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Compliance And Enforcement Of Carbon Emission Targets: Legal Frameworks In India And Australia Under The Paris Agreement

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Abstract
The global urgency to mitigate climate change has prompted both developed and developing nations to adopt legal and policy frameworks aligned with the Paris Agreement. This paper undertakes a comparative analysis of Carbon Emission Reduction Framework of India and Australia, highlighting their approaches to carbon trading, renewable energy expansion, regulatory strategies, and compliance with Paris Agreement. India's framework, rooted in flexibility and equity, emphasises renewable energy development, energy efficiency, and the recently introduced Carbon Credit Trading Scheme (CCTS) as a scalable market-based mechanism. Australia, by contrast, demonstrates a legally binding approach through the Climate Change Act 2022, the Safeguard Mechanism, and mandatory corporate climate disclosures under the Treasury Laws Amendment (2024). While Australia's system provides clarity, transparency, and enforceability, India integrates development imperatives with mitigation and adaptation strategies, particularly through nature-based solutions and sectoral programmes. Both nations reveal distinct pathways in operationalising their Nationally Determined Contributions (NDCs), responding to the global stocktake, and preparing for cooperative approaches under Article 6 of the Paris Agreement. The study concludes that India and Australia represent complementary models: one prioritising scalability and equity, the other bindingness and accountability, collectively contributing to the evolving global climate regime.

Keywords: *Carbon Emission, Carbon Trading, Renewable Energy, Climate Change Law, Paris Agreement.*

1. INTRODUCTION

Climate change is one of the defining challenges of the twenty-first century, driven primarily by carbon dioxide (CO_2) emissions. Globally, annual CO_2 emissions have escalated from approximately 20 billion tonnes in 1990 to over 35 billion tonnes today [1]. Since 1750, humanity has released more than 1.5 trillion tonnes of cumulative CO_2 into the atmosphere underscoring the enduring impact of industrial emissions [2].

At the national level, disparities in per capita emissions are significant. Australia's per capita CO_2 emissions stand at around 14 tonnes [3], placing it among the highest globally - more than three times the global average of roughly 4-5 tonnes per person. By contrast, India's per capita emissions remain

around 2 tonnes, well below the global average and reflecting both its developmental context and lower historic emissions. [4]

These data points illustrate the stark imbalance: a high-income, resource-intensive economy like Australia emits roughly seven times more CO_2 per person than India. Such a disparity intensifies the relevance of examining domestic enforcement mechanisms for carbon targets, especially within the framework of the Paris Agreement.

The primary international instrument for addressing this crisis is the Paris Agreement (2015), which obliges States Parties to establish, communicate, and enhance Nationally Determined Contributions (NDCs), while participating in a robust transparency and global stocktake process. Although the Agreement does not impose punitive enforcement, it is underpinned by a normative regime of transparency, peer pressure, and reputational accountability.

This paper examines legal frameworks in India and Australia - two jurisdictions with vastly unequal per capita emissions and divergent institutional capacities. India, with one of the lowest per capita CO_2 footprints among major economies, faces the dual imperatives of sustaining economic growth and mitigating climate risk. Australia, bearing one of the highest per capita emissions globally, has grappled with policy instability despite its formal NDC commitments. The central research question is: To what extent do the domestic legal frameworks of India and Australia enforce carbon emission targets and facilitate compliance with the Paris Agreement? While the Paris framework sets international expectations, it is domestic laws, regulatory agencies, and judicial mechanisms that operationalize and enforce these commitments.

2. The Paris Agreement and International Climate Commitments

The international legal framework for addressing climate change has evolved through successive instruments, each building upon the other. The United Nations Framework Convention on Climate Change (UNFCCC), adopted in 1992, laid the foundation by recognizing climate change as a common concern of humankind and by articulating the principle of "common but differentiated responsibilities and respective capabilities" (CBDR-RC) [5]. While the UNFCCC itself did not impose strict emission reduction targets, it created the institutional and normative framework for global cooperation. The Kyoto Protocol of 1997 marked the first serious attempt to operationalize binding targets, requiring developed countries to meet quantified emission reduction commitments [6]. However, its effectiveness was undermined by limited participation—most notably the withdrawal of the United States and the exemption of major developing economies from binding obligations - and by weak enforcement mechanisms [7]. This lack of universality and ambition paved the way for a new agreement.

The Paris Agreement (2015) represents a decisive shift in international climate law and remains the central governing treaty today. Unlike Kyoto Protocol, which imposed top-down binding targets only on developed states, Paris Agreement adopts a bottom-up approach centered on Nationally Determined Contributions (NDCs), whereby each Party sets its own mitigation commitments in line with global climate goals [8]. Its architecture rests on three core mechanisms: nationally determined contributions (NDCs), transparency and reporting obligations, and the global stocktake [9].

The Agreement is binding on all Parties, but the binding nature relates primarily to procedural obligations - submitting NDCs, maintaining them, reporting progress, and participating in the transparency framework - rather than the specific substantive content of emission reduction targets [10].

