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Carbon Markets and Climate Justice in India: Legal Architecture, Compliance Challenges, and Equity Implications under the Carbon Credit Trading Scheme

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ABSTRACT

Carbon markets have emerged as a central policy instrument in global climate governance, aiming to reduce greenhouse gas emissions through market-based incentives. India's Carbon Credit Trading Scheme (CCTS), introduced under the Bharatiya Nyaya Sanhita framework of climate action and energy transition, represents a major step toward institutionalizing a domestic carbon market. This abstract critically examines the evolving legal architecture of the CCTS, assessing its interaction with existing environmental laws, regulatory bodies, and compliance mechanisms. The analysis highlights how India seeks to balance economic growth with emission reduction commitments, including the transition toward mandatory sectoral caps and measurement, reporting, and verification (MRV) standards.

At the same time, carbon markets raise complex questions of climate justice. The paper explores the equity implications for vulnerable communities, especially those dependent on land-based livelihoods, who could face disproportionate compliance burdens or exclusion from carbon revenue opportunities. It also evaluates transparency, accountability, and safeguard provisions to ensure that market benefits do not bypass local stakeholders. By situating India's carbon market within broader global and domestic climate justice debates, this study identifies gaps in institutional design and recommends inclusive reforms to strengthen environmental integrity and social equity. The research concludes that the success of India's carbon markets will depend on embedding justice-oriented principles into the operational framework of the CCTS.

Keywords: *Carbon markets; Carbon Credit Trading Scheme; Climate justice; Legal framework; Compliance challenges; Equity implications*

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I. INTRODUCTION

Carbon markets aim to cap greenhouse gas emissions by creating tradeable emission allowances or credits, enabling emitters to buy and sell the right to emit. Under a cap-and-trade framework, entities that reduce emissions more than required can sell allowances to those that exceed their targets, promoting cost-effective decarbonisation[2]. India has now introduced a formal carbon credit trading scheme (CCTS) under the amended Energy Conservation Act, 2001 to harness this mechanism. This development comes as India seeks to meet its updated Nationally Determined Contribution of a 45% emissions intensity reduction by 2030 (from 2005 levels) and achieve net-zero by 2070[3]. India's approach must balance development and decarbonisation, reflecting climate justice concerns – i.e. fair sharing of burdens and benefits, given India's developmental needs and its limited historical emissions. The Supreme Court of India has recently recognised a constitutional right to live free from the adverse effects of climate change[4], underscoring that climate mitigation measures must uphold fundamental rights. In this context, the CCTS seeks to integrate emissions trading with India's energy conservation policies, while posing challenges of compliance, environmental integrity, and equity. This article examines the legal and policy framework of India's carbon market, analyses the design of the compliance and voluntary offset mechanisms, compares CCTS with other major systems (EU, China, California), explores climate justice issues (including the landmark *M.K. Ranjitsinh v. Union of India* judgment), and proposes reforms to ensure the scheme's effectiveness and fairness.

II. LEGAL AND POLICY FRAMEWORK FOR INDIA'S CARBON MARKET

A. Energy Conservation Act and Amendments

India's carbon trading framework is anchored in the Energy Conservation Act, 2001 (ECA), originally enacted to promote energy efficiency and conservation through standards, codes and the Bureau of Energy Efficiency (BEE)[5]. In 2022 the Act was comprehensively amended to

[2] CGEP, C.| (2024) *Lessons for Structuring India's carbon market to support a cost-efficient energy transition - center on Global Energy Policy at Columbia University Sipa: CGEP*, *Center on Global Energy Policy at Columbia University SIPA | CGEP*. Available at: https://www.energypolicy.columbia.edu/publications/lessons-for-structuring-indias-carbon-market-to-support-a-cost-efficient-energy-transition/ (Accessed: 28 January 2026).

[3] *Indian Carbon Credit Trading Scheme* (no date) *International Carbon Action Partnership*. Available at: https://icapcarbonaction.com/en/ets/indian-carbon-credit-trading-scheme (Accessed: 28 January 2026).

[4] Nirula, M. (2024) *Guest blog: Pioneering decision from the Indian Supreme Court recognizing freedom from the adverse effects of climate change as a fundamental right.*, *Climate Law Blog*. Available at: https://blogs.law.columbia.edu/climatechange/2024/08/28/guest-blog-pioneering-decision-from-the-indian-supreme-court-recognizing-freedom-from-the-adverse-effects-of-climate-change-as-a-fundamental-right/ (Accessed: 28 January 2026).

[5] *The Energy Conservation (Amendment) Bill, 2022* (2026) *PRS Legislative Research*. Available at: https://prsindia.org/billtrack/the-energy-conservation-amendment-bill-2022 (Accessed: 28 January 2026).

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enable a domestic carbon market[6]. The amendments explicitly empower the central government to "specify the carbon credit trading scheme" and mandate a minimum share of non-fossil energy consumption for designated entities. A new Section 14AA was inserted, allowing the government or authorized agencies to issue Carbon Credit Certificates (CCCs) to registered entities that over-achieve their prescribed emissions intensity targets. Thus, the legal amendment provides the basis for a market in tradeable carbon credits: entities emitting less (than their baseline path) earn CCCs, while those emitting more must buy and surrender credits.

