In Collaboration With

INDIA'S CARBON CREDIT TRADING SCHEME

MARKET DESIGN, MECHANISMS & THE ROLE OF VERIFICATION

WHITE PAPER · JULY 2026

Ploxi in collaboration with BlockVolt & Parijata Earth Foundation



In Collaboration With

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Foreword

Carbon markets are no longer a future aspiration, they are a present-day imperative. India stands at a pivotal inflection point: the regulatory architecture is in place, the institutional framework has been defined, and the first cohort of obligated entities is entering a compliance cycle that will shape industrial behaviour for decades to come.

What has historically been a domain of international negotiations and voluntary pledges is now becoming a matter of operational reality for Indian industry. The Carbon Credit Trading Scheme is a structural signal that the cost of carbon will be embedded into the economics of Indian manufacturing, energy, and infrastructure.

At Ploxi Consult, we work at the intersection of climate policy and commercial strategy. We have seen, firsthand, the gap between the ambition of the regulatory framework and the readiness of the market ecosystem. This white paper is our attempt to bridge that gap to translate the complexity of the CCTS architecture into actionable intelligence for the entities it will affect most.

We are at an early stage of what will be a multi-decade market evolution. The decisions made now on verification infrastructure, methodology development, and institutional capacity will determine whether India's carbon market becomes a credible, liquid, and globally integrated system, or remains a compliance exercise of limited ambition.

I believe it can and must be the former. India has the institutional legacy, the industrial scale, and the policy ambition to build a carbon market that the world pays attention to. This paper is our contribution to making that case.



Dhwani Sunku

Founder & Chief Executive Officer, Ploxi Consult

Foreword

India's climate journey has entered a defining phase. With the introduction of the Carbon Credit Trading Scheme (CCTS), carbon markets are transitioning from policy discussions to business reality, creating new responsibilities and opportunities for industries, institutions, and project developers alike.

As this ecosystem evolves, one challenge stands out – the need for credible, accessible, and practical knowledge. While the regulatory framework is taking shape, many stakeholders continue to seek clarity on implementation, compliance, project development, and the broader role carbon markets will play in India's low-carbon transition.

At Parijata EARTH Foundation, we believe that an effective carbon market is built not only on sound policy but also on informed participation. Through our work in climate finance, sustainability, capacity building, and stakeholder engagement, we have witnessed the growing demand for guidance that bridges policy with practice.

This white paper is our contribution to that effort. It brings together key developments, practical insights, and emerging opportunities within India's carbon market landscape, with the aim of supporting businesses, policymakers, practitioners, and aspiring professionals as they navigate this evolving space.

India has the ambition, institutional foundation, and innovation capacity to build a carbon market that is transparent, credible, and globally competitive. Realizing that vision will require collaboration, integrity, and continuous learning. We hope this publication serves as a meaningful resource in that collective journey.



Shubhi Goel

Founder & CEO, Parijata Earth Foundation

Foreword

Carbon markets are built on one fundamental principle: trust. Every carbon credit represents a claim that emissions have been reduced, removed, or avoided. Without reliable data, transparent verification, and secure traceability, that trust cannot exist.

As carbon markets mature globally and India operationalizes the Carbon Credit Trading Scheme (CCTS), the conversation must move beyond policy alone. The next challenge is building the digital infrastructure that enables markets to function with integrity at scale. Data must be measured continuously, verified independently, secured against tampering, and connected seamlessly across registries, exchanges, and stakeholders.

At Blockvolt, we see technology as the trust layer of the carbon economy. By combining digital Measurement, Reporting and Verification (dMRV), IoT-enabled monitoring, blockchain-based custody, and secure digital infrastructure, we are working to transform fragmented climate data into verifiable, auditable, and market-ready environmental assets. Technology is no longer an enabler – it is becoming the foundation upon which credible carbon markets will operate.

This white paper reflects our vision for a carbon market where transparency is built into every transaction, verification is continuous rather than periodic, and climate assets can move across domestic and international markets with confidence. As Article 6 mechanisms, CCTS, and global compliance frameworks continue to evolve, digital trust infrastructure will determine the credibility, scalability, and interoperability of tomorrow's carbon markets.

The future of climate finance will belong to markets that can prove integrity – not just promise it. We hope this publication contributes to that journey.



Adith Haridas

Co-Founder, Blockvolt Limited

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EXECUTIVE SUMMARY

India's transition toward a market-based decarbonisation framework marks a pivotal shift in its climate policy architecture. Anchored in its commitment under the Paris Agreement (UNFCCC, 2015) and strengthened through updated Nationally Determined Contributions (Government of India, 2022), the country is increasingly leveraging carbon markets to achieve emissions reduction targets in a cost-efficient and scalable manner.

The introduction of the Carbon Credit Trading Scheme (CCTS) represents a foundational step in operationalising the Indian Carbon Market (ICM) (Ministry of Power, 2023). By integrating both compliance and offset mechanisms, the scheme establishes a dual framework that simultaneously creates demand for carbon credits through mandatory obligations and enables supply through voluntary project-based mitigation activities.

India's prior experience with market-based instruments, including participation in the Kyoto Protocol's Clean Development Mechanism (UNFCCC, 1997) and domestic initiatives such as the Perform, Achieve, and Trade (PAT) scheme administered by the Bureau of Energy Efficiency (BEE, 2024) provides a strong institutional foundation for scaling carbon markets. However, the effectiveness of the CCTS will depend on the credibility, transparency, and efficiency of its implementation.

A critical enabler in this ecosystem is the role of Accredited Carbon Verification (ACV) agencies. As independent third-party entities responsible for validation and verification, ACVs underpin the integrity of carbon credits by ensuring that emissions reductions are real, measurable, and additional (World Bank, 2023). Their role is central to maintaining market confidence and enabling efficient price discovery.

Despite a robust policy design, the emerging market faces structural challenges, particularly limited verification capacity, high entry barriers for accreditation, and a shortage of skilled professionals. Addressing these constraints through targeted capacity building, streamlined processes, and alignment with global standards will be essential to the scheme's success.

2.Introduction

India's climate policy trajectory has evolved significantly in alignment with global efforts to combat climate change. A defining milestone in this journey is its commitment under the Paris Agreement, which aims to limit global average temperature increases to well below 2°C above pre-industrial levels, while pursuing efforts to restrict the rise to 1.5°C (IPCC, 2021). India ratified the agreement in 2016 and has since progressively strengthened its climate commitments in line with its development priorities.