Several provisions of the Paris Agreement are particularly relevant to assessing India's and Australia's compliance. Article 4 requires Parties to prepare, communicate, and maintain successive NDCs, with each iteration expected to reflect a progression in ambition. Developing countries are accorded flexibility in recognition of their differentiated capacities, but the expectation of progression applies universally [11]. While these pledges are nationally determined, their progressive strengthening is legally required: each new NDC must represent an advancement beyond the previous one. For India and Australia, this provision has shaped domestic target-setting - India has pledged to reduce the emissions intensity of its GDP by 45% by 2030 compared to 2005 levels [12], while Australia has committed to reduce its greenhouse gas emissions by 43% below 2005 levels by 2030 [13].

Article 13 establishes the Enhanced Transparency Framework, under which states must provide information on greenhouse gas inventories and progress toward implementing NDCs [14]. This

framework is intended to generate trust and accountability through standardized reporting, review by expert panels, and public dissemination of information. The ETF has particular implications for enforcement domestically, since states must design institutional systems to measure, verify, and report emissions reductions credibly.

Article 14 provides for a Global Stocktake every five years, designed to assess collective progress toward long-term goals - holding the increase in global average temperature to "well below 2°C" and pursuing efforts to limit it to 1.5°C above pre-industrial levels [15], and to inform the next round of NDCs [16]. The stocktake does not impose new obligations but provides a feedback loop designed to inform more ambitious future NDCs.

The Paris Agreement also envisions a compliance mechanism under Article 15, which is facilitative rather than punitive. The Compliance Committee established under this provision assists Parties in meeting obligations but lacks coercive enforcement powers [17]. This reflects the political compromise necessary to secure universal participation: while all Parties are bound to the Agreement, enforcement relies heavily on transparency, peer pressure, and reputational accountability rather than sanctions.

A central pillar of the Paris Agreement is its long-term temperature and emissions objective. Article 2(1)(a) commits Parties to holding the increase in the global average temperature to "well below 2°C above pre-industrial levels" while pursuing efforts to limit the increase to 1.5°C, recognising that this would significantly reduce risks and impacts of climate change. Article 4 further provides that Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, with rapid reductions thereafter to achieve a balance between anthropogenic emissions and removals in the second half of this century [18]. These targets establish the overarching benchmark against which the adequacy of Nationally Determined Contributions (NDCs) is assessed. For states such as India and Australia, the challenge lies in ensuring that domestic implementation and enforcement mechanisms are robust enough to align national pledges with the Paris temperature goal.

In practice, the Paris Agreement's strength lies in its universality and iterative ambition cycle, while its weakness is the absence of direct enforcement of substantive emission targets. For countries such as India and Australia, the key measure of compliance is therefore how domestic legal frameworks operationalize these international commitments. Effective compliance depends on whether national legislation provides clear targets, regulatory authority, institutional monitoring, and mechanisms for accountability.

The Conference of the Parties (COP) continues to play a crucial role in refining and implementing the Paris framework. the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA) regularly adopts decisions, such as the UAE Consensus at COP28 (2023) which for the first time called for a transition away from fossil fuels [19], the legal foundation remains the Paris Agreement itself. COP decisions may refine guidance, establish procedures, or interpret obligations, but they cannot create new binding commitments outside the treaty framework.

Thus, in assessing India and Australia, the central question is not whether they are formally parties to the Paris Agreement (they both are), but rather whether their domestic legal and institutional measures align with the procedural and normative obligations set forth in Articles 4, 13, and 14. The comparative analysis that follows evaluates how each country translates its NDCs into enforceable national frameworks, and how effectively these frameworks contribute to the overarching goals of the Paris Agreement.

3. Domestic Approaches to Carbon Emission Reduction in India and Australia

3.1 India's Carbon Emission Reduction Framework

India's carbon emission reduction framework has developed over three decades from fragmented policy tools to a more integrated and legally anchored system that blends regulatory standards, renewable energy expansion, market-based mechanisms, and community-led initiatives. The framework reflects India's complex role: it is the world's third-largest emitter in absolute terms, but its per capita emissions remain far below the global average, underscoring its claims of equity under the Paris Agreement [20]. India's strategies thus attempt to reconcile developmental imperatives with international obligations, especially its Nationally Determined Contributions (NDCs).

3.1.1 Constitutional and Judicial Foundations

Environmental protection is constitutionally mandated in India. Article 48A, introduced by the 42nd Amendment, directs the State to protect and improve the environment, while Article 51A(g) obliges

citizens to safeguard natural resources [21]. Judicial interpretation has expanded these provisions: in *Subhash Kumar v State of Bihar*, the Supreme Court recognised the right to a clean environment as part of the right to life under Article 21 [22]. In *Vellore Citizens Welfare Forum v Union of India*, the Court integrated the precautionary and polluter-pays principles into Indian law.4 In the recent landmark judgment of *MK Ranjitsinh v. Union of India* [24], the Supreme Court categorically recognised the right against climate change [25]. These rulings provide the normative foundation for climate policies, framing mitigation not merely as policy preference but as a constitutional responsibility.

