

Climate Change, Carbon Trading, and Energy Finance: Emerging Legal and Regulatory Challenges

A comparative analysis on India and Scotland's climate governance

Dr Akhilesh Kumar¹

Abstract

Climate change presents an urgent and systemic challenge for both developed and developing economies, necessitating legally robust, institutionally credible, and financially viable mechanisms to achieve net-zero targets. India and Scotland offer contrasting, yet complementary approaches to climate governance, particularly in the regulation of carbon trading and energy finance. These jurisdictions have been selected because they represent two distinct models of climate regulation: India is a rapidly developing federal democracy with an emerging domestic carbon market and development-oriented climate policies, whereas Scotland is a devolved jurisdiction within the United Kingdom (UK) that operates under mature statutory climate legislation and participates in UK-wide emissions trading arrangements. This comparison enables an evaluation of how differing constitutional structures, levels of economic development, and regulatory maturity influence the design and implementation of climate governance. This paper undertakes a comparative legal analysis of the climate change frameworks of India and Scotland, examining how regulatory design, market-based mechanisms, and financial instruments are deployed to address climate mitigation goals.

Keywords: Carbon Trading; Climate Change Law; Comparative Climate Governance; Energy Finance; India; Net-Zero Transition; Scotland; United Kingdom

¹ PhD, The University of Burdwan.

1. Introduction

This paper analyses India's evolving carbon market architecture, including the statutory basis introduced by the Energy Conservation (Amendment) Act 2022 and the Carbon Credit Trading Scheme 2023, alongside sustainable finance initiatives aimed at mobilising capital for low-carbon development. In parallel, it examines Scotland's climate strategy under the UK framework, characterised by legally binding emissions reduction targets, participation in emissions trading regimes, and the use of advanced green finance mechanisms supported by mature regulatory institutions. Scotland, as previously mentioned, is a developed devolved jurisdiction within the constitutional framework of the UK. While it exercises substantial devolved legislative powers over climate change and environmental policy, important areas—including emissions trading, financial regulation, and certain aspects of energy market governance—remain governed through UK-wide legal and regulatory frameworks. Nevertheless, Scotland has adopted ambitious statutory climate targets and benefits from relatively mature regulatory and financial institutions that support its transition to net-zero emissions. The paper therefore evaluates the effectiveness of these regimes in translating climate commitments into enforceable legal obligations.

Particular attention is given to regulatory challenges such as measurement, reporting and verification (MRV) standards, institutional capacity, market transparency, and enforcement mechanisms that influences both the integrity and credibility of carbon markets in both jurisdictions. The study also explores the role of energy finance in supporting climate transitions, which includes green bonds, public–private partnerships, sovereign and sub-sovereign climate funds, and development finance institutions. It highlights how differences in economic capacity, regulatory maturity, and policy priorities shape climate finance outcomes in both India and Scotland. The comparative analysis demonstrates that the effectiveness of climate finance depends not merely on the availability of financial resources, but on the coherence of the legal and institutional framework governing their mobilisation, allocation, and oversight. While Scotland's more mature statutory framework provides greater regulatory certainty and institutional accountability, India's flexible and development-oriented approach reflects the practical necessity of balancing climate commitments with economic growth and energy security. The study therefore argues that effective climate finance requires a context-specific legal framework that combines regulatory certainty

with sufficient flexibility to accommodate differing developmental and constitutional realities.

Drawing on international climate instruments, especially Article 6 of the Paris Agreement and comparative regulatory practices, the paper identifies best practices and areas for reform. By situating carbon trading and energy finance within the broader context of climate change law, this paper contributes to comparative climate governance scholarship and proposes both legal and policy reforms aimed at strengthening regulatory coherence, ensuring environmental integrity, and supporting equitable and effective net-zero transitions in both jurisdictions.

Climate change has evolved from a predominantly scientific and environmental concern into one of the most complex legal and governance challenges of the twenty-first century. Rising global temperatures, increasing frequency of extreme weather events, sea-level rise, and long-term ecological degradation pose serious risks to economies and societies alike. Climate change has evolved from a predominantly scientific and environmental concern into one of the most complex legal and governance challenges of the twenty-first century. Rising global temperatures, increasing frequency and intensity of extreme weather events, accelerating sea-level rise, and long-term ecological degradation pose serious risks to human societies, ecosystems, and national economies. According to the Intergovernmental Panel on Climate Change (IPCC), human influence has unequivocally warmed the atmosphere, ocean and land, resulting in widespread and rapid changes across the climate system. These developments have compelled states to adopt increasingly sophisticated legal frameworks aimed at mitigation, adaptation, and climate resilience. Central to contemporary climate regulation are market-based mechanisms, particularly carbon trading, and the mobilisation of large-scale energy finance to facilitate the transition towards low-carbon and climate-resilient economies.² These risks have compelled states to adopt increasingly sophisticated legal frameworks, such as emissions trading schemes, carbon pricing mechanisms, renewable energy regulations, climate adaptation policies, and statutory net-zero emission targets, aimed at mitigating climate change, enhancing adaptation, and strengthening climate resilience. Central

² Intergovernmental Panel on Climate Change, Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2023), Summary for Policymakers 4–9
<<https://www.ipcc.ch/report/ar6/syr/>> accessed 15 July 2026.

to contemporary climate regulation are market-based mechanisms, particularly carbon trading, and the mobilisation of large-scale energy finance to enable transitions toward low-carbon and climate-resilient economies.

International climate law has undergone significant evolution over the past three decades. From the foundational principles articulated in the United Nations Framework Convention on Climate Change (UNFCCC)³ to the flexible architecture of the Paris Agreement,⁴ the global climate regime has progressively emphasised nationally determined commitments, cooperative mechanisms, and the alignment of financial flows with climate objectives. However, the effectiveness of these international commitments depends critically on their domestic legal implementation. Regulatory design, institutional capacity, and enforcement mechanisms at the national and sub-national levels ultimately determine whether climate goals translate into measurable emissions reductions.

In this context, comparative legal analysis provides a valuable methodological lens. By examining how different jurisdictions respond to shared global challenges, comparative analysis highlights regulatory strengths, exposes structural weaknesses, and facilitates the transfer of best practices.⁵ India and Scotland present an especially instructive comparison. India is a major developing economy with rapidly growing energy demand, persistent developmental challenges, and increasing international expectations regarding climate mitigation. Scotland, by contrast, is a developed sub-national jurisdiction, which operates within the constitutional framework of the UK with ambitious statutory climate targets⁶ as well as relatively mature regulatory and financial institutions.⁷ The comparison is particularly valuable because it contrasts a state-led system with emerging carbon markets and evolving climate finance regulation against a jurisdiction with established statutory climate targets and participation in a mature emissions trading regime. This enables an assessment of how differing constitutional structures, regulatory maturity, and institutional capacities

³ United Nations Framework Convention on Climate Change (adopted 9 May 1992, entered into force 21 March 1994) 1771 UNTS 107.

⁴ Paris Agreement (adopted 12 December 2015, entered into force 4 November 2016) 3156 UNTS.

⁵ Konrad Zweigert and Hein Kötz, *An Introduction to Comparative Law* (3rd edn, Tony Weir tr, OUP 1998) 15–18.

⁶ Climate Change (Scotland) Act 2009 asp 12; Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 asp 15; Climate Change Committee, *Progress in Reducing Emissions in Scotland: 2023 Report to Parliament* (2023).

⁷ CC(ERT)(S)A 2019 (n5).

influence the design and effectiveness of carbon markets and climate finance mechanisms.