In August 2022, India updated its Nationally Determined Contributions (NDCs), enhancing its ambition to achieve a 45% reduction in the emissions intensity of GDP by 2030 from 2005 levels (Government of India, 2022). This marks a strategic shift towards embedding climate considerations within economic growth pathways, while underscoring the need for robust, market-based mechanisms to enable cost-effective decarbonisation at scale. India's climate ambition was further elevated with the approval of NDC 3.0, covering the period 2031–2035 and submitted to the UNFCCC in early 2026. Building on a track record of meeting targets ahead of schedule, NDC 3.0 raises the emissions intensity reduction target to 47% by 2035 from 2005 levels, commits to 60% non-fossil installed electricity capacity, and enhances the carbon sink target to 3.5 - 4.0 billion tonnes of CO_2 equivalent through forest and tree cover. These escalating commitments reinforce the policy imperative for a well-functioning compliance carbon market and signal that obligations on industry under the CCTS will only deepen over time.

The enactment of the Energy Conservation (Amendment) Act, 2022 provided the legal basis for establishing the CCTS, and the subsequent notification of the scheme in June 2023 set in motion the institutional and procedural machinery for India's first domestic carbon market. This white paper examines the architecture, mechanisms, and strategic implications of the CCTS with particular focus on the role of verification infrastructure as the backbone of market integrity.

3.State of Global Markets

Carbon markets have emerged as critical policy instruments for achieving climate targets in an economically efficient manner (World Bank, State and Trends of Carbon Pricing, 2023). By assigning a price to carbon emissions, these mechanisms internalise the environmental cost of pollution and create financial incentives for mitigation.

3.1 Scale and Momentum

As of January 2025, 38 emissions trading systems are in operation globally, covering approximately 19% of global greenhouse gas emissions equivalent to roughly 12 $GtCO_2e$ (ICAP, Status Report 2025). ETS revenues reached nearly USD 70 billion in 2024, a significant source of government revenue increasingly directed toward clean energy transition and household support programmes. A further 20 systems are under development or active consideration, underscoring the momentum toward carbon pricing as a mainstream climate policy instrument.

The three largest markets include — Chinese National ETS, the EU ETS, and the Korean ETS together account for the majority of ETS-covered emissions globally. India's CCTS, expected to come into full operation from FY2026, represents one of the most significant new entrants to the global ETS landscape.

3.2 Types of Carbon Credits and Market Segments

Carbon markets are broadly segmented into compliance markets and voluntary markets, each with distinct regulatory frameworks, credit types, and participant profiles.



Figure 1: summary of types of carbon markets, its features and examples.

Compliance Markets: Emission Allowances and Intensity Credits

Compliance markets are established by government regulationand impose legally binding obligations on covered entities. They operate through two primary mechanisms:

- Cap-and-Trade Systems (e.g., EU ETS, California Cap-and-Trade): A government sets an absolute cap on total emissions. Regulated entities receive or purchase allowances (each representing one tonne of CO_2e) and must surrender sufficient allowances at the end of each compliance period. Those that reduce emissions below their allocation can sell surplus allowances; those that exceed it must purchase additional allowances. The EU ETS, launched in 2005, is the world's oldest and most developed cap-and-trade system.
- Baseline-and-Credit / Intensity-Based Systems (e.g., India CCTS, China National ETS): Rather than an absolute cap, entities are assigned emission intensity targets (tCO_2e per unit of output). Outperformers earn tradable credits; underperformers must purchase credits to cover the shortfall. This design is particularly suited to fast-growing economies where absolute caps would constrain economic growth.

Voluntary Carbon Markets: Project-Based Credits

Voluntary carbon markets (VCMs) operate outside regulatory mandates and are governed by independent standards. Key credit types and registry operators include:

- Verified Carbon Units (VCUs); Verra / Verified Carbon Standard (VCS): The world's largest voluntary carbon standard by volume, covering projects across renewable energy, forestry, methane capture, and more. VCS credits are widely accepted across corporate and compliance markets.
- Gold Standard Certified Emission Reductions (GS-CERs): Developed by WWF and other NGOs, Gold Standard imposes additional requirements for sustainable development co-benefits, commanding premium pricing in voluntary markets.
- Clean Development Mechanism (CDM) CERs: The UN's original project-based crediting mechanism under the Kyoto Protocol, generating Certified Emission Reductions (CERs) for projects in developing countries. CDM laid the institutional groundwork for India's CCTS.
- Article 6.4 Emission Reductions (A6.4ERs): The successor to CDM under the Paris Agreement, establishing a UN-supervised crediting mechanism for internationally transferred mitigation outcomes. COP29 in Baku (2024) reached a landmark agreement on Article 6.4 rules, opening the pathway for cross-border credit transactions.
- CORSIA Eligible Units: The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), administered by ICAO, requires airlines to offset emissions above 2019 levels using approved carbon credits. From 2027, participation becomes mandatory for all international flights.
- India Carbon Credit Certificates (CCCs): India's own domestic credit unit under the CCTS, denominated in 1 tCO_2e. CCCs trade on CERC-regulated power exchanges and are issued by BEE on the recommendation of the NSC-ICM.

Table 1: Summary of the key carbon credit types, their governing bodies, and market segment.

Credit Type	Standard / Registry	Market Segment	Key Sectors
Emission Allowance (EUA)	EU ETS (European Commission)	Compliance (cap-and-trade)	Power, Industry, Aviation
Carbon Credit Certificate (CCC)	BEE / GCIL (India)	Compliance (intensity-based)	9 industrial sectors
Verified Carbon Unit (VCU)	Verra (VCS)	Voluntary	AFOLU (Agriculture, Forestry and Other Land Use), RE, Waste
Gold Standard CER	Gold Standard Foundation	Voluntary (premium)	RE, Clean Cookstoves, WASH
Article 6.4 Emission Reduction	UNFCCC Supervisory Body	International compliance / VCM	Cross-sector
CORSIA Eligible Unit	ICAO	Aviation compliance	International Aviation
CDM CER	UNFCCC (legacy)	Compliance / Voluntary	Broad — legacy projects

Sources: ICAP Status Report 2025; UNFCCC; ICAO CORSIA; Verra; Gold Standard Foundation; BEE CCTS Notification 2023.

4. India's Experience with Market-Based Mechanisms

India has considerable experience with market-based climate instruments and has been an active participant in global carbon markets. This institutional legacy significantly reduces implementation risk for the CCTS.

Under the Clean Development Mechanism (CDM), India emerged as one of the leading host countries for registered projects globally (UNEP, 2020). These initiatives facilitated emissions reductions alongside technology transfer and sustainable development benefits, building a pipeline of experienced project developers, verification bodies, and technical professionals.