Under the ECA, the Bureau of Energy Efficiency (BEE) is charged with prescribing energy conservation standards and incentivising savings. In practice, India already had a partial carbon market through the Perform, Achieve and Trade (PAT) scheme (launched 2012), which set energy efficiency targets for 13 energy-intensive sectors and issued tradable Energy Savings Certificates (ESCerts) to outperformers[7]. PAT has covered over 1,000 industrial units (e.g. in steel, cement, chemicals, power) and achieved substantial energy savings. However, PAT is an efficiency-based mechanism under the ECA, not a greenhouse-gas cap-and-trade per se. The CCTS builds on PAT's infrastructure and entities but shifts to an explicit carbon-pricing incentive. Concurrently, the ECA's other provisions – such as standards for appliances, vehicles, and buildings – lay the groundwork for reducing energy demand in line with climate goals.

Related policies complement the CCTS. The Electricity Act, 2003 and sectoral regulations impose Renewable Purchase Obligations (RPOs) on power and distribution companies to source a minimum share of electricity from renewables. Notably, the ECA amendment introduces a Non-Fossil Fuel Share (NFPS) obligation for large consumers, similar to RPO, effectively mandating a minimum consumption of low-carbon energy. This NFPS (or Renewable Purchase Obligation for non-discoms) is intended to reduce carbon intensity in the power sector. At the same time, the Ministry of New and Renewable Energy (MNRE) manages schemes like Renewable Energy Certificates (RECs) for solar/wind, and the Ministry of Environment, Forest and Climate Change (MoEFCC) pursues afforestation through its Green India Mission. Collectively, these measures signal that India's carbon market is emerging within a broader legal regime of energy efficiency, renewable promotion, and environmental protection.

[6] The Energy Conservation Amendment Act, 2022.

[7] CGEP, C.| (2024a) *Lessons for Structuring India's carbon market to support a cost-efficient energy transition - center on Global Energy Policy at Columbia University Sipa: CGEP*, *Center on Global Energy Policy at Columbia University SIPA | CGEP*. Available at: https://www.energypolicy.columbia.edu/publications/lessons-for-structuring-indias-carbon-market-to-support-a-cost-efficient-energy-transition/ (Accessed: 28 January 2026).

B. Institutional Architecture and Regulations

Following the ECA amendment, the government moved to set up the institutional framework for CCTS. In June 2023, the Ministry of Power issued a notification launching the Indian Carbon Market (ICM) framework[8]. This established the National Steering Committee for the Indian Carbon Market (NSCICM), chaired by the Cabinet Secretary, to govern the carbon market. NSCICM defines roles and responsibilities: BEE acts as the ICM Administrator (coordinating registration of entities, accreditation of verifiers, and implementing compliance)[9], while the Central Electricity Regulatory Commission (CERC) serves as the trading regulator (overseeing transactions on power exchanges, preventing market manipulation, and ensuring transparency)[10]. The Grid Controller of India Ltd. (an arm of the power grid operator) is designated as the registry to record CCC issuance and transfers. The Central Electricity Regulatory Commission is empowered to regulate trading arrangements, and all transactions must occur on approved exchanges (no over-the-counter trading allowed initially). Thus, the CCTS builds on existing electricity trading infrastructure, with BEE, CERC, and the registry cooperating under NSCICM oversight.

In October 2023 BEE released detailed Draft Procedures for Compliance which were finalized by July 2024. The regulations define the Compliant Market as an intensity-based, baseline-and-credit system. Covered entities – initially nine industrial sectors drawn from the PAT scheme (aluminium, chlor-alkali, cement, fertilizers, iron and steel, pulp and paper, petrochemicals, petroleum refining, textiles) – receive multi-year emissions intensity targets (tCO_2e per unit of output) set by MoEFCC in consultation with technical committees. These targets form each entity's baseline and are updated every three years to allow long-term planning. Entities that exceed their target (i.e. emit less than allowed) earn CCCs equal to the avoided emissions; entities that fall short must purchase and surrender CCCs to cover the gap. The BEE issues CCCs denominated in metric tons, and registers all participating entities on a secure online registry. Once cleared to trade, CCCs are freely bankable (no limit on carryover) but borrowing is disallowed, ensuring that over-compliance benefits can be saved for future use, while stringency gradually tightens.

For the **Offset Mechanism**, the government established a parallel voluntary crediting scheme

[8] *Indian Carbon Credit Trading Scheme* (no date a) *International Carbon Action Partnership*. Available at: https://icapcarbonaction.com/en/ets/indian-carbon-credit-trading-scheme (Accessed: 28 January 2026).
[9] *Carbon seed : Carbon credit trading in India: Framework, compliance, case studies, and future market potential*. Available at: https://www.researchgate.net/publication/394435316_Carbon_Seed_Carbon_Credit_Trading_in_India_Framework_Compliance_Case_Studies_and_Future_Market_Potential (Accessed: 28 January 2026).
[10] Ibid.

under CCTS. A notification (Dec 2023) opened registration for "non-obligated entities" (i.e. projects outside the compliance sectors) from 1 January 2025[11]. Ten broad project categories are currently eligible – e.g. renewable energy, industrial energy efficiency, waste handling, agriculture (manure management), forestry (afforestation of degraded land), fugitive emissions capture, and solvent use – with detailed methodologies to be notified by BEE. Accredited Carbon Verifiers (ACVs) are to be appointed by BEE to validate project emission reductions, under strict MRV guidelines. Credits from eligible projects will be issued as CCCs and can be traded domestically. Importantly, India's design links the voluntary scheme with Paris Article 6 rules: projects matching activities in the Article 6.2 "activity list" (published by MoEFCC for the first 3 years) may seek "corresponding adjustments" to sell credits internationally, whereas credits from projects not on the list can be sold in the voluntary global market but the associated emission reductions will be counted against India's NDC (avoiding double-counting). This anticipates the Article 6 framework while maintaining national oversight.