Despite these differences, both jurisdictions rely on carbon trading mechanisms and energy finance instruments as central tools of climate policy. India is in the process of constructing a domestic carbon market, while simultaneously expanding sustainable finance initiatives. Scotland participates in emissions trading through UK-wide mechanisms and has developed innovative public finance institutions to support its net-zero transition.⁸ Both jurisdictions recognise finance as a central enabler of the transition to a low-carbon economy and have adopted a combination of public and private financing instruments to support climate mitigation and adaptation. In India, climate finance is driven through public investment, sovereign green bonds, multilateral funding, and policy initiatives designed to mobilise private capital for renewable energy and sustainable infrastructure. Scotland, by contrast, complements public funding with an institutional framework that promotes sustainable investment through statutory climate targets, green finance initiatives, and collaboration with private financial markets. Although both jurisdictions acknowledge that mobilising finance is indispensable for achieving climate objectives, they differ significantly in the legal architecture, regulatory obligations, and institutional mechanisms governing sustainable finance. These similarities and differences provide a valuable basis for examining how legal frameworks influence the effectiveness of energy finance in supporting climate transition. This paper explores the legal and regulatory challenges that arise in these contexts, focusing on the integrity of carbon markets and the effectiveness of energy finance frameworks.

The paper proceeds in eight parts. Part 2 outlines the international legal framework governing climate change, with particular emphasis on market mechanisms and climate finance under the Paris Agreement. Part 3 examines climate change law and carbon market development in India. Part 4 analyses Scotland's statutory climate framework and emissions trading participation. Part 5 explores the role of energy finance in both jurisdictions. Part 6 offers a comparative doctrinal analysis, supported by a structured comparison table. Part 7 identifies key regulatory challenges and

⁸ Ministry of Power, Government of India, *Carbon Credit Trading Scheme*, 2023 (Notification No SO 2824(E), 28 June 2023); Energy Conservation Act 2001 (as amended by the Energy Conservation (Amendment) Act 2022); International Energy Agency, *India Energy Policy Review 2023* (IEA 2023).

proposes reforms. This Part does not seek to restate the conclusions reached in the preceding analysis. Instead, it advances specific legal and regulatory reforms that may strengthen the effectiveness, transparency, and accountability of carbon trading and energy finance frameworks in India and Scotland. Building upon the comparative assessment undertaken in the previous Parts, the following recommendations are intended to enhance market integrity, improve institutional coordination, and promote compliance with international climate obligations while accommodating the differing constitutional and regulatory contexts of the two jurisdictions. Part 8 concludes by reflecting on broader implications for comparative climate governance.

2. International Legal Framework on Climate Change

The contemporary architecture of climate governance is firmly rooted in international environmental law, which has progressively evolved from aspirational norm-setting to more structured regulatory and quasi-market mechanisms. For instance, the United Nations Framework Convention on Climate Change (UNFCCC), adopted in 1992, constitutes the foundational instrument of this regime. It establishes core principles such as equity, precaution, sustainable development, the principle of common but differentiated responsibilities and respective capabilities (CBDR–RC), which recognises the historical responsibility of developed states for greenhouse gas emissions, while simultaneously acknowledging the developmental priorities of developing countries.⁹ Although the UNFCCC imposed largely procedural obligations—such as reporting, information sharing, and institutional participation—it has also created a durable legal and institutional framework, which has enabled subsequent normative expansion through protocols, decisions, and soft-law instruments.¹⁰

A defining feature of the UNFCCC regime is its reliance on conference-driven lawmaking. Decisions adopted by the Conference of the Parties (COP), while formally non-binding, have played a crucial role in shaping state practice and regulatory expectations. Scholars have described this process as an example of “dynamic treaty

⁹ UNFCCC (n3).

¹⁰ Organisation for Economic Co-operation and Development, *OECD Companion to the Inventory of Support Measures for Fossil Fuels 2023* (OECD Publishing 2023) <<https://doi.org/10.1787/bac6f2d2-en>> accessed 17 July 2026.

interpretation,” whereby evolving scientific knowledge and political consensus progressively inform legal obligations. This flexible architecture has allowed the climate regime to adapt to changing economic and technological circumstances, but it has also generated concerns regarding legal certainty and enforceability. Despite these differences, both jurisdictions rely on carbon trading mechanisms and energy finance instruments as central tools of climate policy. India is in the process of constructing a domestic carbon market, while simultaneously expanding sustainable finance initiatives.¹¹ Scotland participates in emissions trading through UK-wide mechanisms and has developed innovative public finance institutions to support its net-zero transition.¹² The Kyoto Protocol 1997 marked a decisive shift toward operationalising climate obligations through legally binding emissions reduction targets for developed countries listed in Annexure I.¹³ Of particular legal significance was the introduction of flexible market-based mechanisms, namely international emissions trading, Joint Implementation, and the Clean Development Mechanism (CDM). These mechanisms were premised on the economic efficiency of emissions reductions and sought to internalise the cost of carbon through tradable units. Emissions trading under Article 17 of the Protocol laid the conceptual foundation for contemporary cap-and-trade systems by recognising emissions allowances as transferable compliance instruments.¹⁴

The CDM, established under Article 12 of the Kyoto Protocol, enabled developed countries to meet part of their emissions reduction commitments by investing in mitigation projects in developing countries. While the mechanism generated substantial investment flows—India being one of the largest beneficiaries—it was also subject to sustained criticism. Empirical studies highlighted deficiencies relating to additionality, inflated baselines, and inconsistent verification standards.¹⁵ From a legal perspective, these critiques exposed the tension between market efficiency and environmental integrity, a tension that continues to shape debates on carbon trading. The limitations of the Kyoto regime, combined with changing geopolitical realities, prompted a reconfiguration of international climate law culminating in the Paris Agreement 2015. The Agreement represents a paradigm shift from a top-down,

¹¹ Ministry of Power (n8); ECA 2001 (n8).

¹² OECD (n10); International Energy Agency, World Energy Investment 2024 (IEA 2024).

¹³ Paris Agreement (n4) art 6.

¹⁴ *ibid* art 2(1)(c).

¹⁵ Constitution of India 1950 arts 48A, 51A(g).

bifurcated system to a universal, bottom-up architecture based on nationally determined contributions (NDCs). Rather than imposing uniform obligations, the Agreement requires each Party to prepare, communicate, and maintain successive NDCs reflecting its highest possible ambition.¹⁶ Although NDCs are not legally binding with respect to the achievement of their substantive emissions reduction targets, the procedural obligations concerning their preparation, communication, maintenance, and periodic reporting are binding under international law under the Paris Agreement. In practice, most Parties have complied with these procedural obligations by submitting and updating their NDCs and transparency reports, although the timeliness, completeness, and ambition of such submissions vary significantly across jurisdictions.¹⁷

Article 6 of the Paris Agreement occupies a central position in the emerging law of carbon markets. It provides a legal framework for voluntary cooperation among Parties, including the use of internationally transferred mitigation outcomes (ITMOs) under Article 6(2) and the establishment of a new mechanism under Article 6(4) to contribute to mitigation and sustainable development.¹⁸ Unlike the CDM, Article 6 explicitly incorporates safeguards aimed at ensuring environmental integrity, including robust accounting rules, corresponding adjustments, and the avoidance of double counting. These requirements reflect lessons learned from the Kyoto era and signal a maturation of international carbon market regulation. The legal significance of Article 6 goes beyond emissions trading. It embodies a hybrid regulatory model that combines decentralised cooperation with centralised oversight through UNFCCC institutions. Decisions adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA), particularly at COP26 in Glasgow,¹⁹ have elaborated detailed rules governing authorisation, reporting, registries, and supervisory bodies.²⁰ These developments underscore the increasing complexity and legalisation of international climate governance, blurring the distinction between hard and soft law. These developments underscore the increasing complexity and legalisation of international climate governance, blurring the distinction between hard

¹⁶ *Subhash Kumar v State of Bihar* (1991) 1 SCC 598.

¹⁷ United Nations Framework Convention on Climate Change, *Nationally Determined Contributions under the Paris Agreement – Synthesis Report* (UNFCCC 2024).

¹⁸ *MC Mehta v Union of India* (1987) 1 SCC 395.

¹⁹ UNFCCC, 'Rules, Modalities and Procedures for the Mechanism Established by art 6(4) of the Paris Agreement' (2021).