At the domestic level, India implemented the Perform, Achieve, and Trade (PAT) mechanism, administered by the Bureau of Energy Efficiency. Since its inception in 2012, the PAT scheme has delivered substantial emissions savings exceeding 106 million tonnes of CO_2e (as of June 2024) (BEE, 2024). The PAT scheme covered over 1,000 entities across 13 energy-intensive sectors, creating the administrative and MRV infrastructure that the CCTS will build upon.

India's prior experience reduces implementation risk for the CCTS; however, transitioning from energy efficiency markets to full-scale carbon markets introduces significantly higher MRV and governance complexity. The shift from energy intensity metrics to GHG emissions intensity metrics, and the introduction of dual-layer verification, represent meaningful operational step-changes for regulated entities.

5. India's Carbon Credit Trading Scheme (CCTS)

Building on its prior experience and evolving climate commitments, India introduced the Carbon Credit Trading Scheme (CCTS) as the central pillar of its emerging carbon market architecture (Ministry of Power, 2023). The scheme is designed to incentivise emissions reductions through market-based instruments while ensuring flexibility and cost efficiency.

The CCTS adopts a dual-mechanism structure, comprising a compliance mechanism and an offset mechanism. The compliance mechanism targets energy-intensive sectors through mandatory emissions reduction obligations, while the offset mechanism enables voluntary participation by allowing entities to generate carbon credits through eligible mitigation projects.

5.1 Governance Architecture

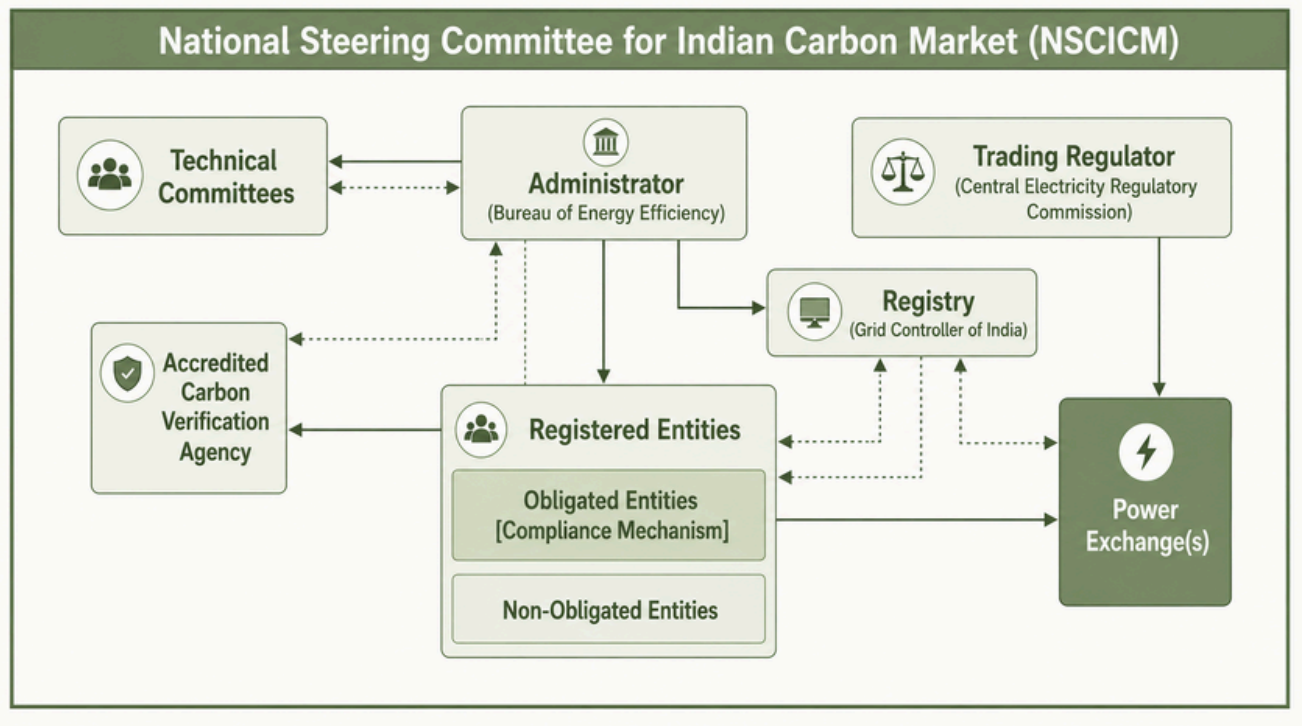


Figure 2: Summary of the Governance Architecture under CCTS.
Sources: Bureau of Energy Efficiency, 2025.

The CCTS is governed through a multi-tiered institutional structure:

- Ministry of Power (MoP): Policy authority; notifies obligated entities; recommends GHG emission intensity targets to MoEFCC for formal notification.
- Ministry of Environment, Forest and Climate Change (MoEFCC): Co-chairs the NSC-ICM; formally notifies GHG emission intensity targets under the Environment Protection Act, 1986; oversees NDC alignment.
- National Steering Committee for the Indian Carbon Market (NSC-ICM): The highest governance body of the ICM, chaired by the Secretary of MoP and co-chaired by the Secretary of MoEFCC. Responsible for overall governance and oversight of the scheme.
- Bureau of Energy Efficiency (BEE): The scheme administrator. Responsible for developing GHG emissions trajectories, setting targets for obligated entities, issuing Carbon Credit Certificates, and administering the ICM Portal.
- Central Electricity Regulatory Commission (CERC): Regulates CCC trading on designated power exchanges. Approves business rules of power exchanges and takes corrective action to prevent fraud.
- Grid Controller of India Limited (GCIL): Registry operator for the CCTS. Maintains the ICM Registry, registers obligated and non-obligated entities, and records all CCC transactions.
- Central Pollution Control Board (CPCB): Enforces penalties for non-compliance under the Environmental Protection Act. Entities failing to meet compliance obligations are subject to an environmental compensation of twice the average CCC market price for the relevant compliance year.

5.2 Key Compliance Parameters

The CCTS will initially cover approximately 800 entities from nine industrial sectors from FY2026, using FY2023-24 as the baseline year for emissions data. Carbon Credit Certificates are denominated in 1 tCO_2e and may be banked indefinitely; forward borrowing is not permitted (ICAP, 2025).