III. COMPLIANCE MECHANISM UNDER CCTS

A. Sectoral Coverage and Targets

The compliance portion of CCTS applies a **"gate-to-gate"** approach, covering direct (Scope 1) and indirect (Scope 2) emissions from participating industrial installations, as well as certain upstream/downstream Scope 3 emissions (e.g. imports/exports of intermediate products). In its initial phase (FY 2025–26), CCTS will cover roughly 800 entities in the nine PAT sectors. Each entity's baseline emissions intensity is set using its performance in FY 2023–24 as the reference. Over the first six-year trajectory period, annual targets are specified by linearly reducing the intensity at sector-specific rates. These trajectories (for example, a 5% or 6% reduction per three-year cycle) are designed to be ambitious enough to meet India's NDC while considering available technologies and economic growth. The targets for FY2025–26 and 2026–27 were notified in April 2025 via "Draft GHG Emission Intensity Target Rules", applying sectoral reduction rates from ~3.6% (cement) up to 7.1% (chlor-alkali) over the two years. The process for target-setting involves the BEE recommending targets to the Ministry of Power (in consultation with industry committees), which forwards them to the Ministry of Environment, Forests & Climate Change (MoEFCC) for official notification under the Environment (Protection) Act, 1986. This multi-agency procedure is intended to balance industry feasibility with climate ambition.

[11] https://www.ieta.org/uploads/wp-content/Resources/Busines-briefs/2025/IETA_Business_Brief-India_July_final-one.pdf

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B. Allowance Issuance and Trading

Under the scheme, entities that **outperform** their annual targets receive a number of CCCs equal to the emission reduction achieved (i.e. difference between baseline and actual intensity times output)[12]. These credits can be banked or sold on exchanges. Conversely, entities that **underperform** must procure CCCs to surrender to the regulator, ensuring compliance. All trading is conducted on power exchanges under the supervision of CERC. The market operates via freely issued CCCs (no auctions initially), with baseline allocations effectively embedded in the targets. The lack of an absolute cap means that cumulative emissions are not fixed in advance; instead, the sum of all entities' intensity-based targets forms a bottom-up emission's "limit"[13]. According to the ICAP analysis, "the total emissions limit under the CCTS is the sum of the bottom-up output-based emissions limits for all individual covered entities; however, the bottom-up limits do not represent an absolute cap". This reflects an output-intensity approach more akin to a performance standard than a rigid cap, which can be phased into a stricter regime later as data improves.

Allowances (CCCs) will be tradable in tonnes of CO_2, with participants required to register on the national registry. Initially, CCCs will trade on the Indian Energy Exchange (or similar platforms), with no over-the-counter trades allowed. Market participants will include all regulated entities and any non-covered entities that opt in. To maintain integrity, BEE has set up rigorous **monitoring, reporting, and verification (MRV)** protocols: covered facilities must measure fuel and electricity use (scope 1 and 2) continuously or periodically, apply Indian or international standards for calorific values, and use accredited laboratories for emission factors[14]. Annual GHG reports are submitted to BEE and State Designated Agencies, with independent third-party verification required. This builds on the PAT/MRV infrastructure, leveraging existing energy auditors and data systems.

C. Compliance Enforcement and Penalties

The CCTS regulations include enforcement tools to ensure that targets are met. Any entity failing to surrender the required CCCs in time will face financial penalties. Notably, draft rules specify an **"environmental compensation"** equal to twice the average CCC trading price for that year[15]. For example, an industry missing its target might have to pay twice the prevailing

[12] *Indian Carbon Credit Trading Scheme* (no date) *International Carbon Action Partnership*. Available at: https://icapcarbonaction.com/en/ets/indian-carbon-credit-trading-scheme (Accessed: 28 January 2026).
[13] Ibid.
[14] ibid
[15] *Bee notifies carbon intensity targets for 282 obligated entities under compliance market | by Universal Carbon Registry | Medium*. Available at: https://medium.com/@UniversalCarbonRegistry/bee-notifies-carbon-intensity-

credit price for each tonne of excess emissions. This makes non-compliance expensive and discourages free-riding. The penalty must be paid within 90 days of imposition, and failure to do so could trigger additional sanctions (under the provisions of the EP Act and the ECA). CERC/CERC-backed adjudicatory bodies will likely oversee disputes and penalties. These enforcement measures echo practices in other jurisdictions: for instance, China's new ETS regulations impose stricter fines and mandatory allowance surrender for violators[16]. India's compliance mechanism is still evolving, but the clear framework for penalties and progressive targets provides a basis for credible enforcement of the scheme.

IV. OFFSET MECHANISM AND VOLUNTARY MARKET RISKS

A. Structure of the Offset Scheme

The CCTS includes an explicit domestic offset programme to incentivise reductions outside the nine regulated sectors. This mechanism allows *non-obligated entities* (e.g. small industries, agriculture, forestry projects) to generate and register eligible projects that reduce, remove or avoid GHGs. Projects must fall in approved categories and follow methodologies prescribed or adapted from international standards. Verified emission reductions are issued as CCCs which can be sold in the compliance market or voluntarily. The offset component aims to broaden participation, drive decarbonisation beyond heavy industry, and bolster market liquidity. Non-obligated entities (including municipalities, farmers' cooperatives, or private firms) can register with BEE and have their projects validated by an **Accredited Carbon Verifier (ACV)**. The BEE opened such registrations in June 2025, alongside applications for ACV accreditation.

