-sector.

Figure 4. Secondary/downstream aluminium facilities: greenhouse gas emissions targets under the CCTS



Source: Targets released by the Ministry of Environment, Forests and Climate Change

"The prescribed reduction trajectories for secondary aluminium facilities are modest, suggesting that the targets are primarily geared towards incremental improvements in energy efficiency."

Figure 4 covers the three producers notified under the secondary aluminium category of the CCTS. Unlike conventional secondary aluminium producers, these entities are largely downstream processing units engaged in operations such as hot and cold rolling, annealing, casting and cutting, with only one unit incorporating a partial scrap remelting facility. Their baseline emissions intensities fall in the range of 0.5–1.4 tCO_2e/t, reflecting the relatively low energy requirements of these thermal processing operations compared with primary smelting.

The prescribed reduction trajectories under the CCTS are modest, suggesting that the targets are primarily geared towards incremental improvements in energy efficiency. At the same time, because the notified producers are not representative of India's broader scrap-based secondary aluminium industry, the targets provide limited insight into the sector's wider decarbonisation potential. India currently derives only around 27% of its aluminium production from secondary sources, compared with over 50% in countries such as Japan, Germany and the US. Expanding genuine secondary aluminium production through stronger domestic scrap collection, improved recycling infrastructure and quality standards, and incentives for greater use of recycled aluminium will therefore require complementary policy measures beyond the current scope of the CCTS.

Governing two decarbonisation challenges within a single regulatory framework

Taken together, Figures 2, 3 and 4 illustrate that the CCTS is effectively governing two distinct decarbonisation challenges within a single regulatory framework. For primary aluminium smelters, meaningful emissions reduction is structurally contingent on the decarbonisation of the power supply, a challenge that intensity targets alone cannot resolve. Further schemes, incentives and infrastructure are likely to be needed to drive this transition to decarbonised power supply. For aluminium refineries and secondary producers, the task of reducing emissions further is more easily achievable, but the targets appear insufficiently ambitious to drive structural change.

The pro-rata reduction of targets, resulting from the delay in notifying smelters, has further weakened what were already modest ambition levels. As the Centre for Science and Environment has highlighted, this delay alone represents an opportunity cost of over 2 million tonnes of avoidable carbon emissions across the first four notified sectors. The relatively modest reduction trajectories across all three aluminium sub-sectors suggest that the CCTS in its current form functions more as a baseline-setting and disclosure exercise than as a transformative decarbonisation instrument.

Photo: Jeet Dhanoa/Unsplash

New complementary policies on aluminium are needed

This reinforces the case for complementary policies: on renewable energy access and open-access reforms for smelters, technology support for inert anode development and fuel switching incentives for alumina refining. It also highlights the need for new policies on aluminium scrap collection, quality standards for domestic scrap and capacity incentives for secondary production.

Conclusion and way ahead

India's aluminium sector is central to the country's clean energy transition, but its dependence on coal-based captive power makes it one of the country's most emissions-intensive industries. However, it also provides an opportunity to achieve significant emissions reductions through the transition to lower carbon energy, particularly as renewable energy sources grow, and become more economically viable and reliable. As demand for aluminium is projected to grow rapidly, decarbonising the sector is essential to avoid locking in high-carbon production. This will also help India to achieve its climate goals and strengthen its competitiveness in emerging green markets globally.

"As demand for aluminium in India is projected to grow rapidly, decarbonising the sector is essential to avoid locking in high-carbon production."

India's Carbon Credit Trading Scheme (CCTS) is a necessary and welcome first step. Its most important contribution is institutional: establishing emissions measurement, accountability and a regulatory framework that is expected to become more stringent over time. However, the relatively modest targets for emissions and their dilution due to delayed notification limit the scheme's impact in the first compliance cycle. This represents a missed opportunity to drive deeper reductions, particularly in primary smelting where most emissions are concentrated.

Ensuring the CCTS delivers meaningful decarbonisation

To translate this foundation into meaningful decarbonisation, the carbon market needs to build ambition in future cycles to signal structural transformations in the sector. This must be complemented


Photo: Zoshua Colah/Unsplash

by accelerated renewable energy adoption, support for breakthrough technologies, such as inert anodes, and stronger policies to expand recycling and domestic scrap collection and scrap-based production.