²⁰ Axel Michaelowa, 'India's Role in the Global Carbon Market' (2010) 10 *Climate Policy* 207.

and soft law. Although many international climate instruments continue to rely on non-binding commitments, reporting mechanisms, and voluntary cooperation, they increasingly generate normative and legal effects through mandatory procedural obligations, domestic implementation measures, transparency frameworks, and compliance mechanisms. As a result, soft law instruments frequently influence the interpretation, development, and practical operation of binding legal obligations, producing a more integrated and hybrid system of climate governance.²¹

Equally transformative is the Paris Agreement's explicit integration of climate finance into the core objectives of the regime. Article 2(1)(c) commits Parties to making financial flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.²² This provision has been widely interpreted as extending the reach of climate obligations beyond environmental ministries to encompass financial regulators, central banks, and development finance institutions. It provides a normative foundation for aligning domestic financial regulation, energy finance policies, and investment frameworks with climate objectives.²³

In addition, Articles 9, 10, and 11 of the Paris Agreement reinforce the importance of finance, technology transfer, and capacity building to achieve climate goals. Developed countries are required to provide financial resources to assist developing countries and all Parties are encouraged to mobilise climate finance from a wide variety of sources.²⁴ These provisions reflect a recognition that mitigation and adaptation cannot be achieved without substantial financial mobilisation, particularly in developing economies. From a comparative perspective, the international legal framework exerts differentiated influences on domestic legal systems. For developing countries such as India, principles of CBDR–RC and financial support shape the design of carbon markets and energy finance mechanisms in ways that prioritise developmental needs.²⁵ For developed jurisdictions such as Scotland, operating within the UK framework, international obligations reinforce existing regulatory structures and encourage higher levels of ambition. In both cases, international climate law operates

²¹ Dinah Shelton, *Commitment and Compliance: The Role of Non-Binding Norms in the International Legal System* (OUP 2000) 1–20; Daniel Bodansky, Jutta Brunnée and Lavanya Rajamani, *International Climate Change Law* (OUP 2017) 54–63.

²² Energy Conservation (Amendment) Act 2022.

²³ Government of India, Carbon Credit Trading Scheme 2023.

²⁴ CC(S)A 2009 (n6).

²⁵ UNFCCC (n3) arts 3(1), 4(3) and 4(7); Paris Agreement (n3) arts 2(2), 4(3) and 9; Daniel Bodansky, Jutta Brunnée and Lavanya Rajamani, *International Climate Change Law* (OUP 2017) 213–241.

less as a prescriptive code and more as an enabling framework that shapes domestic regulatory choices.

Ultimately, the effectiveness of the international climate regime depends on its domestic reception and implementation. While the Paris Agreement provides legal and normative guidance on carbon trading and climate finance, it leaves significant discretion to states in designing regulatory mechanisms. The following sections examine how India and Scotland have responded to this discretion, highlighting the challenges of translating evolving international norms into coherent, enforceable domestic regimes.

3. Climate Change Law and Governance in India

3.1 Constitutional Foundations and Judicial Climate Jurisprudence

India's climate change governance framework is not anchored in a single, comprehensive climate statute. Instead, it is dispersed across constitutional provisions, sector-specific legislation, executive policies, and judicial interpretation. The constitutional foundation for environmental and climate protection is primarily derived from Part IV (Directive Principles of State Policy) and Part IVA (Fundamental Duties) of the Constitution of India. Article 48A directs the State to protect and improve the environment and to safeguard forests and wildlife, while Article 51A(g) imposes a duty upon citizens to protect the natural environment.²⁶ Although these provisions are non-justiciable, they have played a significant interpretive role in environmental adjudication. The Supreme Court of India has progressively constitutionalised environmental protection by reading it into the right to life under Article 21. Beginning with *Subhash Kumar v State of Bihar*, the Court recognised the right to pollution-free water and air as integral to the right to life.²⁷ This jurisprudence was further expanded in *M.C. Mehta v Union of India*, where the Court articulated principles such as absolute liability, sustainable development, and the precautionary principle.²⁸ While these decisions predate the contemporary climate change discourse,

²⁶ (n15) art 48A; art 51A(g). See also Shyam Divan and Armin Rosencranz, *Environmental Law and Policy in India* (2nd edn, OUP 2001) 45–47.

²⁷ (n16) [7]–[8].

²⁸ (n18); *MC Mehta v Union of India (Ganga Pollution Case)* (1988) 1 SCC 471. See also *Vellore Citizens Welfare Forum v Union of India* (1996) 5 SCC 647 [11] – [13].

they have provided a doctrinal foundation upon which climate-related claims may be constructed.

In recent years, Indian courts have begun to explicitly engage with climate change. In *Ridhima Pandey v Union of India*, the National Green Tribunal (NGT) acknowledged the seriousness of climate change, but declined to issue specific directions, citing the absence of a dedicated statutory framework.²⁹ The Tribunal observed that the formulation and implementation of climate policy primarily fell within the domain of the executive and that judicial intervention was unwarranted in the absence of any demonstrated failure to discharge statutory obligations. This judicial restraint highlights a structural limitation of India's climate governance: the absence of clear legislative mandates constrains adjudicatory intervention. Consequently, while constitutional jurisprudence provides normative support, it does not substitute for detailed regulatory design.

3.2 Policy Architecture and National Climate Strategy

India's primary policy instrument for climate governance is the National Action Plan on Climate Change (NAPCC), launched in 2008.³⁰ The NAPCC adopts a mission-based approach, originally comprising eight National Missions, including the National Solar Mission, National Mission for Enhanced Energy Efficiency, and National Mission on Sustainable Habitat. These missions seek to integrate climate objectives with developmental priorities, reflecting India's interpretation of the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC). The NAPCC has since been supplemented by State Action Plans on Climate Change (SAPCCs), which aim to decentralise climate governance. However, empirical studies indicate significant variation in the quality, ambition, and implementation capacity of SAPCCs across states.³¹ This fragmentation poses challenges for the uniform

²⁹ *Ridhima Pandey v Union of India* (2017) Original Application No 187 of 2017 (National Green Tribunal, Principal Bench). See Lavanya Rajamani, 'India's Climate Change Litigation' (2018) 30 *Journal of Environmental Law* 1, 7–9.

³⁰ Government of India, *National Action Plan on Climate Change* (Prime Minister's Council on Climate Change, 2008).

³¹ Navroz K Dubash and others, 'Indian Climate Change Policy: Exploring a Co-Benefits Based Approach' (2013) 43 *Economic and Political Weekly* 47; D M Sathe and S Bansal, 'Assessing State Action Plans on Climate Change in India' (2016) 51 *Economic and Political Weekly* 52.

application of climate policy and complicates the establishment of nationwide market-based mechanisms such as carbon trading.

India's international climate commitments are articulated through its Nationally Determined Contributions (NDCs) under the Paris Agreement. In its updated NDC, India committed itself to reducing the emissions intensity of its GDP and increasing the share of non-fossil fuel-based energy capacity approximately 50% by 2030.³² While these commitments are framed in relative rather than absolute terms, they have significant implications for domestic regulatory design, particularly in the energy and industrial sectors.

3.3 Statutory Basis for Carbon Markets: Energy Conservation Framework

A critical development in India's climate governance landscape is the statutory recognition of carbon markets through the Energy Conservation (Amendment) Act 2022. The amendment expanded the scope of the Energy Conservation Act 2001 by empowering the central government to establish a carbon credit trading scheme.³³ This legislative intervention represents the first explicit statutory basis for carbon trading in India, marking a shift from earlier policy-driven mechanisms to formal legal regulation. Prior to the enactment of the Energy Conservation (Amendment) Act 2022, market-based emissions reduction initiatives, such as the Perform, Achieve and Trade (PAT) Scheme introduced under the National Mission for Enhanced Energy Efficiency, operated primarily through executive policies and subordinate regulations without providing a comprehensive statutory framework for carbon trading. The 2022 amendment therefore establishes the first express legislative foundation for the creation and regulation of a national carbon credit trading market in India.³⁴ The amended Act authorises the central government to specify sectors, designate authorities, and prescribe the manner of issuance and trading of carbon credits. Importantly, it integrates carbon trading within the existing energy efficiency regulatory framework, particularly the Perform, Achieve and Trade (PAT) scheme.

³² UNFCCC, India's Updated First Nationally Determined Contribution (2022) <<https://unfccc.int>> accessed 10 January 2026.

³³ (n22) s 14A (India); See also Ministry of Power, Government of India, *Carbon Market in India* (2023).