6. Compliance Mechanism under CCTS

The compliance mechanism constitutes the demand-side foundation of India's carbon market by mandating emissions reduction obligations for regulated entities.
Its legal basis derives from the Energy Conservation Act, 2001 (as amended 2022), which empowers the Government of India to operationalise the carbon market framework and issue Carbon Credit Certificates. Through this transition, India is expanding from energy-efficiency-based instruments toward a broader greenhouse gas emissions framework.

5.1 Covered Sectors

The following are the 9 "hard-to-abate" energy-intensive sectors targeted by India's Carbon Credit Trading Scheme (CCTS).

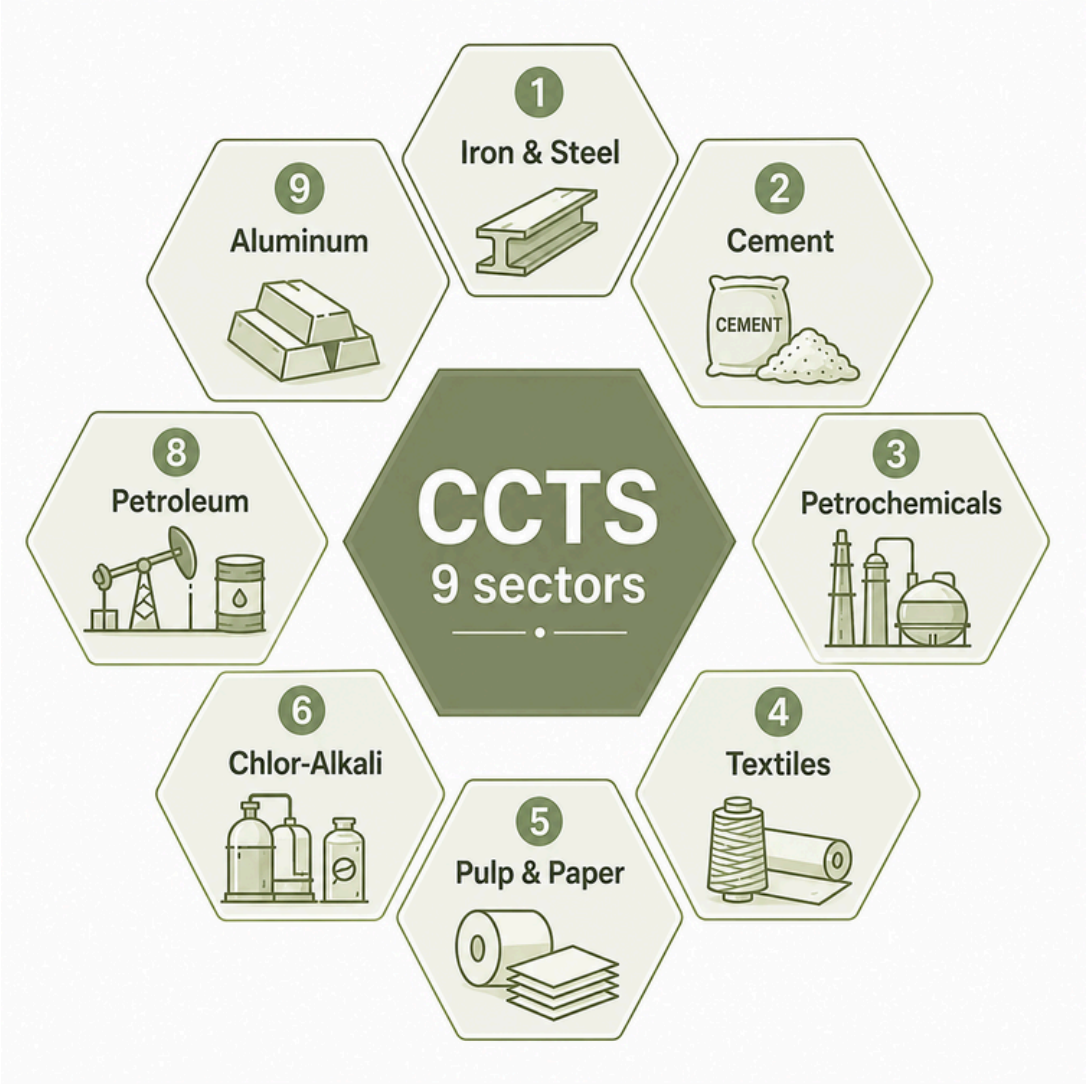


Figure 3: 9 sectors covered under the CCTS compliance mechanism.

Table 2: shows the phase 1 of the CCTS compliance mechanism covers the following nine sectors, transitioning from the PAT scheme from FY2026:

Sector	Sub-type	Key Emissions Source
Aluminium	Refinery / Smelter	Process emissions (PFCs) + energy combustion
Chlor-Alkali	Chlorine production	Process + energy emissions
Cement	Integrated plants	Calcination (process) + kiln combustion
Fertiliser	N_2-based production	Nitrous oxide (N_2O) + energy
Iron & Steel	Integrated / Sponge Iron	Coke combustion + DRI process
Pulp & Paper	Composite mills	Biomass + fossil fuel combustion
Petrochemicals	Integrated complexes	Complex intensity metrics
Petroleum Refinery	All refinery operations	Combustion + process emissions
Textile	Composite / Fibre / Spinning	Thermal and electrical energy

Source: BEE Detailed Procedure for Compliance Mechanism under CCTS (October 2024); ICAP ETS Factsheet-India CCTS.

6.2 MRV Framework and Dual-ACVA Verification

India's compliance mechanism features a distinctive dual-layer verification requirement. Regulated entities must engage two independent Accredited Carbon Verification Agencies per compliance cycle:

- Primary ACVA (Form B): Conducts a full on-site audit of the entity's GHG emissions report and issues a Certificate of Verification. The Primary ACVA must hold ISO 14065 certification and demonstrate sector-specific technical expertise.
- Check-Verifier ACVA (Form C): Conducts an independent desk review of the Primary ACVA's work and issues a Certificate of Check-Verification. The Check-Verifier must be a different body from the Primary ACVA.

This dual-layer approach materially increases the burden of proof for emissions claims and reduces the risk of verification fraud or error, enhancing the overall integrity of the market.

7. Offset Mechanism under CCTS

Complementing the compliance mechanism, the offset mechanism enables voluntary participation and plays a critical role in generating a supply of carbon credits. Under this framework, project developers including private entities, public institutions, and other stakeholders, can undertake emission reduction or removal projects and earn Carbon Credit Certificates upon successful verification.

The Bureau of Energy Efficiency serves as the scheme administrator, overseeing project registration, validation, and issuance processes. The mechanism is designed in alignment with globally accepted principles, including environmental integrity, additionality, transparency, and robust MRV systems.