3.1.2 Early Climate Policy and International Linkages

The National Action Plan on Climate Change (NAPCC), launched in 2008, was India's first comprehensive domestic framework. It included eight "national missions" such as the National Solar Mission, the National Mission on Enhanced Energy Efficiency, and the National Mission on Sustainable Habitat [26]. State Action Plans on Climate Change (SAPCCs) were subsequently required, tailoring mitigation and adaptation strategies to local contexts.

India was also an active participant in the Clean Development Mechanism (CDM) under the Kyoto Protocol, hosting more than 1300 registered projects and generating significant Certified Emission Reductions (CERs) for international markets. This experience built technical and institutional capacity for carbon markets, even though the collapse of CER prices later undermined their utility.

3.1.3 Renewable Energy Policies

Renewable energy expansion is central to India's decarbonisation pathway. Laws and policies have catalysed unprecedented growth in solar, wind, and hydropower:

- **Solar Energy**: The Jawaharlal Nehru National Solar Mission (JNNSM), launched in 2010 under the NAPCC, initially targeted 20 GW of solar capacity by 2022, later revised to 100 GW.9 It employed subsidies, feed-in tariffs, and Renewable Purchase Obligations (RPOs) to drive deployment. Environmental safeguards are ensured through the Environment (Protection) Act 1986, requiring clearances for large solar farms [27].
- **Wind Energy**: India ranks among the top global producers. Incentives such as accelerated depreciation and generation-based tariffs promoted investment, particularly in Tamil Nadu, Gujarat, and Maharashtra. Environmental regulations mandate site assessments to mitigate impacts on habitats and biodiversity.
- **Hydropower**: While hydropower contributes substantially to the renewable portfolio, large projects raise ecological and social concerns. The Forest Conservation Act 1980 and Wildlife Protection Act 1972 regulate projects in sensitive zones, while Environmental Impact Assessments (EIA) under the 2006 notification scrutinise impacts on riverine ecosystems and displacement. To address these challenges, small and micro-hydropower projects have been promoted for decentralised, low-footprint energy.

3.1.4 Market-Based Mechanisms: PAT and REC

India experimented early with domestic carbon trading through two major schemes:

- The **Perform, Achieve and Trade (PAT) Scheme**, launched in 2012 under the Energy Conservation Act 2001, sets energy efficiency targets for energy-intensive industries. Facilities exceeding their targets receive Energy Efficiency Certificates (EECs), tradable with under-performers [28].
- The **Renewable Energy Certificate (REC) Mechanism**, created under CERC regulations in 2010, allows obligated entities to meet Renewable Purchase Obligations (RPOs) by purchasing certificates from renewable generators [29].

Both schemes demonstrated innovative use of market mechanisms but suffered from oversupply, demand fluctuations, and enforcement gaps. Although, PAT and REC had statutory backing and regulatory oversight, their effectiveness was limited by fragmented design and weak compliance.

3.1.5 Towards Integration: The Carbon Credit Trading Scheme (CCTS)

The Energy Conservation (Amendment) Act 2022 introduced explicit provisions for a national Carbon Credit Trading Scheme (CCTS), notified in June 2023 [30]. The CCTS aims to integrate existing schemes into a unified carbon market with the following features [31]:

- A meta-registry to prevent double counting and enhance transparency.

- Stringent Measurement, Reporting and Verification (MRV) protocols to improve credit quality.
- Fungible credits tradable across sectors, overseen by the Bureau of Energy Efficiency and Central Electricity Authority.

This integration reflects recommendations from scholars who have argued that unified markets with robust governance can align India's system with Paris Agreement mechanisms under Article 6. However, concerns remain over additionality, permanence, and risks of greenwashing.

3.1.6 Regulatory Standards and Emission Controls

India complements market mechanisms with command-and-control regulation:

- The **Air (Prevention and Control of Pollution) Act 1981** empowers the Central Pollution Control Board (CPCB) to prescribe emission standards for industries.
- The **Motor Vehicles Act 1988** sets vehicular emission norms, updated through Bharat Stage (BS) standards.
- The **Energy Conservation Act 2001** mandates Minimum Energy Performance Standards (MEPS) for appliances and industrial equipment, enforced by the Bureau of Energy Efficiency. These include star-labelling schemes and mandatory energy audits.

3.1.7 Voluntary, Community and Nature-Based Approaches

India's framework also incorporates voluntary and community-driven measures:

- **CSR initiatives**: Corporate Social Responsibility rules under the Companies Act 2013 encourage investments in sustainability projects.
- **Local governance**: Panchayats and municipalities, empowered under the 73rd and 74th Amendments, implement grassroots projects in afforestation, waste management, and renewable adoption.
- **Nature-Based Solutions**: India has pledged to create a 2.5–3 billion tonne carbon sink by 2030 through afforestation and reforestation. Programmes such as mangrove restoration and agroforestry are integrated into carbon credit systems. The Green Credit Programme (GCP), notified in 2023, introduces tradable credits for biodiversity, water conservation, and afforestation, complementing the CCTS.

3.1.8 Integration with the Paris Agreement and SDGs

India's updated NDC (2022) commits to reducing emission intensity of GDP by 45% by 2030 and achieving 50% cumulative electric capacity from non-fossil sources. These commitments directly correspond to Paris Agreement obligations under Articles 4 (progressive NDCs) and 13 (transparency). Emerging market mechanisms under the CCTS also provide pathways to operationalise Article 6 through internationally transferable mitigation outcomes [32].