³⁴ Government of India, Bureau of Energy Efficiency, *Perform, Achieve and Trade (PAT) Scheme* <<https://beeindia.gov.in/en/programmes/perform-achieve-and-trade-pat>> accessed 18 July 2026.

This integration reflects a pragmatic approach that builds upon institutional familiarity while gradually expanding the scope of market-based climate regulation.

3.4 Carbon Credit Trading Scheme 2023: Design and Scope

Pursuant to the 2022 amendment, the Government of India notified the Carbon Credit Trading Scheme (CCTS) 2023.³⁵ The Scheme establishes a regulatory architecture for the creation and trading of carbon credits. The Bureau of Energy Efficiency (BEE) is designated as the administrator responsible for accreditation, issuance, and compliance oversight, while the Central Electricity Regulatory Commission (CERC) regulates the trading of carbon credits on recognised exchanges. The CCTS adopts a phased approach. In its initial phase, the Scheme focuses on compliance mechanisms linked to energy efficiency and renewable energy obligations. Over time, it envisages expansion into voluntary and potentially mandatory emissions trading across additional sectors. This incremental design seeks to mitigate regulatory risk and allow institutional capacity to develop alongside market growth. However, several legal and regulatory ambiguities persist. The Scheme does not clearly define the legal nature of carbon credits, leaving open questions regarding their classification as commodities, financial instruments, or *sui generis* regulatory assets. This ambiguity has implications for taxation, insolvency treatment, and investor protection.³⁶ This uncertainty has significant implications for the legal operation and commercial viability of India's emerging carbon market. First, the absence of a clear legal classification creates uncertainty in the field of taxation. If carbon credits are treated as goods or commodities, their transfer may attract the Goods and Services Tax (GST), whereas their characterisation as financial instruments or statutory permits may lead to a different tax treatment. Similarly, uncertainty remains regarding the applicability of income tax provisions to the generation, transfer, and trading of carbon credits, particularly in distinguishing between business income and capital gains. Such ambiguity increases compliance costs and exposes market participants to potential tax disputes.

³⁵ Ministry of Power, Government of India, Carbon Credit Trading Scheme, 2023 (Notification dated 28 June 2023).

³⁶ Ajay Mathur, 'Designing India's Carbon Market: Legal and Institutional Challenges' (2023) 58 *Economic and Political Weekly* 19, 22–24.

Secondly, the absence of statutory recognition of carbon credits as a distinct form of property raises important issues under insolvency law. The Insolvency and Bankruptcy Code 2016 recognises various forms of assets that may be included within the insolvency estate of a corporate debtor. However, in the absence of legislative clarification, it remains uncertain whether carbon credits constitute transferable assets capable of being realised by insolvency professionals for the benefit of creditors. Similar questions arise regarding the creation of security interests over carbon credits, their attachment during execution proceedings, and their treatment during corporate restructuring or liquidation. The lack of certainty may reduce the willingness of financial institutions to recognise carbon credits as commercially valuable assets or collateral for financing.

Thirdly, the uncertain legal character of carbon credits creates challenges for investor protection and market regulation. If carbon credits are ultimately characterised as financial instruments or securities, trading activities may fall within the jurisdiction of the Securities and Exchange Board of India (SEBI), thereby attracting regulatory requirements relating to disclosure, market conduct, investor protection, and enforcement against fraud and market manipulation. Conversely, if they are regarded merely as regulatory permits or environmental compliance instruments, the existing securities law framework may not apply, leaving gaps in regulatory oversight and reducing legal protection for market participants. This uncertainty may discourage institutional investors, increase transaction risks, and undermine confidence in the integrity and transparency of the carbon market.

Finally, these unresolved questions have broader implications for contractual certainty and cross-border carbon trading. Parties engaged in domestic or international carbon credit transactions require legal certainty regarding ownership rights, transferability, enforcement of contractual obligations, dispute resolution, and the recognition of carbon credits across jurisdictions. Without a comprehensive statutory framework clarifying the legal status of carbon credits, India's carbon market may face increased transaction costs, regulatory fragmentation, and reduced investor confidence, thereby limiting its effectiveness in supporting the country's climate commitments under the Paris Agreement. Legislative clarification, either through amendments to the Energy Conservation Act 2001 or detailed subordinate regulations

issued under the Carbon Credit Trading Scheme, would significantly enhance legal certainty and promote the efficient functioning of India's carbon market.

3.5 Institutional Capacity, MRV, and Enforcement Challenges

Effective carbon markets depend upon robust systems for measurement, reporting, and verification (MRV). In India, MRV frameworks are still evolving and vary significantly across sectors. While the PAT scheme has generated experience with energy efficiency certificates, scaling MRV systems to economy-wide emissions trading presents substantial technical and administrative challenges.³⁷ Institutional fragmentation further complicates enforcement. Multiple ministries and agencies—including the Ministry of Power, Ministry of Environment, Forest and Climate Change, BEE, and sectoral regulators—exercise overlapping responsibilities. The absence of a dedicated climate regulator raises concerns regarding coordination, accountability, and regulatory capture. Scholars have argued that without independent oversight, carbon markets risk undermining environmental integrity and public confidence.³⁸ Enforcement mechanisms under the CCTS rely primarily on penalties prescribed by delegated legislation. Compared to jurisdictions with statutory emissions caps and judicially enforceable targets, India's enforcement framework remains relatively weak. This reflects a broader preference for facilitative rather than coercive regulation, consistent with India's developmental priorities. This reflects a broader preference for facilitative rather than coercive regulation, consistent with India's developmental priorities and the principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR–RC).³⁹ In contrast, Scotland has adopted a more prescriptive statutory approach, imposing legally binding emissions reduction targets under the Climate Change (Scotland) Act 2009, as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, supported by regular monitoring, independent oversight, and statutory accountability mechanisms. The differing approaches illustrate the influence of each jurisdiction's constitutional framework,

³⁷ Bureau of Energy Efficiency, *Perform, Achieve and Trade (PAT) Scheme – Evaluation Report* (BEE 2021). See also Michael Mehling and Harro van Asselt, 'Designing MRV Systems for Carbon Markets' (2018) 27 *Review of European, Comparative & International Environmental Law* 3.

³⁸ Lavanya Rajamani, 'The Making and Unmaking of India's Climate Policy' (2021) 33 *Journal of Environmental Law* 1, 18–21.

³⁹ UNFCCC (n3) art 3(1); Paris Agreement (n4) art 2(2).

level of economic development, and climate governance priorities: whereas India's regulatory framework emphasises flexibility to balance climate objectives with economic development, Scotland's framework places greater emphasis on legally enforceable obligations and institutional accountability.

3.6 Assessment and Implications for Comparative Analysis

India's climate governance framework illustrates a model of regulatory gradualism and experimentalism. Constitutional principles and judicial jurisprudence provide normative legitimacy, while sectoral legislation and executive schemes supply operational mechanisms. The emergence of a statutory carbon market represents a significant step forward, yet its effectiveness will depend on regulatory clarity, institutional capacity, and alignment with international standards under Article 6 of the Paris Agreement. From a comparative perspective, India's approach contrasts sharply with the statutory certainty and enforceability characteristic of Scotland's climate regime. At the same time, India's emphasis on flexibility and development-sensitive regulation offers important lessons for designing carbon markets in emerging economies. These contrasts form the basis for the comparative doctrinal analysis undertaken in subsequent sections.

4. Climate Change Law and Governance in Scotland

4.1 Statutory Framework

Scotland has emerged as a leading jurisdiction in Europe for climate governance, underpinned by one of the most ambitious statutory frameworks on climate change.⁴⁰ The Climate Change (Scotland) Act 2009 introduced legally binding greenhouse gas reduction targets, a statutory system of carbon budgeting and requirements for annual reporting and monitoring by the Scottish Ministers.⁴¹ It requires the Scottish Ministers to set annual emissions reduction targets and report regularly to the Scottish Parliament on progress towards meeting those targets and imposed statutory climate change duties on Scottish public bodies, supported by monitoring and reporting

⁴⁰ Climate Change Committee, *Progress in Reducing Emissions in Scotland: 2024 Report to Parliament* (Climate Change Committee 2024); CC(S)A 2009 (n6); CC(ERT)(S)A 2019 (n6).