The offset scheme functions like a domestic Clean Development Mechanism. It is entirely voluntary – there is no obligation to use or purchase these credits – but it can provide revenue to project developers and encourage sustainable practices. The design deliberately permits linkage with international carbon markets: if an offset activity is on India's Article 6.2 eligibility list, its CCCs can be authorised for sale overseas (with corresponding adjustments). Otherwise, the credits can be sold on the global voluntary market, albeit with the understanding that reductions count against India's NDC[17]. This scheme is expected to launch in 2025 alongside the compliance market, creating India's first national carbon crediting mechanism.

targets-for-282-obligated-entities-under-compliance-market-1b248eb60ce1 (Accessed: 28 January 2026).

[16] CGEP, C.| (2024a) *Lessons for Structuring India's carbon market to support a cost-efficient energy transition - center on Global Energy Policy at Columbia University Sipa: CGEP*, *Center on Global Energy Policy at Columbia University SIPA | CGEP*. Available at: https://www.energypolicy.columbia.edu/publications/lessons-for-structuring-indias-carbon-market-to-support-a-cost-efficient-energy-transition/ (Accessed: 28 January 2026).

[17] Supta note 11.

B. Integrity and Risk in the Voluntary Market

While offsets can mobilise emission cuts in agriculture, waste, forestry and other sectors, they also carry well-known risks. Globally, voluntary carbon markets (VCMs) have been criticized for poor-quality credits that fail to deliver real climate benefits. A recent civil-society report found that among the 47 largest offset projects worldwide, 80% of credits were "problematic" – non-additional, non-permanent, or over-credited[18]. Remarkably, **nine of these top-100 projects were in India** (mostly large-scale solar, wind and hydro projects). These projects often benefited from policy incentives (e.g. feed-in tariffs or renewable mandates), calling into question whether carbon payments truly "enabled" them. The report concluded that such credits "could not be reliably counted on to deliver promised emissions reductions", highlighting endemic VCM flaws like exaggerating baselines, double-counting, or ignoring leakage[19]. Thus, India's offset scheme inherits these challenges: if project baselines are set leniently, or if projects would have happened anyway, the integrity of Indian credits will be undermined.

Domestic experts echo these concerns. The Council on Energy, Environment and Water (CEEW) notes that procedural bottlenecks and misaligned incentives plague India's nascent offset market[20]. For example, carbon project developers may lack clarity on registration rules, while different ministries hold fragmented data. There is a risk that stronger sectors (like large enterprises) could capture most credits, leaving small or rural stakeholders sidelined. Without rigorous standards, offsets may degenerate into a public relations exercise ("greenwashing") rather than genuine mitigation. India must therefore set stringent criteria for additionality (proving that projects rely on carbon revenue), permanence (ensuring benefits last), and leakage (avoiding offshoring of emissions). Borrowing from CA's example, the CCTS may consider qualitative limits: for instance, California allows just six project types and caps offsets at 4–6% of compliance requirements[21]. Similarly, India should ensure that offsets form only a limited portion of its compliance regime (Columbia analysts advise an "offset limit to a small share of the market"[22]), and perform periodic audits of issued credits. Enforcement mechanisms (such

[18] Shankar, P. (2025) *Nine projects in India produced 'problematic' carbon credits in 2024, says report*, *Mongabay*. Available at: https://india.mongabay.com/2025/07/nine-projects-in-india-produced-problematic-carbon-credits-in-2024-says-report/ (Accessed: 28 January 2026).

[19] Ibid.

[20] (No date a) *India's voluntary offset scheme in Carbon Credit Trading Market*. Available at: https://www.ceew.in/publications/voluntary-carbon-offset-mechanism-and-challenges-in-carbon-credit-trading-scheme-market-for-india (Accessed: 28 January 2026).

[21] *USA - California Cap-and-Trade Program: International Carbon Action Partnership* (no date) *USA - California Cap-and-Trade Program | International Carbon Action Partnership*. Available at: https://icapcarbonaction.com/en/ets/usa-california-cap-and-trade-program (Accessed: 28 January 2026).

[22] CGEP, C.| (2024a) *Lessons for Structuring India's carbon market to support a cost-efficient energy transition - center on Global Energy Policy at Columbia University Sipa: CGEP*, *Center on Global Energy Policy at Columbia University SIPA | CGEP*. Available at: https://www.energypolicy.columbia.edu/publications/lessons-for-

as "buyer liability" like in California, which empowers the regulator to invalidate non-conforming credits) could strengthen oversight. Transparency is also key: a publicly accessible registry of projects and credits (with methodologies and documentation) would allow civil society scrutiny. Given India's commitments under Article 6, the domestic offset scheme is also expected to align with evolving international guidelines (e.g. Article 6.4 standards for methodology approval), which can raise the bar on credit quality.

V. COMPARATIVE ANALYSIS: EU, CHINA AND CALIFORNIA

Placing India's CCTS in a global context reveals similarities and differences with established systems. The **EU Emissions Trading System (EU ETS)** (operational since 2005) is the largest and oldest carbon market. It sets an absolute emissions cap across power generation, industry and aviation in the European Economic Area. Allowances are primarily auctioned, with free allocation to sectors at risk of carbon leakage, and no use of offset credits is allowed. The EU ETS has progressively tightened its cap, yielding steep emissions cuts (over 47% below 2005 levels by 2023) and high prices (around €60/ton in 2024). It recently expanded scope (to maritime and plans for transport/buildings under a separate ETS2) and introduced the Market Stability Reserve to adjust the cap. The EU's approach of an absolute cap with declining allowances contrasts with India's intensity-based, no-total-limit scheme. A key lesson from the EU is the value of **auctioning with revenue use**: since 2008 the EU has generated over €180 billion, used to fund innovation and social support. India's CCTS currently issues credits freely, but may consider phased auctions in future phases (as per best practice, "gradually reducing free allocation while increasing auctions"). Importantly, the EU's ETS is backed by stringent MRV and regulatory enforcement, a benchmark for India as it scales up.