7.1 Phase 1 Eligible Sectors

BEE's Offset Mechanism Detailed Procedure (Version 1, March 2025) opens the following sectors for voluntary project registration, with projects required to have commenced on or after 1 January 2025:

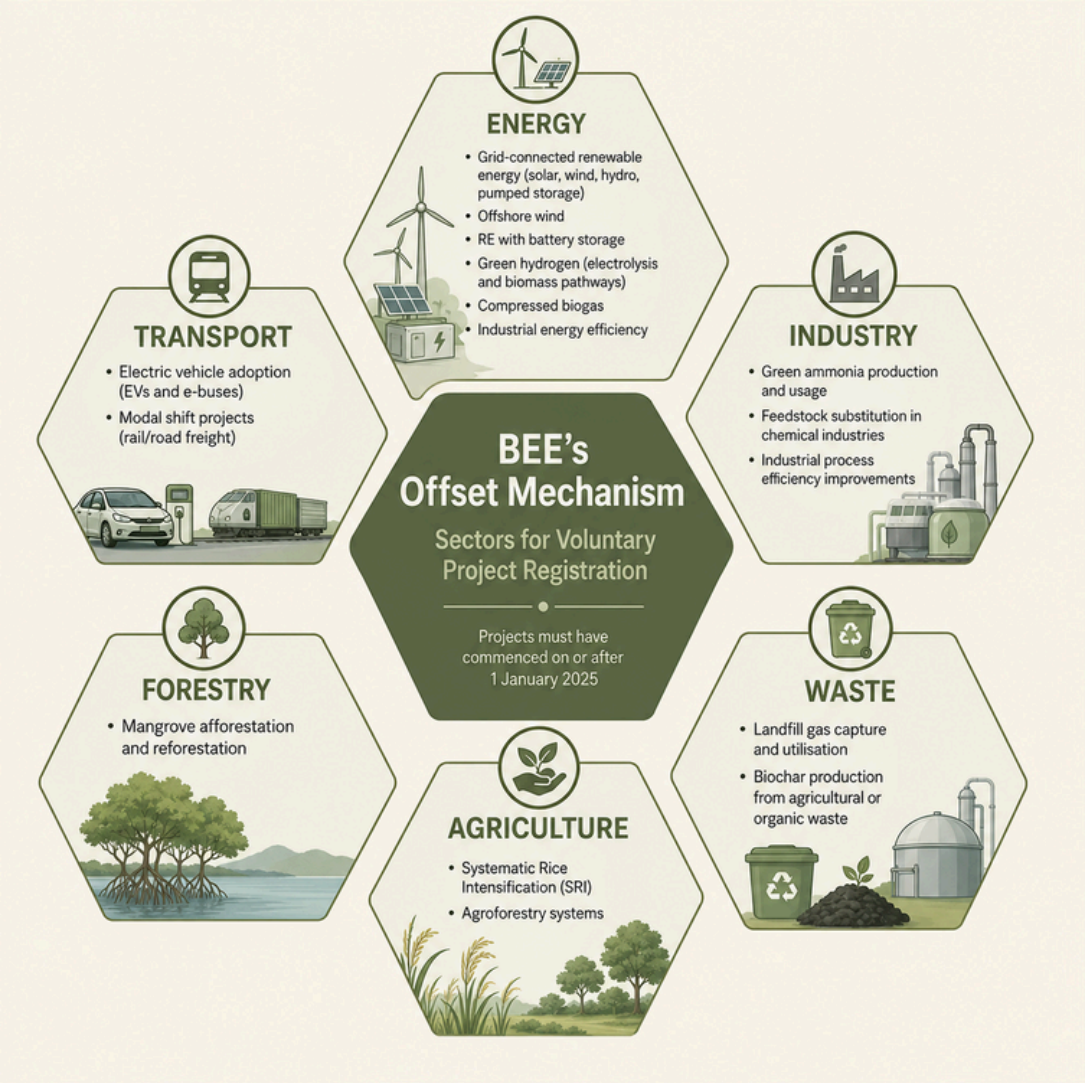


Figure 4: shows 6 sectors for voluntary project registration in BEE's Offset Mechanism

Energy: Grid-connected renewable energy (solar, wind, hydro, pumped storage), offshore wind, RE with battery storage, green hydrogen (electrolysis and biomass pathways), compressed biogas, and industrial energy efficiency.

- Industry: Green ammonia production and usage, feedstock substitution in chemical industries, and industrial process efficiency improvements.
- Waste: Landfill gas capture and utilisation, and biochar production from agricultural or organic waste.
- Agriculture: Systematic rice intensification (SRI) and agroforestry systems.
- Forestry: Mangrove afforestation and reforestation.
- Transport: Electric vehicle adoption (EVs and e-buses) and modal shift projects (rail/road freight).

Phase 2, expected in future procedure versions, will expand coverage to construction, fugitive emissions, solvent use, and carbon capture, utilisation, and storage (CCUS).

7.2 Project Lifecycle

The project lifecycle under the ICM Offset Mechanism consists of seven stages: account registration on the ICM Portal; preparation and public consultation of the Project Design Document (PDD); validation by an Accredited Carbon Verification Agency (ACVA); project registration following expert review and approval by the Technical Committee; project implementation and monitoring; ex-post verification by a different ACVA; and issuance of Carbon Credit Certificates (CCCs) after completeness checks, expert assessment, Technical Committee approval, and recommendation by the NSC-ICM. Crediting periods may be fixed (10 years) or renewable (5+5+5 years), and requests for issuance must be submitted within two years after the end of the relevant crediting period.