⁴¹ CC(S)A 2009 (n6).

mechanisms.⁴² These institutional mechanisms are intended to enhance transparency, accountability, and the implementation of Scotland's climate change objectives.⁴³ The Act codified climate governance as a core function of government decision-making, ensuring that emissions reductions are systematically integrated across sectors including energy, transport, and industry. Its provisions include sectoral targets, detailed duties for public bodies, and the authority to issue guidance on adaptation and mitigation measures.⁴⁴

The framework was strengthened by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, which established a legally binding net-zero target for 2045, five years ahead of the UK-wide target of 2050.⁴⁵ This legislation reflects Scotland's commitment to embedding climate governance within a comprehensive statutory framework, strengthening legal accountability and long-term climate policy implementation.⁴⁶ It also requires the Scottish Ministers to set annual targets, update emission inventories, and prepare reports for the Scottish Parliament. The 2019 amendment introduced new compliance mechanisms, including enhanced scrutiny by the UK Climate Change Committee (CCC), which evaluates policy progress, advises on carbon budgets, and reports publicly on achievements and shortfalls.⁴⁷ The 2019 amendment strengthened accountability by enhancing scrutiny by the UK Climate Change Committee (CCC), which independently evaluates policy progress, advises on emissions reduction pathways, and reports publicly on achievements and implementation gaps.⁴⁸ Although these mechanisms have improved transparency and institutional accountability, their effectiveness has been mixed. The CCC has recognised Scotland's substantial long-term reductions in greenhouse gas emissions but has also concluded that progress towards several interim targets has been insufficient, leading the Scottish Government in 2024 to acknowledge that the

⁴² CC(S)A 2009 (n6) ss 33–37.

⁴³ Scottish Government, Climate change: legislation (11 July 2017); Climate Change Committee, Progress in Reducing Emissions in Scotland (latest annual report).

⁴⁴ *ibid.*, s 3–5.

⁴⁵ CC(ERT)(S)A 2019 (n6).

⁴⁶ CC(S)A 2009 (n6); CC(ERT)(S)A 2019 (n6); Aileen McHarg, 'Climate Change Constitutionalism? Lessons from the United Kingdom' (2011) 2(4) *Climate Law* 469–484.

⁴⁷ UK Climate Change Committee, *Progress in Reducing Emissions: 2023 Report to Parliament* (CCC 2023) 12–18.

⁴⁸ CCC Report to Parliament (n40).

statutory 2030 emissions reduction target was no longer achievable.⁴⁹ These developments suggest that Scotland's principal challenge lies not in the absence of a robust legal framework but in the effective implementation of climate policies necessary to meet its statutory ambitions.

The statutory framework provides a level of legal certainty that is largely unparalleled internationally. The statutory framework provides a high degree of legal certainty by establishing legally binding emissions reduction targets, clearly defined institutional responsibilities, statutory planning obligations, and regular monitoring and reporting requirements. Unlike jurisdictions that rely predominantly on executive policies or non-binding climate strategies, Scotland's framework places key climate commitments on a statutory footing, thereby enhancing regulatory predictability, institutional accountability, and long-term policy continuity. This legal certainty provides greater confidence for public authorities, private investors, and other stakeholders by reducing regulatory uncertainty and facilitating long-term investment in low-carbon infrastructure and renewable energy projects. Nevertheless, the effectiveness of this framework ultimately depends upon consistent policy implementation and the achievement of statutory targets in practice. Targets are enforceable through judicial review, allowing civil society actors, NGOs, and other stakeholders to hold the government accountable for policy inaction. For example, courts have considered the justiciability of climate targets in light of statutory obligations, reinforcing the principle that climate commitments carry concrete legal weight.⁵⁰ The statutory climate targets are supported by the possibility of judicial review, enabling the courts to scrutinise whether the Scottish Ministers have complied with their statutory duties and procedural obligations under the Climate Change (Scotland) Act 2009. However, judicial review is primarily concerned with the legality, rationality, and procedural propriety of governmental decision-making, rather than the substantive merits of climate policy. Accordingly, while the courts may require compliance with statutory obligations or set aside unlawful decisions, they are generally cautious about substituting their own views for those of the executive in matters involving complex policy choices and the allocation of public resources. The

⁴⁹ Scottish Government, *Statement to Parliament on Scotland's Climate Change Targets* (18 April 2024); Climate Change Committee, *Progress in Reducing Emissions in Scotland: 2024 Report to Parliament* (Climate Change Committee 2024).

⁵⁰ *Friends of the Earth Scotland v Scottish Ministers* [2021] CSOH 32.

combination of statutory targets, carbon budgeting, and independent oversight constitutes a system of climate accountability that contrasts sharply with jurisdictions that rely primarily on executive policy instruments or voluntary commitments.

In addition to emissions targets, the Act obliges Scottish public bodies to exercise their functions in a way consistent with climate objectives. This “public body duty” has significant implications for planning, procurement, and infrastructure investment. By embedding climate obligations across government agencies, Scotland seeks to ensure that climate policy is coherent and institutionally anchored.⁵¹ It also creates a legal expectation that governmental decision-making will explicitly consider carbon reduction and adaptation priorities, thereby internalising climate concerns within routine governance processes.

The Scottish framework is complemented by secondary legislation and guidance, including the Climate Change (Duties of Public Bodies: Reporting Requirements) Regulations 2015 and sector-specific statutory guidance. These instruments operationalise high-level statutory duties, detailing how agencies should monitor emissions, report progress, and integrate climate considerations into operational decision-making.⁵² The clarity of these statutory instruments has supported the implementation of Scotland's climate policies by providing a stable legal framework for emissions reduction, renewable energy development, and low-carbon innovation. Although the effectiveness of these measures ultimately depends on implementation and broader economic conditions, the statutory framework has enhanced regulatory certainty and facilitated long-term investment in the low-carbon transition.

4.2 Emissions Trading and Carbon Markets

A central pillar of Scotland's climate governance is its participation in the UK Emissions Trading Scheme (UK ETS), which replaced the EU ETS following Brexit.⁵³ The UK ETS covers the power sector, energy-intensive industries, and aviation, applying a cap on total emissions while allowing the trading of carbon allowances. By creating a price signal for emissions, the scheme incentivises investment in low-carbon

⁵¹ CC(S)A 2009 (n6) s 44.

⁵² Climate Change (Duties of Public Bodies: Reporting Requirements) Regulations 2015.

⁵³ Greenhouse Gas Emissions Trading Scheme Order 2020 (UK).

technologies and operational efficiency. The UK ETS regulations specify allocation procedures, monitoring, reporting, verification, and enforcement mechanisms, with significant penalties for non-compliance.⁵⁴

Scotland's participation in the UK ETS provides access to a mature carbon market characterised by transparent institutional arrangements. The scheme is administered at the UK level, with devolved governments participating in consultation processes and policy design where relevant. However, as a devolved administration, Scotland has limited direct control over the scheme's overall architecture, including allowance caps, allocation methodology, and auction design.⁵⁵ This limited autonomy presents challenges for tailoring carbon pricing policies to devolved climate objectives, such as sectoral decarbonisation strategies or regional industrial transition plans.

Nevertheless, the UK ETS offers substantial benefits. By operating within a consolidated market, Scottish firms gain exposure to a larger pool of trading participants, enhancing liquidity and price discovery. It also allows alignment with international standards, facilitating potential linkage with other carbon markets under Article 6 of the Paris Agreement.⁵⁶ It also allows alignment with international standards, thereby creating the potential for future linkage with international carbon markets under Article 6 of the Paris Agreement. However, such linkage is neither automatic nor solely dependent on domestic regulatory alignment. It would require robust accounting and monitoring frameworks, the application of corresponding adjustments⁵⁷ to prevent double counting of emissions reductions, compliance with internationally agreed transparency requirements, and the conclusion of appropriate bilateral or multilateral legal and political agreements⁵⁸ between participating jurisdictions. Accordingly, while alignment with international standards enhances the prospects for future market integration, the practical implementation of Article 6 remains contingent upon both domestic regulatory readiness and international cooperation. For policymakers, the UK ETS complements domestic carbon budgeting

⁵⁴ *ibid*, regs 4-15.