China's **national ETS** (launched 2021) differs structurally from both EU and India. It is the world's largest by covered emissions (~8,000 $MtCO_2e$, over 60% of China's CO_2). Initially it covers only the power sector, with full free allocation of allowances based on output-based benchmarks[23]. China has used an intensity-style allocation (benchmarks) and, until very recently, no allowances were auctioned. In 2024 China relaunched its national **Certified Emissions Reduction (CCER)** offset program, and has enacted "Interim Regulations" providing legal underpinning and penalties for its ETS[24]. The Chinese market has struggled with data integrity and compliance (e.g. historic under-surrender of allowances)[25]. India can

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[23] *China National ETS* (no date) *International Carbon Action Partnership*. Available at: https://icapcarbonaction.com/en/ets/china-national-ets (Accessed: 28 January 2026).

[24] Ibid.

[25] CGEP, C.| (2024a) *Lessons for Structuring India's carbon market to support a cost-efficient energy transition -*

draw on these experiences: the Chinese move to formalize its ETS with stricter penalties (fine for non-surrender, tighter MRV) suggests that India too should invest in enforcement capacity. Also, China's plan to introduce auctions gradually (as signaled in the new regulations) aligns with the global trend of moving from free allocations to auctions over time. Both China and India started with energy-intensive industries; unlike China's sectoral mandate, India from the outset is explicitly intensity-based with voluntary offsets.

California's **Cap-and-Trade Program** (operational since 2013, linked with Québec) offers another model. It covers roughly 76% of California's emissions, including power, industry, transport fuel, buildings and waste. California allocates allowances through a mix of auctions and free (benchmarked) distribution, and tightens its cap annually. Significantly, it allows *domestic carbon offsets* (six project types: forestry, urban forestry, livestock, ozone-depleting substances, coal mine methane, rice cultivation) with a quantitative limit (4–6% of an entity's obligation). Offsets must meet strict protocols and provide "direct environmental benefits" to California; moreover, the program enforces "buyer liability" – if an offset is later invalidated, the user must replace it. Revenues from California's auctions are channeled into climate investments, especially in disadvantaged communities, exemplifying a just-transition approach. For India, California's experience suggests several insights: linking trading across jurisdictions (California-Quebec) can expand market liquidity; limited offsets with rigorous protocols can be allowed if accompanied by safeguards; and using auction revenues for equitable purposes (e.g. renewable subsidies or adaptation in poor regions) can address justice concerns. Currently, India's CCTS is not directly linked to any external ETS, but parallel markets (like RGGI or the Western Climate Initiative) hint at the potential for future linkage. **Key lessons** from these systems include:

1. **Phase-in design**: As Columbia researchers note, successful markets often start with generous free allocations (to build political support and let industry adjust) but require stringent MRV from day one. Over time, auctions should increase to reflect the cost of carbon and raise finance for climate action. India's initially free CCC issuance and phase-in of sectors mirror this approach.
2. **Offset limits**: All mature ETSs limit offsets. The EU prohibits them for compliance; California limits them to 4–6%; China is tightening its voluntary offset program after

center on Global Energy Policy at Columbia University Sipa: CGEP, *Center on Global Energy Policy at Columbia University SIPA | CGEP*. Available at: https://www.energypolicy.columbia.edu/publications/lessons-for-structuring-indias-carbon-market-to-support-a-cost-efficient-energy-transition/ (Accessed: 28 January 2026).

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past over-issuance. Experts advise capping Indian offsets at a modest share of obligations to prevent dilution of the cap.

3. **Governance and enforcement**: China's interim rules underscore the need for clear penalties and inter-agency coordination. India should ensure NSCICM, state agencies and regulators have non-overlapping mandates, and that accountability mechanisms are robust (e.g. performance audits of ACVs, CERC oversight of trading)[26].
4. **Social safeguards**: The EU and California have introduced dedicated funds (Social Climate Fund, Climate Investments) to cushion low-income consumers. India may similarly consider using future carbon revenues to fund energy access and job retraining in carbon-intensive regions.

VI. CARBON MARKETS AND CLIMATE JUSTICE

Climate justice in India entails recognising that poorer populations (and generations) suffer disproportionately from climate impacts, despite contributing little to emissions. Carbon pricing policies must therefore be equitable. The Supreme Court of India has recently elevated climate protection into the realm of fundamental rights. In *M.K. Ranjitsinh v. Union of India (2024)*, a five-judge bench held that the Constitution guarantees individuals a "right to be free from the adverse effects of climate change", rooted in Articles 21 (right to life) and 14 (equality). Although *Ranjitsinh* arose from a case about bird species preservation, the Court obiter declared this new right, reinforcing earlier holdings that the right to life includes "the right to health, a clean environment, and the basic necessities of life". By constitutionalising climate rights, *Ranjitsinh* implies that government policies like CCTS must demonstrably advance people's right to a sustainable environment.