Domestically, India's climate strategy aligns with the Sustainable Development Goals (SDGs), especially SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action). Climate measures are framed not merely as mitigation but as integrated drivers of sustainable development.

Despite ambitious goals, significant hurdles remain. Coal continues to supply nearly 70% of electricity, locking India into carbon-intensive pathways [33]. SAPCCs often lack adequate resources, leading to patchy sub-national implementation. Market-based schemes face risks of oversupply, fluctuating demand, and questions of integrity. Enforcement capacity of regulators such as BEE, CERC, and CPCB is often stretched. The "just transition" challenge for coal-dependent regions is yet to be fully integrated into planning.

Nevertheless, India's framework demonstrates a gradual but clear paradigm shift: from fragmented schemes and voluntary initiatives to a legally grounded national carbon market, complemented by renewable energy expansion and nature-based strategies. If effectively implemented with robust MRV and enforcement, this integrated framework could not only advance India's Paris obligations but also provide a model of climate governance balancing development and sustainability.

3.2 Australia's Carbon Emission Reduction Framework

Australia has gradually built a sophisticated legal and policy framework for carbon emission reduction, combining reporting obligations, statutory emission targets, carbon crediting, and market-based mechanisms. Its framework reflects a layered approach: data collection and transparency through the

National Greenhouse and Energy Reporting Act (NGER), incentives for emission reduction through the Carbon Farming Initiative (CFI) and the Australian Carbon Credit Unit (ACCU) scheme, binding reduction targets under the Climate Change Act 2022, compliance enforcement through the Safeguard Mechanism, and sectoral initiatives such as the Renewable Energy Target and Powering Australia Plan. Recent reforms, including the Safeguard Mechanism (Crediting) Amendment Act 2023 and the Treasury Laws Amendment Act 2024, further strengthen enforcement credibility by introducing decarbonisation pathways for industry and mandatory climate-related disclosures for corporations. Together, these instruments provide a comprehensive architecture that aims to align Australia's domestic policies with its Paris Agreement obligations.

3.2.1 National Greenhouse and Energy Reporting Act, 2007 and the NGER Scheme

The National Greenhouse and Energy Reporting Act, 2007 (NGER Act) establishes Australia's national framework for measuring and reporting greenhouse gas (GHG) emissions, energy production, and energy consumption. It was designed to reduce duplication, support future emissions trading, and meet international reporting obligations. Salient features include [34]:

- Mandatory annual reporting by registered corporations to the Clean Energy Regulator on emissions, energy production, and energy use, with penalties for non-compliance.
- Provisions for reporting on emission reductions and removals from GHG projects.
- Facility-level obligations to ensure net emissions do not exceed prescribed baselines.
- Empowering the Minister to make "safeguard rules" governing baselines and compliance under the Safeguard Mechanism.

The NGER Scheme, created under this Act, provides the data backbone for Australia's climate policy. It supplies the empirical basis for the Climate Change Act's annual statements, enables national GHG inventories, and underpins international reporting. Without NGER, accurate monitoring and verification of emissions reductions would not be feasible.

3.2.2 The Carbon Credits (Carbon Farming Initiative) Act, 2011

The Carbon Farming Initiative (CFI) Act, 2011 created a statutory framework for generating carbon credits through emission reduction and sequestration projects. It serves dual purposes: incentivising landholders and project developers to undertake abatement projects, and enabling Australia to meet its international obligations. Key provisions include [35]:

- Declaration of eligible offsets projects (s. 27), a prerequisite for generating credits.
- Emission avoidance projects (s. 53), such as reducing methane from waste or savanna burning.
- Sequestration projects (s. 54), including afforestation and soil carbon enhancement.
- Methodology determinations (s. 106), which establish monitoring, reporting, and verification protocols.

Projects that qualify generate Australian Carbon Credit Units (ACCUs), which may be sold to the Commonwealth or private buyers. The scheme thus integrates environmental integrity with market-based incentives.

3.2.3 Climate Change Act, 2022

The Climate Change Act, 2022 represents a major milestone, as it enshrines Australia's emission reduction targets into law. Salient features include [36]:

- Statutory targets of 43% reduction from 2005 levels by 2030, and net zero by 2050.
- Annual Climate Change Statements presented to Parliament, reporting on progress, international developments, rural and regional impacts, and climate risks.
- An enhanced role for the Climate Change Authority, which provides independent advice on targets and the annual statement.

This Act provides the overarching framework, ensuring that policies such as the Safeguard Mechanism, CFI/ACCUs, and Renewable Energy Target operate within a unified trajectory towards net zero.

3.2.4 The Safeguard Mechanism and the Safeguard Mechanism (Crediting) Amendment Act, 2023

The Safeguard Mechanism, originally introduced under the NGER framework, requires large industrial facilities to keep emissions within baselines. The 2023 Amendment Act strengthened this mechanism significantly by [37]:

- Creating a legal ceiling for emission per facility and establishing a cumulative emissions budget (1,233 Mt CO_2-e) to 2030.
- Mandating baseline declines of 4.9% annually, with best-practice standards for new facilities.
- Creating Safeguard Mechanism Credits (SMCs) for facilities emitting below their baselines, allowing trade alongside ACCUs.

