COMPARATIVE ANALYSIS OF RENEWABLE ENERGY REGULATIONS IN THE CONTEXT OF JUST TRANSITION: EU AND INDIA

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ABSTRACT

This paper undertakes a comparative analysis of renewable energy regulation in the European Union (EU) and India through the lens of Just Transition. While both jurisdictions are firmly embedded within the international climate regime and have articulated ambitious commitments toward renewable energy expansion and emissions reduction, they diverge markedly in their approaches to governance, institutional design, and social protection. The analysis highlights differences in legal enforceability, market integration, fiscal capacity, and the extent to which social-justice considerations are embedded within energy regulation. The paper argues that the EU has progressively institutionalised Just Transition principles through binding supranational legislation, harmonised market-based instruments, and dedicated financial mechanisms. Instruments such as the Renewable Energy Directives, the Emissions Trading System, and the Just Transition Mechanism collectively integrate decarbonisation with regional planning, labour protection, and redistributive support, particularly for carbon-intensive regions and vulnerable communities. This has enabled the EU to align climate ambition with social cohesion within its internal energy market. In contrast, India's renewable energy transition is driven largely by policy instruments, decentralised implementation, and judicial interpretation rather than a unified statutory framework. While this approach has enabled rapid capacity addition and technological scaling, it has also resulted in fragmented governance and limited institutionalisation of Just Transition safeguards. By examining regulatory architecture, market instruments, and socio-economic impacts, the paper identifies key structural gaps in India's renewable energy governance and distils transferable lessons from the EU experience. These lessons offer pathways for embedding social justice more firmly within India's evolving energy law framework.

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KEY WORDS – Just Transition, Renewable Energy Governance, Comparative Energy Law

INTRODUCTION

Energy is crucial for the complete transition to sustainability. [3] While Decarbonization has become a priority for States, the challenges is no longer limited to reducing emissions but extends to restructuring the global energy system, and now to be considered alongside the social commitments and consequences. This is where the concept of Just Transition makes an entry by capturing the livelihoods of workers, communities, regions and the very social fabric.

In both the European Union and India, renewable energy is not treated as an isolated policy objective but as a structural component of constitutional commitment, international environmental jurisprudence and statutory regulation. Yet the normative and institutional bases of their frameworks differ considerably owing to differences in the legal frameworks across jurisdictions and in approaches to implementing international law. The EU has infused the concept of JT into their very governance system and thus made it binding. However, India addresses this through decentralised policies and judicial interpretations, therefore leaving social equity largely outside the scope of enforceability.

This paper compares RE regulation in the EU and India via Just Transition, focusing on legal, institutional, and market elements that distribute transition costs and benefits. While India has rapidly deployed renewables cost-effectively, the lack of an institutionalised Just Transition risks regional inequality, labour displacement, and community exclusion. Conversely, the EU's model embeds social equity in energy governance. The study highlights structural gaps in India's approach and extracts lessons from the EU to develop an Indian Just Transition.

JUST TRANSITION PRINCIPLES

The concept of Just Transition emerged from labour and environmental justice movements, particularly within the International Labour Organisation (ILO), and has since been incorporated into international

[3] Ban Ki-moon, *Sustainable Energy for All: A Framework for Action*, The Secretary-General's High-Level Group On Sustainable Energy For All (2012), https://www.seforall.org/sites/default/files/l/2013/09/SE_for_All_-_Framework_for_Action_FINAL.pdf.

climate governance. [4] The ILO defines Just Transition as a process of greening the economy in a manner, that is fair and inclusive manner, creating decent work opportunities and leaving no one behind.[5] The ILO's *Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All* emphasise that climate policies must be accompanied by social dialogue, skills development, social protection, and employment generation. These guidelines conceptualise Just Transition not merely as compensation for loss, but as proactive economic restructuring that creates decent work while safeguarding vulnerable populations.[6]