Implications for CCTS are significant. First, recognizing climate rights places a legal obligation on the state to ensure that any climate policy is effective and non-discriminatory. If CCTS fails to reduce emissions as promised, or if it unjustly burdens certain groups, affected citizens could challenge it in court. For example, if offset projects displace forest-dependent communities without consent, those communities might claim violation of their Article 21 right. The horizontal application of environmental rights (as hinted by the Court in *Ranjitsinh*) suggests private project developers could also be held responsible for climate harm. Thus, CCTS must integrate justice safeguards: ensuring project-affected people have information and

[26] *Carbon seed : Carbon credit trading in India: Framework, compliance, case studies, and future market potential*. Available at: https://www.researchgate.net/publication/394435316_Carbon_Seed_Carbon_Credit_Trading_in_India_Framework_Compliance_Case_Studies_and_Future_Market_Potential (Accessed: 28 January 2026).

grievance redress, that vulnerable industries are given transition support, and that carbon revenues fund adaptation for the poor. Transparency and public participation are therefore not just best practice but constitutional imperatives.

Secondly, *Ranjitsinh* underscores the **precautionary principle** inherent in the right to a healthy environment. The carbon market should err on the side of higher ambition. Under a rights framework, intensifying targets over time (as the law already plans) is appropriate.

In short, climate justice demands that CCTS benefits be equitably shared and burdens fairly allocated. The Government should ensure that carbon pricing revenues (eventual auction funds or penalties) are used to help poor communities adapt (e.g. solarisation of low-income homes, rural employment schemes). In design and implementation, the scheme must align with India's constitutional commitment to protect life and livelihood from climate change.

VII. CASE STUDIES OF INDIAN CARBON CREDIT PROJECTS

Indian industries and organisations have already engaged with carbon markets through the Clean Development Mechanism (CDM) and voluntary programs[27]. Examining these cases sheds light on practical challenges and successes.

1. **Gujarat Fluorochemicals Ltd (GFL)** – In the early CDM era, GFL destroyed HFC-23 (a byproduct from HCFC-22 manufacture) using advanced incinerators. This project was enormous: it generated 876 crore INR in revenue from CERs. As an early mover, GFL's success was due to tackling a large-volume, high-global-warming gas and securing UN certification. This example shows the value of targeting potent emissions for credits, but also highlights CDM criticisms (HFC-23 destruction projects drew allegations that credits incentivised production of the gas as a profitable by-product).

2. **SRF Limited** – SRF undertook a clean technology upgrade in its fluorochemical plant. The project earned 772,000 CERs (sold at roughly €22 each) for over INR 64 crore. SRF's case demonstrates that even modest emissions cuts can yield significant revenue if priced well. Crucially, SRF invested in robust verification and engaged carbon auditors early, ensuring credibility.

3. **Delhi Metro Rail Corporation (DMRC)** – The DMRC's CDM project certified 630,000 credits by shifting urban commuters from road vehicles to electric metro trains. This was globally notable as the first metro system to earn UN-verified credits. The project's significance lies in its "behavioral" emissions reduction (fewer cars on roads), achieving large-

[27] *Ibid.*

scale impact outside a factory. It highlights how infrastructure projects can be eligible (and successful) credits generators.

4. **JSW Steel** – This steel major installed Corex smelters (innovative technology replacing traditional blast furnaces) to cut CO_2 emissions. The upgrades resulted in approximately $225 million worth of CO_2 savings. Although exact credit figures are proprietary, JSW's investment in cleaner technology exemplifies how modernisation can both reduce emissions and create credits.

5. **Kalpatru Power Transmission Ltd (KPTL)** – KPTL established a biomass cogeneration plant burning mustard crop waste. It became India's first UN-approved biomass CDM project. By turning agricultural residue (a rural byproduct) into energy and credits, KPTL merged rural development with carbon finance. This model (jointly improving farmer incomes and cutting diesel usage) is a template for agro-industrial projects.

Across these industrial case studies, common success factors emerge: early engagement with carbon markets, large-scale and technically sound projects (so reductions are unambiguous), rigorous third-party verification, and astute market timing when selling credits. Companies integrated carbon projects into broader business strategies, seeing credits as both revenue and part of their corporate sustainability commitments. These cases also illustrate challenges: high upfront investment, need for specialised knowledge, and changing international prices.

On the nature-based side, **afforestation and conservation projects** show promise, though none have yet generated large carbon portfolios under CCTS (the scheme is too new). Two notable initiatives reflect this potential:

1. **Reliance's Vantara Conservation Campus** – Opened in 2024, this 3,500-acre wildlife rehabilitation and plantation facility (at Jamnagar refinery) is envisioned as a massive carbon sink. Vantara (Sanskrit for "star of the forest") hosts over 2,000 staff tending to wildlife, wetlands and forests. It exemplifies how a corporate can convert land into long-term sequestration. While primarily aimed at wildlife and ESG branding, it is expected to generate future carbon credits as vegetation matures.
2. **BCCI's "Dot Ball Forest" Initiative** – The Board of Cricket Control in India pledged (from 2025) to plant one mangrove (or appropriate tree) for every "dot ball" bowled in domestic and international matches. With thousands of dot balls per season, this is scaled afforestation tied to popular culture. Over time (10–20 years), these plantations can sequester significant CO_2, generating CCCs. It represents an innovative, community-engaging model for credits.

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Each project type – industrial abatement or land-based – entails social considerations. For instance, forestry projects must secure land rights and involve local communities to ensure "sustainable development" co-benefits. The "Dot Ball" and Vanatra projects inherently involve government/state support and thus navigate possible regulatory and land-tenure complexities. These case studies demonstrate India's diverse carbon activities: from multinational firms to public institutions, and from pure emission cuts to ecosystem restoration. They also underscore the importance of domestic expertise: companies that understood international carbon rules (like GFL, SRF) reaped rewards, while new entrants will need guidance to avoid past pitfalls.