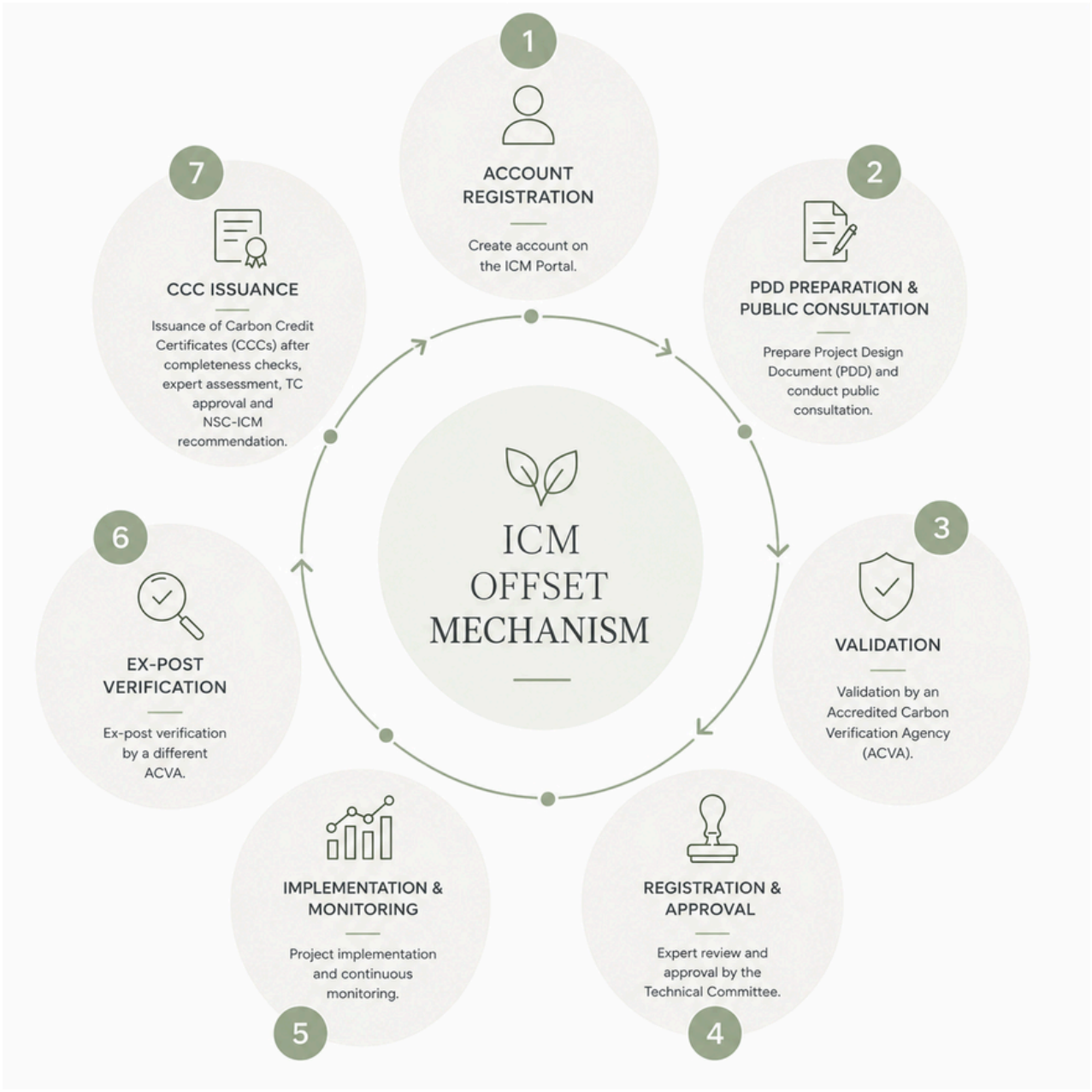


Figure 5: shows the 7 stages of ICM OFFSET Mechanism in a project lifecycle.

8. Accredited Carbon Verification Agencies: Enabling Market Integrity

A robust carbon market is fundamentally dependent on the credibility of its MRV systems. Within India's CCTS, Accredited Carbon Verification Agencies serve as independent third-party entities responsible for validating projects and verifying emissions and emission reductions.

Their role is central to ensuring that carbon credits represent real, measurable, and additional emissions reductions. In doing so, ACVAs mitigate risks such as double-counting and greenwashing, thereby reinforcing trust and confidence in the market.

The accreditation and oversight of ACVA agencies are administered by the Bureau of Energy Efficiency, supported by an Accreditation Advisory Committee. This institutional framework establishes clear procedures and eligibility criteria to ensure that verification bodies meet stringent standards of competence and independence. Key accreditation requirements include ISO 14065 certification for lead verifiers, demonstrated sector-specific technical expertise, strict conflict-of-interest prohibitions, and financial and operational capability for field audits (BEE, Accreditation Procedure, July 2024).

As of 2024, the ecosystem of accredited verification bodies in India remains nascent. While several international verification organisations including those already accredited under Verra, Gold Standard, and ISO 14065, are expected to seek ACVA accreditation under the CCTS framework, domestic capacity is limited. Building a sufficient pipeline of accredited bodies across the full range of eligible sectors, from energy and industry to forestry and CCUS, will be one of the most operationally critical near-term priorities for the ICM.

9. Comparative Analysis: India CCTS and Global Emissions Trading Systems

India's CCTS shares common features with established ETS frameworks globally, but reflects design choices that are specifically adapted to India's development context, administrative capacity, and climate ambition. The table below compares the CCTS with the EU ETS, China's National ETS, and the Korea ETS, the three largest operational systems globally across key design parameters.

Table 3: shows the Comparative Design Features: Selected Emissions Trading Systems

Parameter	India CCTS	EU ETS	China National ETS	Korea ETS (K-ETS)
Year Established	2023 (notified); FY2026	2005	2021	2015
System Type	Intensity-based baseline-and-	Absolute cap-and-trade	Intensity-based baseline-and-	Absolute cap-and-trade
GHGs Covered	CO_2, PFCs	CO_2, N_2O, PFCs, HFCs, CH4	CO_2, CH4 & C2F6	CO_2, CH_4, N_2O, PFCs, HFCs, SF_6
Sectors Covered	9 industrial sectors (Phase 1)	Power, industry, aviation, maritime	Power generation & Industry	Maritime, Waste, Domestic Aviation, Transport, Buildings, Industry, Power
No. of Entities	~ 490	~12,410	~3,300+	~700+
Allocation Method	Free Allocation: Output-based Benchmarking	Auctioning; Free Allocation (Fixed Benchmarking)	Free allocation (output-based Benchmarking)	Free allocation (Grandparenting; Fixed Benchmarking), Auction
Carbon Price	Not yet traded (est. ₹600–1200/tCO_2e)	~EUR 74.35/tCO_2e (~USD 84.01)	~CNY 70.78/tCO_2e (~USD 9.85)	~KRW 10,000–16,000/tCO_2e (~USD 7–11)
Banking	Unlimited	Unlimited	Limited (within phases)	Limited
Borrowing	Not permitted	Not permitted	Not permitted	Limited
Offset Use	Yes (offset mechanism CCCs)	Limited (no domestic offsets from 2021)	Yes (CCERs — capped)	Yes (KOC credits — capped at 5%)
MRV Standard	Dual-ACVA verification (unique)	Third-party verification (EU MRR)	Single verifier (CNAS accredited)	Single verifier (government-accredited)
Legal Basis	Energy Conservation Act, 2001 (amended 2022)	EU Directive 2003/87/EC (revised)	Interim Regulations for the Management of Carbon Emissions	Framework Act on Carbon Neutrality and Green Growth (2010)
Registry Operator	GCIL (Grid Controller of India)	EUTL (European Commission)	CCER National Registry	KRX (Korea Exchange)

Sources: ICAP ETS Database - India CCTS Factsheet, EU ETS Factsheet, China National ETS Factsheet, Korea ETS Factsheet (ICAP, 2025). All data as of 2025. ICAP is a collaborative forum of governments and public authorities, and is a credible non-commercial source for ETS data.