⁵⁵ Maria Lee, 'The UK Emissions Trading Scheme and Devolution' (2022) 34 *Journal of Environmental Law* 451, 462-465.

⁵⁶ Paris Agreement (n4) art 6.

⁵⁷ Decision 2 CMA 3, *Guidance on Cooperative Approaches Referred to in Article 6, Paragraph 2, of the Paris Agreement* (13 November 2021) paras 1-7, annex.

⁵⁸ *ibid*; Lavanya Rajamani and Jacqueline Peel, *Principles of International Environmental Law* (5th edn, CUP 2021) 395-403.

by translating statutory emissions caps into market signals that influence investment and operational decisions in energy-intensive sectors.

Scotland also leverages complementary instruments to support carbon markets and climate finance. The Scottish National Investment Bank (SNIB), established under the Scottish National Investment Bank Act 2020, functions as a public finance institution with an explicit climate mandate.⁵⁹ By providing patient capital for renewable energy, green infrastructure, and innovation, the SNIB helps regulated entities respond to carbon pricing incentives, thereby reinforcing the efficacy of the UK ETS. This alignment between statutory targets, market mechanisms, and financial support exemplifies an integrated approach to climate governance, combining regulatory, economic, and financial levers.

4.3 Strengths and Limitations

Scotland's climate governance benefits from several key strengths. First, statutory certainty ensures that targets and obligations are legally enforceable, providing a credible framework for government policy and private investment.⁶⁰ Second, institutional maturity, including the CCC and SNIB, facilitates coherent policy implementation, monitoring, and oversight. Third, integrated enforcement mechanisms, including judicial review and financial penalties, reinforce compliance and accountability. Collectively, these features enhance environmental integrity and market confidence, enabling Scotland to pursue ambitious decarbonisation strategies with credible legal backing.

However, challenges remain. The interaction between devolved and reserved powers can complicate regulatory coherence. Certain sectors, including energy market regulation and carbon pricing, remain reserved to the UK government, limiting the scope for independent Scottish policy innovation.⁶¹ This constraint may affect the ability of devolved authorities to set sector-specific carbon prices or adjust auctioning mechanisms to meet local industrial or social objectives.

⁵⁹ Scottish National Investment Bank Act 2020 s 1–3.

⁶⁰ CC(ERT)(S)A 2019 (n6) s 1.

⁶¹ Lee (n11) 463-465.

Price volatility in the carbon market is another concern. While trading provides economic efficiency, short-term fluctuations in allowance prices can create uncertainty for firms making long-term investment decisions.⁶² To mitigate excessive price volatility, the UK Emissions Trading Scheme (UK ETS) incorporates market stability mechanisms, including an Auction Reserve Price (ARP),⁶³ which establishes a minimum auction price for allowances, and a Cost Containment Mechanism (CCM),⁶⁴ which permits regulatory intervention where allowance prices remain exceptionally high for a sustained period. However, these mechanisms are intended to address extreme market conditions rather than eliminate ordinary price fluctuations. Consequently, while they contribute to market stability and investor confidence, they do not fully remove pricing uncertainty, particularly during periods of economic disruption, changing regulatory expectations, or fluctuations in energy demand. Coupled with potential misalignment between UK ETS caps and Scotland's ambitious statutory targets, these factors may slow progress toward net-zero emissions unless carefully managed through complementary policy instruments, such as targeted subsidies, green finance mechanisms, or long-term regulatory signals.

Finally, despite strong institutional structures, Scotland's climate governance is not immune to implementation gaps. Sectoral differences in emissions intensity, regional disparities in industrial structure, and the integration of renewable energy into the grid pose ongoing challenges for policy delivery.⁶⁵ The interaction between UK-wide carbon market mechanisms and devolved statutory obligations requires careful coordination to ensure that statutory climate targets translate into measurable emissions reductions on the ground.

In conclusion, Scotland's climate governance represents a model of statutory climate constitutionalism, combining legally binding targets, carbon budgeting, institutional oversight, and market-based incentives. While participation in the UK ETS introduces constraints on devolved autonomy and exposes the system to price volatility, the overall framework demonstrates how integrated legal, institutional, and market instruments can drive ambitious climate policy. The Scottish experience offers

⁶² UK Climate Change Committee, *UK Carbon Prices and Market Stability* (2022) 21.

⁶³ Department for Energy Security and Net Zero, *UK Emissions Trading Scheme: A Policy Overview* (2026).

⁶⁴ UK ETS Authority, *UK Emissions Trading Scheme: Main Authority Response to the Future Markets Policy Consultation* (Department for Energy Security and Net Zero 2025).

⁶⁵ Scottish Government, *Energy and Climate Change: Sectoral Progress Report* (2023) 34–39.

valuable lessons for jurisdictions seeking to embed climate obligations within legally enforceable structures while leveraging carbon markets and finance as complementary tools for transition.

5. Energy Finance and Climate Transition

5.1 Conceptual Foundations of Energy Finance in Climate Law

Energy finance has emerged as a central pillar of contemporary climate governance, reflecting the recognition that legal commitments to decarbonisation cannot be realised without large-scale mobilisation of capital. International climate law increasingly frames finance not merely as a supporting tool but as a constitutive element of climate action. This shift is evident in Article 2(1)(c) of the Paris Agreement, which commits Parties to making financial flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.⁶⁶ This provision represents a significant normative expansion of climate obligations, extending their reach beyond environmental regulation into the domains of financial governance, investment policy, and economic planning. From a legal perspective, energy finance encompasses a diverse set of instruments and institutional arrangements, including public expenditure, development finance, private investment, blended finance, and market-based instruments (such as green bonds and sustainability-linked loans).⁶⁷ The regulatory challenge lies in aligning these financial flows with climate objectives while ensuring transparency, accountability, and environmental integrity. Jurisdictions differ markedly in their capacity to operationalise this alignment, shaped by levels of economic development, regulatory maturity, and institutional design.

5.2 Energy Finance and Climate Transition in India

India's energy transition presents one of the most complex climate finance challenges globally. Rapid economic growth, rising energy demand, and persistent developmental needs necessitate continued expansion of energy infrastructure, even as India seeks to

⁶⁶ Paris Agreement (n4) art 2(1)(c).

⁶⁷ World Bank, *State and Trends of Carbon Pricing 2024* (World Bank 2024); Asian Development Bank, *Energy Policy 2021*.

decarbonise its economy.⁶⁸ Estimates by international institutions suggest that achieving India's net-zero target by 2070 will require cumulative investment running into several trillion dollars across power generation, transmission, transport, and industrial sectors.⁶⁹ Mobilising such capital within a developing economy context places significant strain on existing financial and regulatory frameworks. Public finance plays a foundational role in India's energy transition. Budgetary allocations, viability gap funding, and public sector lending institutions provide essential risk mitigation and project development support, particularly in renewable energy. The Indian Renewable Energy Development Agency (IREDA) and the Power Finance Corporation act as specialised financial intermediaries, offering concessional loans and refinancing facilities for clean energy projects.⁷⁰ These institutions operate within a hybrid legal framework, combining statutory mandates with commercial lending practices.

Private finance has expanded rapidly in India's renewable energy sector, particularly in solar and wind power. Public-private partnerships (PPPs) have been instrumental in scaling deployment, supported by standardised power purchase agreements and competitive bidding mechanisms. However, regulatory uncertainty, grid integration challenges, and counterparty risk associated with state-owned distribution companies continue to deter investment, especially in emerging technologies such as green hydrogen and energy storage.⁷¹ Green bonds have emerged as a prominent instrument for mobilising climate finance in India. Both corporate and sovereign issuances have been used to finance renewable energy, clean transport, and climate-resilient infrastructure. The Reserve Bank of India and the Securities and Exchange Board of India have taken steps to develop regulatory guidelines for green debt securities, enhancing disclosure and use-of-proceeds requirements.⁷² Nevertheless, the absence

⁶⁸ International Energy Agency, *India Energy Outlook 2021* (IEA 2021) 19–32; Government of India, *India's Updated First Nationally Determined Contribution under the Paris Agreement* (2022) 2–6; International Energy Agency, *World Energy Investment 2024* (IEA 2024) 191–201.