If implemented with increasing ambition, these measures can reduce emissions, improve air quality, reduce dependence on imported fossil fuels and scrap, and enhance export competitiveness. The decisions taken in the next few years will determine whether India's aluminium growth becomes a source of carbon lock-in or a cornerstone of a cleaner and more resilient industrial future.

Grantham Research Institute on Climate Change and the Environment

London School of Economics and Political Science

Houghton Street, London, WC2A 2AE

e gri.policy@lse.ac.uk
w www.lse.ac.uk/granthaminstitute

References

CARE Ratings Ltd. (2019) *Domestic performance of the Aluminium industry during FY18*. https://www.careratings.com/uploads/newsfiles/Aluminium%20Industry%20Update.pdf

Emirates Global Aluminium [EGA] (2025) *Sustainability Report 2024*. Abu Dhabi. ega-2024-sustainability-report.pdf

Global Efficiency Intelligence (2022). *Aluminum Climate Impact – An International Benchmarking of Energy and CO2 Intensities*. Florida. https://www.globalefficiencyintel.com/aluminum-climate-impact-international-benchmarking-energy-co2-intensities

International Aluminium Institute [IAI] (2024) *Greenhouse Gas Emissions – Aluminium Sector; Primary Aluminium Production Statistics*.

JMK Research & Analytics (2025) *Green Power Procurement in the Aluminium Sector in India*. Gurugram. https://jmkresearch.com/renewable-sector-published-reports/green-power-procurement-in-the-aluminium-sector-in-india

Kumar P (2025) India notifies GHG emission intensity targets for four sectors: Delay derails ambition further. *Down to Earth*, 17 October. https://www.downtoearth.org.in/climate-change/india-notifies-ghg-emission-intensity-targets-for-four-sectors-delay-derails-ambition-further

Ministry of Mines (2025) *Aluminium Vision Document*. New Delhi: Government of India: https://mines.gov.in/admin/storage/ckeditor/n-25_1751560267.pdf

NITI Aayog (2026) *Roadmap for Aluminium Sector Decarbonisation*. New Delhi: National Institution for Transforming India. https://www.niti.gov.in/sites/default/files/2026-01/Roadmap_for_Aluminium_Sector_Decarbonisation.pdf

Press Information Bureau (2025) *Record Production in Mining in FY 2024-25*. New Delhi: Ministry of Mines, Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2126960&reg=48&lang=2

Saraswat V and Ghosh A (2018) *Need for an Aluminum Policy in India*. New Delhi: NITI Aayog, Government of India.

Sharma A, Sayed S, Seethamraju S and Bandyopadhyay S (2025) *Decarbonization Measures for the Indian Aluminum Sector*. Process Integration and Optimization for Sustainability. https://doi.org/10.1007/s41660-025-00537-4

Sripathy P, Nitturu K, Yadav D and Mallya H (2024) *Evaluating Net-Zero Trajectories for the Indian Aluminium Industry: Marginal Abatement Cost Curves of Carbon Mitigation Technologies*. New Delhi: Council on Energy, Environment and Water. https://www.ceew.in/publications/how-can-india-achieve-low-carbon-sustainable-aluminium-production-and-reduce-carbon-footprint

Vedanta Aluminium (2022) *India's 76th Independence Day: Vedanta Aluminium commits to 'paanch pran' for nation's advancement*. Press release, 16 August. New Delhi. https://vedantaaluminium.com/media/press-releases/list/indias-76th-independence-day-vedanta-aluminium-commits-to-paanch-pran-for-nations-advancement/

About the authors

Sangeeth Selvaraju is a Policy Fellow at the Grantham Research Institute on Environment and Climate change.

Parth Kumar is a Programme Manager at the Sustainable Industrialisation Unit, Centre for Science and Environment, India.

Acknowledgements

The authors acknowledge Hayeon Cho, Duttatreya Das and Atik Sheikh for comments and feedback.

AI was used in this report for making charts and data cleaning.

This brief was first published in August 2026 by the Grantham Research Institute on Climate Change and the Environment.

DOI: 10.21953/researchonline.lse.ac.uk.00140335