9.1 Key Design Distinctions

Several design features of the India CCTS merit specific commentary when viewed in comparative perspective:

- Intensity-based design: Like China's National ETS, India has opted for an intensity-based rather than absolute-cap approach. This is consistent with India's status as a developing economy where industrial output is expected to grow, an absolute cap would impose an implicit constraint on economic expansion that intensity targets avoid.
- Dual-ACVA verification: India's requirement for two independent verification bodies per compliance cycle is not replicated in any other major operational ETS. This design choice prioritises integrity over administrative simplicity, reflecting the importance of market credibility in a nascent system.
- Integrated offset mechanism: Unlike the EU ETS (which phased out domestic offset use), India has embedded an offset mechanism within the CCTS from inception, creating an integrated compliance-and-crediting architecture that maximises market liquidity and sectoral participation.
- Power exchange trading: CCC trading is routed exclusively through CERC-regulated power exchanges rather than OTC or bilateral markets, ensuring price transparency and regulatory oversight from the outset.

10. Industrial Decarbonisation: Key Players in India

India's industrial decarbonisation landscape is increasingly active, with major conglomerates, public sector undertakings, and specialised clean-energy developers investing significantly in low-carbon technologies across hard-to-abate sectors. The entities below represent the most active players relevant to the CCTS compliance universe and offset market.

10.1 Steel and Heavy Industry

1) Tata Steel has committed to net-zero steel production by 2045 and is actively piloting hydrogen-based direct reduced iron (DRI) production. In January 2025, Tata Steel developed India's first hydrogen-grade pipeline steel (API X65 ERW), a critical enabler for green hydrogen infrastructure. Tata Steel is among the obligated entities expected to be covered under the CCTS compliance mechanism.

2) JSW Energy commissioned India's largest green hydrogen production facility at Vijayanagar plant in Karnataka (Nov '2025), producing 3,800 metric tonnes p.a. of green hydrogen for use in JSW Steel's DRI operations. JSW Steel and JSW Energy have signed offtake agreements for 90,000 tonnes p.a. of green hydrogen by 2030, representing one of India's most advanced industrial decarbonisation programmes.

3) Jindal Steel and Power Limited (JSPL) announced plans in September 2024 to develop a 4,500-tonne per annum green hydrogen facility at its Angul plant in Odisha, targeting a 50% reduction in coal use in DRI operations within 18-24 months of commissioning (expected December 2025).

4) India’s largest public sector steel producer and a significant obligated entity under the CCTS compliance mechanism. SAIL operates integrated steel plants across Bhilai, Bokaro, Durgapur, Rourkela, and Burnpur, making it one of the highest-emission industrial entities in the country. The company is actively pursuing energy efficiency improvements and exploring low-carbon steelmaking pathways under its sustainability roadmap, representing a material demand centre for carbon credits.

5) National Aluminium Company (NALCO), India’s largest public sector aluminium producer and a Navratna PSU, NALCO is a significant participant in India’s hard-to-abate industrial sector. Aluminium smelting is among the most energy-intensive industrial processes, and NALCO’s operations in Odisha place it firmly within the CCTS compliance universe. The company has initiated programmes to improve specific energy consumption and is exploring renewable energy procurement to reduce Scope 2 emissions.

6) A flagship Aditya Birla Group company and one of Asia’s largest aluminium producers, Hindalco operates integrated aluminium and copper facilities across India. With substantial captive power generation and energy-intensive smelting operations, Hindalco is an obligated entity under the CCTS. The company has set science-based targets and is investing in renewable energy, recycling-led decarbonisation, and operational efficiency to reduce its carbon footprint.

10.2 Renewable Energy and Green Hydrogen

1) NTPC Limited : India's largest power utility is undergoing a significant green transition through its subsidiary NTPC Green Energy. NTPC is developing green hydrogen, green methanol, and green ammonia hubs, including a landmark facility in Andhra Pradesh. NTPC signed an MoU with A.P. Møller-Maersk in December 2024 to supply green methanol to international shipping vessels.

2) ReNew Power : A leading independent power producer with a pipeline capacity of over 5.5 GW, ReNew Power is active in solar, wind, and storage projects across India, and is a significant potential participant in the offset mechanism.

3) Greenko Group : Specialising in large-scale pumped hydro storage and renewable energy projects, Greenko is among India's most significant green energy developers and a likely CCTS offset project participant.

10.3 Cement and Fertiliser

1) UltraTech Cement / Ambuja Cements: As the two dominant players in India's cement sector, one of the nine CCTS compliance sectors, both UltraTech and Ambuja are expected to be obligated entities. Cement decarbonisation remains particularly challenging given process emissions from calcination, making carbon credits an important compliance tool. Both entities are investing in alternative fuels, blended cements, and carbon capture feasibility assessments.

2) Dalmia Bharat (Dalmia Cement): A significant mid-tier cement producer with a strong presence in eastern and southern India, Dalmia Bharat has set an ambitious target of achieving carbon neutrality by 2040 — one of the earliest such commitments in the Indian cement industry. Dalmia is an obligated entity under the CCTS and has been actively investing in waste heat recovery, renewable energy, and low-clinker cement products.

3) Shree Cement: One of India's fastest-growing cement companies and among the lowest-cost producers globally, Shree Cement operates large integrated plants in Rajasthan, Uttarakhand, and Bihar. With high clinker-to-cement ratios and captive power operations, it is an obligated entity under the CCTS. Shree Cement has a track record of energy efficiency leadership and is exploring further decarbonisation through blended cements and renewable energy.

4) JK Cement: A mid-sized but regionally dominant cement manufacturer with a significant presence in northern India, JK Cement operates grey and white cement plants and has committed to reducing its specific carbon emissions. Its operations bring it within the CCTS compliance framework, and the company represents a key mid-market client for carbon accounting and offset advisory services.