⁶⁹ International Energy Agency, *India Energy Outlook 2021* (IEA 2021) 112–120.

⁷⁰ Indian Renewable Energy Development Agency Act 1987; Power Finance Corporation Ltd, *Annual Report 2021–22* (PFC 2022) 34–38.

⁷¹ Navroz K Dubash, 'India's Energy Transition: Institutional and Regulatory Challenges' (2022) 57 *Economic and Political Weekly* 43, 46–49.

⁷² Securities and Exchange Board of India, *Disclosure Requirements for Issuance and Listing of Green Debt Securities* (SEBI 2021) paras 4–6; Reserve Bank of India, *Report on Currency and Finance 2022* (RBI 2022) ch 7.

of a comprehensive national green taxonomy has raised concerns regarding greenwashing and inconsistent classification standards.

International climate finance remains critical to India's transition. Multilateral development banks and bilateral climate funds provide concessional finance, guarantees, and technical assistance. However, scholars have noted that access to international finance is often constrained by complex conditionalities and limited absorptive capacity at sub-national levels.⁷³ This underscores the need for stronger institutional coordination and capacity-building to translate financial commitments into effective emissions reductions.

5.3 Energy Finance and Climate Transition in Scotland

Scotland's energy finance landscape reflects the advantages of operating within a developed economy with access to mature financial markets and robust regulatory institutions. Climate objectives are integrated into public finance decision-making through statutory mandates and policy frameworks, ensuring alignment between fiscal policy and emissions reduction targets. The Climate Change (Scotland) Act 2009 requires Scottish Ministers to report on the use of resources to meet climate targets, reinforcing fiscal accountability.⁷⁴ A distinctive feature of Scotland's approach is the establishment of the Scottish National Investment Bank (SNIB) under the Scottish National Investment Bank Act 2020. The SNIB has a statutory mission to support the transition to net-zero emissions, promote inclusive growth, and foster innovation.⁷⁵ Unlike traditional development banks, the SNIB operates with an explicit climate mandate, allowing it to deploy patient capital in sectors that may be underserved by private finance. Green bonds and sustainable finance instruments form another pillar of Scotland's energy finance strategy. Although sovereign green gilt issuance occurs at the UK level, Scotland benefits indirectly through access to UK-wide capital markets and targeted funding streams.⁷⁶ Mandatory climate-related financial disclosures, initially aligned with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), further enhance transparency and risk management

⁷³ Lavanya Rajamani and Shibani Ghosh, 'Developing Countries and Climate Finance' (2019) 29 *Journal of Environmental Law* 23, 35–38.

⁷⁴ CC(S)A 2009 (n6) s 33.

⁷⁵ Scottish National Investment Bank Act 2020, ss 1–3.

⁷⁶ HM Treasury, *UK Green Financing Framework* (HMT 2021) 5–9.

within the financial system.⁷⁷ At present increasingly informed by the International Sustainability Standards Board (ISSB) Standards, particularly IFRS S1 (General Requirements for Disclosure of Sustainability-related Financial Information) and IFRS S2 (Climate-related Disclosures), further enhance transparency, comparability, and climate risk management within the financial system.

Public investment in energy infrastructure is complemented by private sector participation, particularly in offshore wind and renewable technologies. Scotland's regulatory framework provides long-term policy certainty, reducing investment risk and lowering the cost of capital. However, reliance on UK-level financial regulation and market mechanisms also constrains Scotland's ability to independently tailor finance instruments to devolved policy priorities.⁷⁸

5.4 Comparative Assessment: Legal and Regulatory Dimensions of Energy Finance

A comparative assessment of energy finance in India and Scotland reveals both convergence and divergence in regulatory approaches. The assessment of energy finance in India and Scotland is particularly valuable because the two jurisdictions represent contrasting legal and institutional approaches to climate governance. India, as a rapidly developing economy, seeks to reconcile climate objectives with economic growth and energy security, whereas Scotland, as a developed devolved jurisdiction within the United Kingdom, has adopted a more mature statutory framework for climate governance and sustainable finance. Comparing these jurisdictions provides valuable insights into how differing constitutional structures, levels of economic development, and regulatory philosophies influence the design and effectiveness of energy finance mechanisms, thereby identifying best practices and lessons that may inform future legal and policy reforms. Both jurisdictions recognise finance as a central enabler of climate transition and employ a mix of public and private instruments. However, differences in economic capacity, institutional maturity, and legal design shape divergent outcomes. India's approach is characterised by regulatory

⁷⁷ Financial Conduct Authority, *Enhancing Climate-Related Disclosures by Listed Issuers* (PS21/24, 2021) paras 2.12–2.18.

⁷⁸ Scotland Act 1998 c 46 sch 5; Aileen McHarg, *The Scottish Parliament* (2nd edn, Edinburgh University Press 2021) 88–95.

experimentation and incrementalism. Energy finance mechanisms are often introduced through executive policy and sectoral regulation, with limited statutory integration. While this flexibility facilitates rapid deployment, it also generates regulatory uncertainty and uneven enforcement. Scotland's model, by contrast, embeds climate finance within a statutory framework that emphasises accountability, transparency, and long-term alignment with emissions targets. From an environmental integrity perspective, Scotland's stronger disclosure requirements and institutional oversight reduce the risk of misaligned financial flows. India's challenge lies in developing comparable standards while maintaining accessibility to finance and supporting developmental objectives. These contrasts underscore the importance of legal design in shaping the effectiveness of energy finance as a climate governance tool.

5.5 Implications for Carbon Markets and Net-Zero Transitions

Energy finance and carbon markets are mutually reinforcing components of climate governance. Well-functioning carbon markets generate price signals that guide investment decisions, while effective energy finance mechanisms enable regulated entities to respond to these signals. In jurisdictions where finance frameworks are weak or fragmented, carbon markets risk exacerbating inequities or failing to deliver emissions reductions. For India, strengthening the legal coherence between carbon trading and energy finance will be essential to ensuring that emerging carbon markets contribute meaningfully to the net-zero transition. This may require statutory recognition of sustainable finance principles, development of a national taxonomy, and enhanced coordination between financial regulators and climate authorities. Scotland's experience demonstrates the benefits of integrating finance into climate legislation, but also highlights the constraints imposed by multi-level governance. Overall, energy finance occupies a pivotal position in the legal architecture of climate governance. Comparative insights from India and Scotland illustrate that while financial innovation is indispensable, its effectiveness ultimately depends on robust legal frameworks, institutional capacity, and alignment with international climate obligations.

6. Comparative Analysis: Doctrinal and Regulatory Perspectives

Dimension	India	Scotland
Legal Basis	Sectoral statutes and executive schemes	Comprehensive statutory framework
Carbon Market	Emerging domestic carbon market	Participation in UK ETS
Enforcement	Limited, evolving	Strong, penalty-based
Energy Finance	Rapid growth, higher risk	Mature, institutionally supported
Equity Focus	Development-oriented	Just transition emphasis

A deeper comparative doctrinal evaluation of India and Scotland's climate governance frameworks reveals that the effectiveness of climate regulation depends not merely on ambition, but on the legal architecture through which that ambition is operationalised. Scotland's model demonstrates the advantages of embedding climate objectives within binding statutory instruments, supported by institutional oversight and justiciability. The integration of emissions targets, fiscal accountability, and financial mobilisation within a single legislative framework creates regulatory coherence and enhances compliance incentives. This alignment reduces fragmentation between environmental law and financial regulation, allowing climate objectives to permeate decision-making across sectors.