This reform transforms the Safeguard Mechanism into a binding, market-compatible decarbonisation pathway for Australia's largest emitters.

3.2.5 Australian Carbon Credit Unit (ACCU) Scheme

The ACCU Scheme, closely tied to the CFI, incentivises abatement in sectors such as agriculture, forestry, and waste management. ACCUs function as a flexible compliance tool under the Safeguard Mechanism and a voluntary offsetting instrument. They expand the reach of climate policy beyond regulated sectors and reinforce Australia's commitment to market-based mitigation.

3.2.6 Renewable Energy Target (RET)

The RET requires electricity retailers to source an additional 33,000 GWh of renewable energy annually from 2020 to 2030. Administered by the Clean Energy Regulator, it has successfully driven investment in wind and solar, significantly reducing power-sector emissions. Although the target has largely been met, RET continues to provide a market signal supporting Australia's net zero trajectory.

3.2.7 Complementary Policies and Strategic Plans

1. **Powering Australia Plan**: A government roadmap combining job creation, energy affordability, and decarbonisation, aligned with the 43% reduction target by 2030.
2. **Net Zero in Government Operations Strategy**: Commits the federal public service to net zero by 2030, demonstrating leadership through electrification, energy efficiency, and sustainable procurement.

3.2.8 Treasury Laws Amendment (Financial Market Infrastructure and Other Measures) Act, 2024

This Act introduces Australia's first mandatory climate-related financial disclosure regime, commencing 2025. It aligns with ISSB standards and requires entities meeting specified thresholds to disclose [38]:

- Scope 1 and 2 emissions (from year one), and Scope 3 emissions (from year two).
- Climate-related risks and opportunities affecting cashflows, finance, or capital costs.
- Governance, strategy, and risk management arrangements.

The framework applies in phases to large, medium, and smaller entities with material exposure. Assurance standards will be phased in by 2030. By embedding disclosure obligations into financial law, this reform strengthens investor confidence and integrates climate risk into economic governance

4. Comparative Analysis

India and Australia present two distinct yet converging trajectories in building legal and institutional architectures for carbon emission reduction. Both countries are large, resource-intensive economies facing the dual challenge of sustaining growth while meeting climate commitments. Their frameworks illustrate the evolution of carbon governance from fragmented initiatives towards integrated market-based and statutory systems, though with differing institutional anchors, enforcement designs, and degrees of maturity.

4.1 Statutory Anchors and Institutional Frameworks

India's carbon market governance has historically been fragmented across multiple instruments. The Energy Conservation Act, 2001, as amended, provides the statutory base for the Perform, Achieve, and Trade (PAT) mechanism, Renewable Energy Certificates (RECs), and now the Carbon Credit Trading Scheme (CCTS) 2023. Regulatory authority is dispersed: the Bureau of Energy Efficiency (BEE) designs and monitors PAT, while the Central Electricity Regulatory Commission (CERC) oversees RECs. The Ministry of Power and the Ministry of Environment, Forest and Climate Change (MoEFCC) also play significant roles. This multiplicity often produces overlapping jurisdictions and enforcement inconsistencies.

In contrast, Australia's framework is anchored in a more centralised statutory model, beginning with the National Greenhouse and Energy Reporting Act 2007, which created a uniform national reporting system and empowered the Clean Energy Regulator as the single supervisory authority. Subsequent legislation - the Carbon Farming Initiative Act 2011, Climate Change Act 2022, and Safeguard

Mechanism (Crediting) Amendment Act 2023, all build upon this centralised backbone, ensuring consistency in monitoring, reporting, and enforcement.

4.2 Market-Based Mechanisms and Credit Integrity

India's early instruments, PAT and REC, were pioneering but remained limited in scope and effectiveness due to fragmented registries, weak trading volumes, and inadequate compliance enforcement. The CCTS (2023) marks a shift towards a national carbon market with a unified registry and integration of earlier instruments. However, its implementation remains nascent, and questions around additionality, permanence, and market liquidity persist.

Australia's crediting framework, through Australian Carbon Credit Units (ACCUs), is more mature. It establishes detailed project methodologies (covering both sequestration and emissions avoidance) and integrates ACCUs directly into compliance under the Safeguard Mechanism. The 2023 reforms further introduced Safeguard Mechanism Credits (SMCs), allowing large facilities to earn tradable credits for outperforming baselines. This design ensures high fungibility, stronger price signals, and greater market credibility compared to India's still-developing system.

4.3 Emission Targets and Alignment with International Commitments

India's Nationally Determined Contribution (NDC) under the Paris Agreement focuses on reducing the emissions intensity of GDP by 45% by 2030 and creating an additional carbon sink of 2.5–3 billion tonnes of CO_2 equivalent. However, these targets are not legislatively enshrined, relying instead on policy mechanisms such as the NAPCC missions and sectoral regulations. India's approach remains policy-driven and incremental, with an emphasis on flexibility.