5) India Cements: A leading cement manufacturer with strong roots in Tamil Nadu and a growing presence across southern India, India Cements is an obligated entity under the CCTS. The company operates multiple integrated plants and has been engaged in energy efficiency initiatives under the PAT scheme, providing a foundation for transition to CCTS compliance. It represents a strategic engagement opportunity given its regional market dominance.

6) Rashtriya Chemicals and Fertilizers (RCF) / IFFCO: Major fertiliser producers expected to be covered under the CCTS compliance mechanism for high-intensity nitrogen production. Both entities are PSUs actively exploring energy efficiency and green ammonia pathways. RCF operates plants in Maharashtra, while IFFCO is a farmer-owned cooperative with one of the largest fertiliser manufacturing capacities in Asia.

7) Coromandel International: A publicly listed fertiliser company with diversified operations in crop nutrition, crop protection, and retail agri-inputs, Coromandel International is one of India's leading phosphatic fertiliser producers. Its manufacturing facilities in Andhra Pradesh and Telangana fall within the CCTS obligated sector framework. Coromandel has been progressively investing in energy efficiency and is exploring sustainable agriculture solutions aligned with low-carbon production.

8) Gujarat State Fertilisers and Chemicals (GSFC): A Gujarat government-promoted fertiliser company with a long-standing presence in the nitrogen and phosphatic fertiliser segment, GSFC is an obligated entity under the CCTS for its energy-intensive ammonia and urea production operations. The company has an established track record under the PAT scheme and is exploring green ammonia and energy transition pathways, making it a relevant target for CCTS compliance and decarbonisation advisory.

10.4 Technology and MRV Enablers

1) Blockvolt Limited: A digital climate infrastructure platform delivering AI-powered dMRV, blockchain-enabled traceability, IoT-integrated monitoring, and secure carbon asset management to build transparent, high-integrity, and interoperable carbon markets.

2) Treeni Sustainability Solutions: A digital MRV and ESG data management platform operating in partnership with Ploxi Consult, enabling automated emissions monitoring and ICM Portal-compatible reporting for obligated entities and offset project developers.

3) Ploxi Earth: A digital sustainability platform, operating alongside Ploxi Consult, spanning ESG management, GHG and carbon accounting, and a decarbonisation marketplace connecting corporates with clean-tech vendors. It also supports certification and regulatory compliance (CBAM, ICTS, EPR) and enables environmental attributes trading, including I-RECs and carbon credits.

4) Bureau Veritas / TUV SUD / DNV: International verification bodies expected to seek ACVA accreditation under BEE's accreditation procedure, bringing global verification expertise to the nascent Indian ACVA ecosystem.

Note: Company information is based on publicly available announcements and government disclosures as of April 2026. This list is illustrative and not exhaustive.

11. Market Challenges and Capacity Constraints

While the CCTS framework is robust in design, its effectiveness will depend on the readiness of the supporting ecosystem particularly the availability of accredited verification capacity.
Stringent accreditation requirements, while necessary to ensure quality and integrity, may create entry barriers for new participants. Challenges such as high compliance costs, limited availability of skilled professionals, and operational complexities may constrain the supply of ACVA agencies in the initial phases.
Addressing these constraints requires targeted interventions across three dimensions:

- Capacity Building: BEE and the Ministry of Power should establish a dedicated ACVA development programme, potentially in partnership with established international bodies such as the UNFCCC and sector-specific industry associations, to accelerate the training and certification of MRV professionals across key obligated sectors.
- Accreditation Design: A tiered or provisional accreditation pathway could lower entry barriers for domestic verification bodies in the short term, with full accreditation requirements phased in as the market matures.
- Digital Infrastructure: The adoption of technology-enabled MRV systems including remote sensing, satellite monitoring, and automated data platforms, can reduce the cost and time burden of verification, particularly for forestry, agriculture, and land-use projects where ground-level monitoring is resource-intensive.

Together, these measures would materially improve verification throughput, reduce bottlenecks, and sustain market confidence as the CCTS scales.

12. Global Alignment and Strategic Outlook

India's carbon market framework demonstrates alignment with established international standards, including those followed by Verra, Gold Standard, and ISO frameworks for validation and verification bodies. Such alignment enhances the credibility and global acceptability of Indian carbon credits, while enabling potential integration with international carbon markets and compliance with emerging cross-border regulatory frameworks.

The operationalisation of Article 6 of the Paris Agreement, following the landmark COP29 agreement in Baku in November 2024, creates a pathway for internationally transferred mitigation outcomes (ITMOs). India's ability to generate high-integrity domestic carbon credits will determine the extent to which it can participate in, and benefit from, these emerging international linkages. A credible, well-functioning domestic market is therefore not only a climate policy instrument but also a strategic economic asset.

Looking ahead, the effectiveness and scalability of the CCTS will depend on targeted interventions including capacity building, process optimisation, adoption of digital MRV systems, and ecosystem expansion. As of 2025, 38 ETS systems are in operation globally, covering 19% of global GHG emissions (ICAP, 2025). India's entry as a major new system marks a significant expansion of the global carbon market landscape, particularly among large emerging economies.

13. Conclusion

India's Carbon Credit Trading Scheme represents a transformative step toward market-driven decarbonisation. The regulatory foundation is complete: BEE's dual procedures cover both the compliance and offset mechanisms in actionable detail. The institutional framework spanning MoP, MoEFCC, NSC-ICM, BEE, CERC, GCIL, and CPCB, provides the governance architecture needed for a credible market. And India's CDM and PAT heritage provides the institutional memory and technical capacity to make the transition viable.

The binding constraint, as this paper has argued, is verification infrastructure. The CCTS cannot scale at a faster rate than its ACVA ecosystem allows. Building this capacity domestically and in partnership with established international verification bodies is the single most important operational priority for the ICM in its first three years.

Early movers obligated entities that build GHG baselines now, offset project developers that register in Phase 1, and verification agencies that achieve ACVA accreditation before the compliance cycle peaks, will hold durable competitive advantages in a market that will deepen significantly over the next decade.

Viewed in a global context, India's CCTS is a significant addition to the world's emissions trading landscape. Its intensity-based design, dual-verification architecture, and integrated offset mechanism represent an original contribution to ETS design adapted to India's development context but informed by global best practice. With the right investments in verification infrastructure, institutional capacity, and digital MRV systems, the Indian Carbon Market has the potential to become one of the most significant and influential carbon trading systems among the world's emerging economies, a model that other developing nations may look to as they design their own market-based climate frameworks.

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