India's framework, by contrast, reflects a pluralistic and evolving regulatory approach shaped by developmental imperatives. While this flexibility enables rapid policy innovation and accommodates diverse socio-economic conditions, it also generates doctrinal uncertainty. The reliance on executive policy and sector-specific regulation limits enforceability and weakens the normative force of climate commitments, particularly in relation to financial alignment under Article 2(1)(c) of the Paris Agreement. The reliance on executive policy and sector-specific regulation limits enforceability and weakens the normative force of climate commitments, particularly in relation to financial alignment under Article 2(1)(c) of the Paris Agreement, which requires Parties to make finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development. Although India has introduced several sustainable finance initiatives, including the Sovereign Green Bond

Framework, the Reserve Bank of India's guidance on climate-related financial risks, and the Securities and Exchange Board of India's Business Responsibility and Sustainability Reporting (BRSR) framework, these measures are largely regulatory or policy-based rather than grounded in a comprehensive statutory framework. Consequently, financial institutions are encouraged—but generally not legally required—to align investment decisions, lending practices, or disclosure obligations with national climate objectives. This fragmented approach limits regulatory certainty, weakens accountability, and falls short of fully operationalising the finance alignment objective embodied in Article 2(1)(c) of the Paris Agreement. The absence of comprehensive statutory integration risks misalignment between climate goals and investment practices. Comparatively, these models illustrate that robust legal design is central to translating climate ambition into durable emissions reductions. The lessons emerging from Scotland and India underscore the need for climate law to function not only as environmental regulation, but as a framework governing economic and financial transformation.

7. Regulatory Challenges and Reform Proposals

Despite significant legislative and policy developments in both India and Scotland, important legal and regulatory challenges continue to impede the effective operation of carbon markets and climate finance mechanisms. This section examines the principal regulatory gaps and institutional constraints in the two jurisdictions and proposes reforms to strengthen the legal framework for achieving climate objectives. While both jurisdictions operate within the broader framework of international climate law, particularly the Paris Agreement, their regulatory choices reflect divergent constitutional structures, economic contexts, and governance philosophies. As previously mentioned, Scotland represents a model of statutory climate constitutionalism, where emissions reduction targets, carbon budgeting, and financial accountability are embedded within binding legislation. The Climate Change (Scotland) Act 2009 and its 2019 amendment exemplify how climate ambition can be translated into legally enforceable duties, supported by independent oversight and judicial review.⁷⁹ This approach enhances regulatory certainty, strengthens investor

⁷⁹ CC(S)A 2009 (n6); CC(ERT)(S)A 2019 (n6); UK Climate Change Committee, *Progress in Reducing Emissions: 2023 Report to Parliament* (CCC 2023) 12–18.

confidence, and ensures alignment between climate policy and financial decision-making. Carbon markets under the UK ETS benefit from this legal clarity, operating within a mature institutional ecosystem characterised by robust monitoring, reporting, and enforcement mechanisms.

India's climate governance framework, by contrast, reflects a model of regulatory gradualism shaped by developmental priorities and institutional diversity. Constitutional principles and judicial jurisprudence provide a strong normative foundation for environmental protection, yet climate governance remains fragmented across sectoral legislation, executive policies, and delegated regulation. The introduction of a statutory carbon market through the Energy Conservation (Amendment) Act 2022 marks a significant legal milestone, signalling a shift towards market-based climate regulation.⁸⁰ However, the absence of an overarching climate statute limits coherence and weakens the enforceability of long-term climate commitments.

From a doctrinal perspective, this comparison underscores the importance of statutory integration. Climate governance is most effective where emissions targets, carbon markets, and energy finance are embedded within a unified legal framework that clearly defines institutional responsibilities and accountability mechanisms. Scotland's experience illustrates how statutory clarity can mitigate regulatory fragmentation and enhance the environmental integrity of carbon markets. India's experience, meanwhile, highlights the risks associated with over-reliance on executive policy instruments, particularly in relation to investor protection, MRV systems, and enforcement credibility. At the same time, this analysis cautions against uncritical transplantation of regulatory models. Scotland's framework operates within a developed economy with access to mature capital markets and relatively stable institutional capacity. India's regulatory choices must account for socio-economic constraints, energy poverty, and the need for continued infrastructure expansion. Flexibility and experimentation are therefore not merely transitional features, but structural necessities within India's climate governance architecture.⁸¹ The challenge

⁸⁰ Energy Conservation (Amendment) Act 2022 s 14A.

⁸¹ Lavanya Rajamani, *Innovation and Experimentation in the Paris Agreement* (2016) 6 Climate Law 1, 12–15.

lies in ensuring that flexibility does not undermine legal certainty or environmental outcomes.

Normatively, this study suggests several recommendations. First, India would benefit from the adoption of a framework climate statute that consolidates emissions targets, carbon market governance, and climate finance principles. Such legislation need not impose rigid absolute caps but could provide statutory recognition to relative targets, sectoral pathways, and market-based mechanisms, thereby enhancing coherence without sacrificing developmental sensitivity. Comparative experience demonstrates that even framework legislation can significantly strengthen accountability and coordination.⁸² Secondly, both jurisdictions must strengthen the legal integration between carbon markets and energy finance. Carbon pricing mechanisms are only effective when regulated entities have access to affordable finance to undertake decarbonisation investments. Statutory recognition of sustainable finance principles, including clear taxonomies and disclosure obligations, is essential to prevent greenwashing and align private capital with climate objectives. Scotland's statutory reporting duties and India's emerging green finance regulations provide useful starting points, but further harmonisation with international standards is required.⁸³

Thirdly, institutional capacity and independence are critical. Effective MRV systems, independent regulators, and transparent enforcement mechanisms are indispensable to maintaining market credibility. In India, greater coordination between climate, energy, and financial regulators is necessary to avoid jurisdictional overlap and regulatory arbitrage. Scotland, while benefiting from strong institutions, must navigate the constraints of devolved governance and ensure that UK-wide mechanisms such as the UK ETS remain aligned with devolved climate ambition.⁸⁴ Finally, this comparative analysis reinforces the evolving role of climate law as a form of economic governance. Climate regulation increasingly shapes investment flows, industrial policy, and financial risk management. Legal frameworks that fail to recognise this expanded role risk rendering climate commitments aspirational rather than transformative. By contrast, jurisdictions that integrate climate objectives into the

⁸² Jacqueline Peel and Hari Osofsky, *Climate Change Litigation: Regulatory Pathways to Cleaner Energy* (CUP 2015) 87–90.

⁸³ Organisation for Economic Co-operation and Development, *Aligning Finance with Climate Goals* (OECD 2020) 41–45.

⁸⁴ Maria Lee, 'The UK Emissions Trading Scheme and Devolution' (2022) 34 *Journal of Environmental Law* 451, 462–465.

core of legal and financial systems are better positioned to deliver durable emissions reductions consistent with global climate goals.

In conclusion, the experiences of India and Scotland illustrate that climate governance is not a question of ambition alone, but of legal structure. Carbon markets and energy finance can serve as powerful instruments of climate transition, but only when supported by coherent, enforceable, and context-sensitive legal frameworks. As climate law continues to evolve, comparative insights of this nature are essential to informing regulatory design that is both effective and equitable.

Conclusion

This comparative analysis of climate change law and governance in India and Scotland demonstrates that the effectiveness of carbon markets and energy finance mechanisms depends less on the ambition of climate commitments and more on the legal structures through which those commitments are implemented. While both jurisdictions operate within the international framework of the Paris Agreement, their domestic approaches reflect fundamentally different constitutional arrangements, economic capacities, and regulatory philosophies.

Scotland's climate regime exemplifies the advantages of statutory clarity and enforceability. Legally binding emissions targets, institutional oversight, and integrated climate finance obligations create regulatory coherence and enhance accountability. This legal certainty strengthens investor confidence and supports the effective operation of carbon markets within a mature governance framework. India's approach, by contrast, reflects regulatory gradualism shaped by developmental priorities and institutional diversity. Although constitutional jurisprudence provides a strong normative foundation, the absence of a comprehensive climate statute results in fragmented governance and weaker enforceability, particularly in relation to carbon markets and sustainable finance.

The comparison underscores that climate governance is most effective when emissions regulation, market mechanisms, and financial mobilisation are integrated within a coherent legal framework. At the same time, regulatory models must remain sensitive to national circumstances. Ultimately, carbon trading and energy finance can serve as

transformative tools for climate mitigation only when supported by context-appropriate, legally robust, and institutionally credible frameworks.