By contrast, Australia's Climate Change Act 2022 legally binds the country to a 43% reduction from 2005 levels by 2030 and net zero by 2050, with annual climate statements ensuring parliamentary accountability. This statutory anchoring provides stronger enforceability and aligns domestic obligations explicitly with the Paris Agreement. The incorporation of a national emissions budget and sectoral baselines under the Safeguard Mechanism further strengthens Australia's alignment with international commitments.

4.4 Enforcement and Compliance Mechanisms

India's enforcement mechanisms have traditionally been weak and dispersed, with penalties for non-compliance under PAT and REC often delayed or diluted. The CCTS seeks to remedy this by centralising compliance under the Energy Conservation Act and creating a unified meta-registry, but enforcement credibility will depend on MRV robustness and regulator capacity.

Australia's compliance design is clearer and more stringent. Facilities under the Safeguard Mechanism must keep emissions within baselines, with civil penalties for breaches. The introduction of baseline decline trajectories and tradable credits ensures that compliance is not only mandatory but incentivised. In addition, the Treasury Laws Amendment Act 2024 imposes mandatory climate-related financial disclosures, embedding climate accountability into corporate governance and capital markets - a step India has not yet matched.

4.5 Role of Renewable Energy and Complementary Policies

Both India and Australia employ renewable energy promotion as a central climate strategy, though with different emphases. India's National Solar Mission and Renewable Purchase Obligations (RPOs) have driven rapid solar capacity expansion, while state-level policies have boosted wind and hydropower. Environmental laws such as the Environment Protection Act and Forest Conservation Act regulate ecological impacts of renewables.

Australia's Renewable Energy Target (RET) established a binding market for renewable energy certificates, significantly decarbonising the power sector. This is complemented by the Powering Australia Plan and the APS Net Zero by 2030 strategy, which extend climate action into public operations and broader energy sector planning.

4.6 Transparency and Financial Integration

India's reporting architecture is fragmented across PAT, REC, and emerging CCTS registries, with limited public transparency compared to global best practice. Corporate climate disclosures are mostly voluntary, although SEBI has introduced ESG reporting frameworks for listed companies.

Australia, by contrast, has legislated mandatory ISSB-aligned climate disclosures beginning 2025, ensuring uniformity and comparability across industries. This not only enhances transparency but also aligns climate policy with financial regulation, attracting international capital and reinforcing investor confidence in transition pathways.

4.7 Comparative Insights

- **Centralisation vs Fragmentation**: Australia's framework benefits from a centralised regulator and statutory backbone, while India's remains multi-institutional and fragmented, though reforms under CCTS are pushing towards integration.
- **Legal Anchoring of Targets**: Australia has legislated Paris-aligned targets, enhancing accountability; India's commitments remain policy-based.
- **Market Credibility**: Australia's ACCU-SMC framework offers higher integrity and liquidity, while India's REC/PAT experience reflects weak enforcement and low demand.
- **Transparency and Finance**: Australia is embedding climate accountability in financial law; India is still at a preliminary stage of ESG-linked disclosures.
- **Renewables**: Both countries leverage renewable energy, but India emphasises rapid capacity addition for energy security, whereas Australia uses legally mandated RET to ensure market penetration.

5. Compliance with Paris Agreement

The Paris Agreement requires Parties to demonstrate meaningful climate action through ambitious NDCs (Article 4), transparent reporting (Article 13), participation in the global stocktake (Article 14), and cooperation via market mechanisms (Article 6). Examining how India and Australia implement these obligations reveals their strengths and challenges in holding themselves accountable under international law.

5.1 Nationally Determined Contributions and Domestic Implementation

India's updated NDC targets a 45 per cent reduction in emissions intensity by 2030, alongside achieving 50 per cent of installed capacity from non-fossil fuel sources and the creation of a 2.5–3 billion tonne CO_2 equivalent carbon sink. These remain policy commitments rather than legally binding mandates, but are operationalised through instruments such as the National Solar Mission, efficiency standards, and most recently, the Carbon Credit Trading Scheme (CCTS) under the Energy Conservation (Amendment) Act 2022. The CCTS introduces facility-level emission intensity targets and a centralized measurement, reporting and verification (MRV) system, making it India's first binding framework for industrial CO_2 intensity reduction [39].

By contrast, Australia has embedded its NDC into binding law through the Climate Change Act 2022, which legislates a 43 per cent reduction from 2005 levels by 2030 and net zero by 2050. The Act requires successive NDCs to represent "greater ambition" and ensures that domestic targets are interpreted consistently with the Paris Agreement. Implementation is supported by the Safeguard Mechanism, which imposes declining emissions baselines on large industrial facilities while introducing credits (SMCs) for outperformers. Complementary policies, such as the Renewable Energy Target (RET) and Powering Australia Plan, ensure sectoral contributions to the national NDC. [40]

5.2 Transparency through the Enhanced Transparency Framework

Article 13 of the Paris Agreement establishes an Enhanced Transparency Framework (ETF). Australia's National Greenhouse and Energy Reporting (NGER) Scheme, administered by the Clean Energy Regulator, provides a robust facility-level system for monitoring emissions, which has recently been expanded to include mandatory climate-related financial disclosures aligned with ISSB standards.