At the international level, the Paris Agreement explicitly recognises Just Transition in its Preamble, acknowledging the imperatives of a "Just Transition of the workforce and the creation of decent work and quality jobs." Although the Agreement does not impose binding obligations, it establishes a normative expectation that climate action must be socially equitable.[7]

From a legal perspective, Just Transition rests on four interlinked principles:

1. Distributive Justice – ensuring that the economic costs and benefits of energy transition are equitably shared across regions, classes, and generations.
2. Procedural Justice – guaranteeing meaningful participation of affected workers, communities, and indigenous groups in decision-making processes.
3. Restorative Justice – addressing historical environmental harm and economic dependency, particularly in fossil-fuel-dependent regions.
4. Intergenerational Equity – aligning present energy choices with the rights and welfare of future generations.[8]

[4] Int'l Labour Org., *Guidelines For A Just Transition Towards Environmentally Sustainable Economies And Societies For All* 3–4 (2015).
[5] UNFCCC, *Just Transition of the Workforce, and the Creation of Decent Work and Quality Jobs*, FCCC/TP/2016/7 (Oct. 26, 2016), https://unfccc.int/sites/default/files/resource/Just%20transition.pdf.
[6] Dimitris Stevis & Andrea Bossmann, A Global Just Transition: Conceptual and Governance Dimensions, in *Handbook of the International Political Economy of Energy and Natural Resources* 161, 161–178 (Andreas Goldthau ed., Edward Elgar Publ'g 2014).
[7] V. Johansson, Just Transition as an Evolving Concept in International Climate Law, 35 J. ENV'T L. 229, 229–49 (2023).
[8] UN Global Compact, *Just Transition*, United Nations Global Compact, https://unglobalcompact.org/take-action/think-labs/just-transition.

In the EU, these principles have been progressively translated into binding regulations, funding mechanisms, and institutional mandates. In India, they are largely driven by passive policy documents and judicial pronouncements rather than enforceable statutory frameworks. This divergence forms the analytical backbone of the comparative inquiry.

SUSTAINABILITY AND RENEWABLE ENERGY

The foundations of international environmental regulation emerged in the mid-twentieth century, most notably through the Trail Smelter arbitration, [9] which established the principle that states bear responsibility for preventing transboundary environmental harm. This principle later informed multilateral environmental governance, including the Stockholm Declaration, which recognised the tension between environmental protection and economic development while affirming state responsibility for environmental harm beyond national borders.[10]

The Brundtland Report articulated sustainable development as a framework that explicitly linked environmental protection with energy efficiency and long-term resource planning. This approach was subsequently reinforced through multilateral environmental processes, culminating in the Paris Agreement, which embeds climate mitigation within nationally determined commitments and explicitly acknowledges the need for a "just transition of the workforce" in its Preamble. Together, these instruments provide the normative foundation for integrating renewable energy deployment with social equity concerns.

The Kyoto Protocol introduced quantified emission reduction obligations for Annexe I states, promoting more structured renewable energy transitions in developed countries/ Although India, as a non-Annexe I State, had no binding reduction targets, it used the Kyoto framework to justify voluntary mitigation and renewable energy expansion as a part of its larger development strategy. The EU, classified as an Annexe I entity, adopted binding targets which were subsequently implemented through supranational instruments.

The Paris Agreement strengthened the global shift towards renewable energy by requiring all states to prepare nationally determined contributions (NDCs). The Agreement's emphasis on low-emission

[9] *Trail Smelter Dispute*, 1 CAN. Y.B. INT'L L. 213 (1963).
[10] *Founex Report on Development and Environment* (1971); see also U.N. Doc. A/CONF.48/14/Rev.1 (1973), at 3; U.N. Doc. A/CONF.48/14 (1972), at 2–65; Corr. 1.

development pathways, adaptation and climate resilience has encouraged widespread domestic legislation and policy reforms. In both the EU and India, renewable energy has become an essential component of NDC implementation.