VIII. TRANSPARENCY, GOVERNANCE AND EQUITY SAFEGUARDS

A credible carbon market requires strong governance, transparency, and social safeguards. India's framework addresses some of these but improvements are needed.

1. **Governance and Oversight:** The tripartite institutional design (BEE administrator, CERC regulator, GCIL registry) provides checks and balances. However, experts caution that overlapping mandates could cause confusion[28]. For example, the Ministry of Power, MoEFCC and BEE all play roles in setting targets and issuing CCCs. To prevent conflicts, NSCICM should ensure clear protocols: each body's scope (technical target-setting versus legal enforcement) must be delineated. Coordination with state pollution control boards (for MRV) must be streamlined. The Supreme Court's recent emphasis on constitutional rights implies judicial oversight: citizens could petition the court if regulators fail to act on non-compliance or if the market's integrity is compromised. In practice, disputes (e.g. over MRV data or penalty imposition) may require the appointment of expert tribunals or a specialized environmental court, as *Ranjitsinh* judges have encouraged.

2. **Transparency:** Public disclosure is essential. All covered entities, their emission data, and credit trades should ideally be posted on an accessible registry. The EU's CITL and California's CITSS provide models. Currently, the power exchanges will handle trading, and entities must report annually. To build trust, the government could publish annual **compliance reports** summarising aggregate emissions, credit issuance, trading volumes and prices. The NSCICM could consider an independent market surveillance mechanism (similar to commodity or securities regulators) to detect manipulation. Price discovery on exchanges will help

[28] CGEP, C.| (2024a) *Lessons for Structuring India's carbon market to support a cost-efficient energy transition - center on Global Energy Policy at Columbia University Sipa: CGEP*, *Center on Global Energy Policy at Columbia University SIPA | CGEP*. Available at: https://www.energypolicy.columbia.edu/publications/lessons-for-structuring-indias-carbon-market-to-support-a-cost-efficient-energy-transition/ (Accessed: 28 January 2026).

internalize the carbon cost, but India should monitor for excessive volatility or cornering by a few players.

3. **Equity and Justice Safeguards:** The scheme must uphold the principles of climate justice. First, revenue use and burden sharing. If in future phases India auctions allowances, proceeds should be earmarked to support low-income groups and vulnerable sectors. For now, the "twice-the-price" penalty transfers funds to government, so those funds could be ring-fenced for renewable energy projects in rural areas, energy-efficiency subsidies for poor households, or climate adaptation initiatives for farmers. Second, differential treatment: India may consider providing transition assistance to smaller industries or those in poorer regions. For example, textile units in less-developed states should not face the same carbon burden without support (otherwise the policy could spur economic inequality). Third, participation by marginalized communities in offset projects must be safeguarded. Guidelines could require that any forestry or biogas project obtain **Free, Prior and Informed Consent (FPIC)** from local tribal and forest communities, and that they share in credit revenues (similar to benefit-sharing norms in REDD+). Fourth, to protect small entities, BEE could group smaller plants so they too can earn credits collectively, rather than leaving them excluded by scale thresholds. In California, a portion of climate fund is set aside specifically for community-based projects; India could create a similar "Green Climate Justice Fund" financed by auctioning a minor share of CCCs or penalties.

Finally, under Article 6 of the Paris Agreement, international linkage raises equity issues too. If India sells credits abroad, it must ensure that domestic climate goals are not compromised. Any imported profits (through Article 6 trading) should include contributions to global funds or technology transfers that benefit developing countries. India has indicated it will identify eligible Article 6 projects (as seen in its whitelist)[29], but any bilateral deals (Article 6.2) should adhere to sustainable development criteria. In summary, embedding justice into CCTS means proactive use of revenue and robust inclusion of vulnerable groups, consistent with India's constitutional and international commitments.

IX. RECOMMENDATIONS FOR STRENGTHENING CCTS

Based on the above analysis, the following recommendations can enhance the CCTS's effectiveness and fairness:

[29] Supra Note 11.

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1. **Institutional Clarity and Capacity:** NSCICM must regularly review and publish the roles of agencies. Consider establishing an independent oversight unit (with representation from environment ministry, industry, civil society) to audit the carbon market's operation. Expand training for BEE, state agencies and verifiers to handle the technical load. Clearly empower CERC to enforce market rules and impose penalties swiftly. Explore creation of specialist environmental courts or arbitration panels to resolve disputes under CCTS.

2. **Robust Safeguards:** Adopt strict standards for offset projects: require third-party certification of additionality and permanence, and enforce a "buyer liability" rule (so that if a credit is later invalidated the holder must replace it)[30]. Limit the share of total compliance that can be met with offsets (for example, start with <5%, review after 2-3 years). Mandate that all offset projects include gender and social inclusion criteria (e.g. local job creation, equitable benefit-sharing) to protect communities and women farmers.

3. **Transparency Measures:** Make emissions and credit data publicly accessible (online dashboard) to allow independent verification and civil society oversight. Release annual market performance reports. Use blockchain or secure digital platforms (as hinted by industry visionaries) to track credits and prevent fraud. Engage NGOs and academic experts in monitoring for "greenwashing."

4. **Equitable Revenue Use:** When auctioning is introduced, legislate use of a significant fraction (e.g. 50%) of revenues for a **Just Transition Fund** or climate adaptation programmes in poor regions. Even pre-auction, actively direct penalty proceeds to a national climate development fund. Provide technical and financial support to small industries to upgrade clean technologies, so they are not unduly harmed by compliance costs.