India's transparency framework has historically been fragmented across ministries and state agencies. The CCTS, however, consolidates reporting into a single MRV system with a centralised registry designed to avoid double counting of credits [41]. While implementation is ongoing, this marks a major step in aligning domestic transparency mechanisms with Paris requirements.

5.3 Responding to the Global Stocktake

The global stocktake (Article 14) requires Parties to iteratively increase ambition. Australia has codified this into its Climate Change Act, which mandates the responsible Minister to table an Annual Climate Change Statement to Parliament, reporting on progress, gaps, and policy effectiveness.[8] This institutionalises feedback loops between the stocktake and domestic law.

India's approach is more adaptive than legislated. Adjustments occur through periodic NDC updates, Renewable Purchase Obligation (RPO) recalibrations, and the operationalisation of new frameworks such as the CCTS. While flexible, this approach does not formally integrate the global stocktake into binding domestic law.

5.4 Cooperative Approaches under Article 6

India's CCTS establishes a domestic carbon market capable of linking to international systems, with safeguards for MRV, registries, and avoidance of double counting. This provides a platform for participation in Article 6 cooperative approaches.

Australia, while relying primarily on its domestic Australian Carbon Credit Units (ACCUs) and SMCs, currently lacks a strategy for international credit trading. However, its strong internal compliance infrastructure places it in a favourable position to engage under Article 6 in future.

5.5 Adaptation, Climate Finance, and Co-benefits

India integrates mitigation with adaptation through the National Action Plan on Climate Change (NAPCC), subnational climate action plans, and nature-based solutions (e.g. afforestation, mangrove restoration). Its emphasis on climate equity underscores the need for international climate finance, though it also mobilises domestic green finance through green bonds and CSR-linked initiatives.

Australia, as a developed country, pairs domestic resilience planning with international climate finance commitments, while also mandating corporate climate disclosures to redirect private capital into both mitigation and adaptation initiatives.

Australia demonstrates stronger Paris Agreement compliance through legally binding targets, transparent reporting, and enforceable decarbonisation pathways. India, while still evolving its regulatory architecture, has consolidated its fragmented frameworks into the CCTS, representing a scalable approach with significant potential. Both countries thus embody distinct strategies towards compliance - Australia emphasising legal bindingness and transparency, and India flexibility, scalability, and climate equity.

6. CONCLUSION

The comparative study of India's and Australia's carbon emission reduction frameworks highlights two distinct yet complementary approaches to fulfilling Paris Agreement commitments. India's strategy emphasises policy innovation, renewable energy expansion, and emerging carbon markets, reflecting the challenges of balancing growth with sustainability in a developing economy. Australia, by contrast, relies on statutory targets, facility-level obligations, and strong transparency mechanisms, ensuring legal enforceability and closer alignment with international reporting standards.

Both models illustrate the convergence of law, policy, and markets in climate governance, yet also reveal limitations: India faces fragmented implementation and lacks statutory caps, while Australia is criticised for its reliance on offsets and limited ambition relative to its emissions profile. In compliance terms, Australia is institutionally better positioned, whereas India demonstrates greater dynamism in scaling renewable energy and community-based adaptation.

Together, they show that credible climate action requires a hybrid approach - combining statutory certainty with developmental responsiveness. The experiences of both nations underscore that success depends not only on setting targets but on building robust mechanisms for implementation, monitoring, and progressive enhancement in line with the Paris framework.

REFERENCES

[1] CO2 emissions: How much CO2 does the world emit? Which countries emit the most?, Our World in Data, Available at https://ourworldindata.org/co2-emissions? (last visited on 17/08/2025).

[2] Ritchie, H., 2019, "Who has contributed most to global CO2 emissions?", Our World in Data, Available at https://ourworldindata.org/contributed-most-global-co2? (last visited on 17/08/2025).

[3] Per capita CO2 emissions by source, 2023, Our World in Data, Available at https://ourworldindata.org/grapher/per-capita-co2-by-source? (last visited on 16/08/2025).

[4] Where in the world do people emit the most CO2?, Our World in Data, Available at https://ourworldindata.org/per-capita-co2? (last visited on 17/08/2025).
[5] United Nations Framework Convention on Climate Change (UNFCCC), 1992, Art. 3.
[6] Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto, 1997 (United Nations treaty series, Vol. 2303, No. 30822), Art. 3.
[7] Gupta, J., 2014, The History of Global Climate Governance, Cambridge University Press, Cambridge UK, Chap. 5.
[8] Chhachhar, V., Verma, K., 2024, Climate Change and Negotiating Challenges: A Lesson for Success and Failure, In: Rai, P.K., Rai, S. (eds) Climate, Environment and Agricultural Development, Advances in Geographical and Environmental Sciences, Springer, Singapore, Available at https://doi.org/10.1007/978-981-97-8363-2_1 .
[9] Mayer, B., 2022, International law obligations on climate change mitigation, Oxford University Press, London UK.
[10] Mayer, B., 2018, The international law on climate change, Cambridge University Press, Cambridge UK.
[11] Paris Agreement, 2015 (United Nations treaty series, No. 54113), Art. 4.
[12] Energy Storage systems (ESS) Overview, Ministry of New and Renewable Energy, Available at https://mnre.gov.in/en/energy-storage-systemsess-overview/ (last visited on 17/08/2025).
[13] Emissions Reduction: Net Zero, Department of Climate change, Energy, the Environment and Water (Australian Government), Available at https://www.dcceew.gov.au/climate-change/emissions-reduction/net-zero (last visited on 17/08/2025).
[14] Paris Agreement, 2015 (United Nations treaty series, No. 54113), Art. 13.
[15] Paris Agreement, 2015 (United Nations treaty series, No. 54113), Art. 2(1)(a).
[16] Paris Agreement, 2015 (United Nations treaty series, No. 54113), Art. 14.
[17] Paris Agreement, 2015 (United Nations treaty series, No. 54113), Art. 15.
[18] Paris Agreement, 2015 (United Nations treaty series, No. 54113), Art. 4(1).
[19] COP28 Agreement Signals "Beginning of the End" of the Fossil Fuel Era, UN Climate Press Release, Available at https://unfccc.int/news/cop28-agreement-signals-beginning-of-the-end-of-the-fossil-fuel-era (last visited on 17/08/2025).
[20] Per capita CO2 emissions by source, 2023, Our World in Data, Available at https://ourworldindata.org/grapher/per-capita-co2-by-source? (last visited on 16/08/2025).
[21] Constitution of India, 1950, Arts. 48A, 51A(g).
[22] Subhash Kumar v. State of Bihar, AIR 1991 SC 420.
[23] Vellore Citizens Welfare Forum v Union of India, AIR 1996 SC 2715.
[24] MK Ranjitsinh v. Union of India, 2024 INSC 280.
[25] Chhachhar, V., et al., 2025, "Right Against Climate Change in India with Special Reference to MK Ranjitsinh and Ors. v. Union of India", Journal of Law and Sustainable Development, 13(3), e04348. Available at https://doi.org/10.55908/sdgs.v13i3.4348 .
[26] National Action Plan on Climate Change (NAPCC), PIB, Ministry of Information and Broadcasting of India, Available at https://static.pib.gov.in/WriteReadData/specificdocs/documents/2021/dec/doc202112101.pdf (last visited on 16/08/2025).
[27] Eight years of National Solar Mission: Renewing the renewables target, The Energy and Resources Institute, Available at https://www.teriin.org/article/national-solar-mission-journey-toward-energy-security-and-sustainable-future (last visited on 17/08/2025).
[28] Ramesh, M., 2025, The Role of Environmental Laws in Sustainable Development: A Focus on India, In: Oraon, A.P.L., et al., (eds) Environmental Science: Interdisciplinary Approaches and Emerging Trends, Nature Light Publications, Pune, Available at https://zenodo.org/uploads/15647557.
[29] Overview of Legal and Policy Measures of Carbon Trading and Renewable Energy Certificate (REC) In India, Current World Environment, Available at https://www.cwejournal.org/vol16no1/overview-of-legal-and-policy-measures-of-carbon-trading-and-renewable-energy-certificate-rec-in-india (last visited on 17/08/2025).
[30] The Energy Conservation (Amendment) Act, 2022
[31] Carbon Credit Trading Scheme, 2023, Ministry of Power, Available at https://cdnbbsr.s3waas.gov.in/s3716e1b8c6cd17b771da77391355749f3/uploads/2023/10/2023100519442899 22.pdf (last visited on 17/08/2025).
[32] India's Updated First Nationally Determined Contribution Under Paris Agreement (2021-2030), Government of India, Available at https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20Nationally%20Determined%20Contrib.pdf (last visited on 17/08/2025).
[33] India Energy Outlook 2021, IEA, Paris, Available at https://www.iea.org/reports/india-energy-outlook-2021 (last visited on 17/08/2025).
[34] National Greenhouse and Energy Reporting Act, 2007, Sec. 19, 21, & 22XF.
[35] Carbon Credits (Carbon Farming Initiative) Act, 2011, Sec. 27, 53, 54, & 106.
[36] The Climate Change Act, 2022, Sec. 10, 12, 14, & 15.
[37] The Safeguard Mechanism and the Safeguard Mechanism (Crediting) Amendment Act, 2023, Sec 3 (2).
[38] Mandatory Climate- Related Financial Disclosures For Australia: What You Need to Know, SBC, Available at https://steadfastconsultants.in/mandatory-climate-related-financial-disclosures-for-australia-what-you-need-to-know/ (last visited on 17/08/2025).
[39] India sets first-ever GHG emission intensity targets under CCTS, Down to Earth, Available at https://www.downtoearth.org.in/climate-change/india-sets-first-ever-ghg-emission-intensity-targets-under-ccts (last visited on 17/08/2025).

[40] Promoting biodiversity, emissions reduction and renewable energy uptake, Clean Energy regulator, Australian Government, Available at https://cer.gov.au (last visited on 17/08/2025).
[41] Giving shape to India's carbon credit mechanism, The Hindu, Available at https://www.thehindu.com/opinion/op-ed/giving-shape-to-indias-carbon-credit-mechanism/article68856701.ece (last visited on 17/08/2025).