5. **Phased Integration of Article 6:** Align CCTS methodologies with UN-approved Art.6.4 methodologies to enable eventual linkage. Establish a robust national registry compatible with the UN ITMO tracking system. Negotiate bilateral agreements for Article 6.2 trades carefully: ensure corresponding adjustments are taken and a portion of proceeds (for adaptation) is allocated to host communities.

6. **Continuous Review and Adjustment:** Institutionalise periodic review (every 3 years) of targets and market rules by an expert committee. This should evaluate actual emissions outcomes, the need for tightening the intensity cut, and possible expansion of sectors (e.g.

[30] *USA - California Cap-and-Trade Program: International Carbon Action Partnership* (no date) *USA - California Cap-and-Trade Program | International Carbon Action Partnership*. Available at: https://icapcarbonaction.com/en/ets/usa-california-cap-and-trade-program (Accessed: 28 January 2026).

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adding coal power plants after initial phase). Include climate justice indicators in the review (e.g. impact on energy prices, industry competitiveness, rural livelihoods). Adapt the scheme over time – for instance, when sufficient data exists, transition from intensity targets to absolute caps.

7. **Integration with Broader Policy:** Ensure CCTS is not siloed. Integrate carbon pricing with energy, industrial and urban policies. For example, coordinate with the Ministry of Commerce to consider carbon costs in export planning (anticipating the EU's Carbon Border Adjustment Mechanism)[31]. Use RPO/NFPS to complement CCTS by directly reducing power sector emissions. Harmonize CCTS requirements with existing national programs (PAT, UJALA, FAME, etc.) to avoid duplication and maximize coherence.

8. **Awareness and Capacity Building:** Educate stakeholders about CCTS. Industry associations, state governments and NGOs should be informed of compliance requirements and support available. Develop simple guidelines and help desks. Promote research on emission factors, low-carbon technologies and market design to continuously refine the system.

By incorporating these measures, India can make its carbon market more stringent, transparent and equitable. Properly designed, CCTS can channel capital into green investments, empower communities through inclusive offsets, and help India meet its climate pledges while upholding justice.

X. CONCLUSION

India's **Carbon Credit Trading Scheme** represents a landmark shift: from purely regulatory emissions control to a market-based approach tailored for India's circumstances. The scheme is embedded in the strengthened **Energy Conservation Act, 2022**, and builds on India's long history with efficiency and renewable certificate programs. By blending an intensity-based cap-and-trade for heavy industries with a voluntary crediting mechanism for other sectors, the CCTS aims for comprehensive coverage. However, its success will depend on rigorous implementation. Ensuring that carbon credits correspond to real, measurable emissions cuts is paramount – global experience shows that without stringent safeguards, markets can be flooded with credits of dubious quality[32].

[31] CGEP, C.| (2024a) *Lessons for Structuring India's carbon market to support a cost-efficient energy transition - center on Global Energy Policy at Columbia University Sipa: CGEP*, *Center on Global Energy Policy at Columbia University SIPA | CGEP*. Available at: https://www.energypolicy.columbia.edu/publications/lessons-for-structuring-indias-carbon-market-to-support-a-cost-efficient-energy-transition/ (Accessed: 28 January 2026).

[32] Shankar, P. (2025) *Nine projects in India produced 'problematic' carbon credits in 2024, says report*, *Mongabay*. Available at: https://india.mongabay.com/2025/07/nine-projects-in-india-produced-problematic-carbon-credits-in-2024-says-report/ (Accessed: 28 January 2026).

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Moreover, India's commitment to climate justice, now part of its constitutional fabric[33], demands that this market serve all people fairly. Vulnerable communities must not bear the brunt of transition costs, and traditional knowledge-holders (e.g. forest dwellers) should share in carbon finance. The scheme's design can promote justice by directing finance toward the poor (via adaptation funds) and by fostering sustainable livelihoods (for instance, supporting community forestry and clean cooking through offsets).

International experience offers valuable guidance. From the EU's carbon auctioning and social fund[34] to California's rigorous offset protocols[35], the message is clear: transparency, strong institutions, and social safeguards are as important as the cap itself. India's unique approach – including voluntary offsets and alignment with Article 6 – is innovative but must be managed carefully.

In sum, the CCTS holds promise to drive India's decarbonisation efficiently. If instituted with clear rules, vigilant oversight, and a justice lens, it can harness market forces for the public good. Continuous review and adaptation will be needed, as with any new policy, to address unforeseen issues. Ultimately, by placing climate rights at the forefront and integrating equity into its carbon market, India can ensure that the transition to a low-carbon economy is both effective and fair – a true embodiment of climate justice under the rule of law.

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[33] Nirula, M. (2024) *Guest blog: Pioneering decision from the Indian Supreme Court recognizing freedom from the adverse effects of climate change as a fundamental right.*, *Climate Law Blog*. Available at: https://blogs.law.columbia.edu/climatechange/2024/08/28/guest-blog-pioneering-decision-from-the-indian-supreme-court-recognizing-freedom-from-the-adverse-effects-of-climate-change-as-a-fundamental-right/ (Accessed: 28 January 2026).

[34] *EU Emissions Trading System (EU ETS)* (no date) *International Carbon Action Partnership*. Available at: https://icapcarbonaction.com/en/ets/eu-emissions-trading-system-eu-ets (Accessed: 28 January 2026).

[35] Ibid.

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