INTERNATIONAL DEVOLUTION TO THE INDIAN CONTEXT

Any international obligations work effectively when incorporated domestically by a sovereign power with the authority to do so. States generally ratify international conventions or follow customary law in this regard. It is up to the Member States or the parties to international conventions or treaties, based on their political and sovereign will, to chart the procedures for implementing such conventions and treaties, as there is no uniform international rule. There is no singular supreme body to monitor and supervise environmental law, nor does it prescribe a specific implementation method.[11] Hence, the States also have the option not to enforce the treaty, even after ratification, unless the treaty itself contains enforcement mechanisms. It is also crucial to refer to the Vienna Convention on the Law of Treaties (1969) when implementing. Article 27 of the VCLT states that *pacta sunt servanda*, meaning that states have the duty to honour their international obligations in good faith and may not invoke domestic law to justify non-implementation.[12]

India's constitutional practice has consistently reflected an openness to incorporating international environmental principles. Article 51(c)[13] of the Constitution directs the States to foster respect for international law and treaty obligations. Similarly, the DPSPs of the constitution under Article 39(b)[14] state that the state has a duty to own and manage resources for the betterment of citizens. India thus implements international renewable energy commitments through a blend of executive policy, legislative action and judicial endorsement. Although India requires domestic legislation for direct enforceability, it adopts a dualist model. The courts have frequently used international environmental norms to interpret constitutional provisions.

The judicial approaches under Article 21[15] and 48A[16] enabled the incorporation of sustainable development, the precautionary principle, and the polluter-pays principle without requiring formal legislative transformation. In the field of environmental governance, this constitutional interpretive

[11] Daniel Bodansky, Implementation of International Environmental Law, 54 JAPANESE Y.B. INT'L L. 62 (2011).
[12] Vienna Convention on the Law of Treaties art. 27, May 23, 1969, 1155 U.N.T.S. 331.
[13] India Const. art. 51(c).
[14] India Const. art. 39(b).
[15] India Const. art. 21.
[16] India Const. art. 48(a).

approach has facilitated the domestic integration of international sustainability norms. In *Vellore Citizens Forum v. Union of India,*[17] in which the Supreme Court applied the polluter-pays, precautionary, and sustainable development principles. While indirectly aiding the national laws, proactive judiciaries such as India's facilitated the implementation of international environmental law. Similarly, Renewable energy has become part of this broader assimilation because climate commitments are viewed as a choice in defence of the right to life and environmental protection.

Although the Constitution does not explicitly mention renewable energy, judicially expanded environmental rights have created a normative environment that encourages its adoption, particularly by the Supreme Court of India and the National Green Tribunal. International climate obligations are domestically realised through a suite of policies rather than a single dedicated statute. The National Action Plan on Climate Change (NAPCC) provides the conceptual foundation, with missions on solar energy, enhanced energy efficiency, and sustainable habitat forming the backbone of India's RE strategy.

The EU and India share a common grounding in international climate treaties but diverge significantly in how they implement these commitments. Their differences arise from institutional structures, legal hierarchies, constitutional frameworks, and regulatory cultures. The EU, as a supranational entity, transforms international obligations into enforceable domestic law through directives and regulations. India, by contrast, relies on constitutional interpretation, executive policies and programmatic action plans.

EU renewable energy governance is governed by the Renewable Energy Directive (RED)[18]. The original 2009 RED established binding targets for member states, a rare move in global energy law. The revised RED II and the emerging RED III set progressively higher targets, reflecting the EU's long-term pathway towards climate neutrality.[19] These directives not only impose numerical obligations but also require member states to streamline administrative procedures, ensure grid access, promote guarantees of origin and introduce support schemes.

The binding character of directives means that Member States cannot disregard EU-level commitments. Domestic legislation must align with EU energy targets, thereby creating a harmonised renewable energy

[17] (1996) 5 SCC 647.
[18] Alessio Devis, The Renewable Energy Directive III and the Streamlining of Environmental Procedures: A Paradigm Shift in EU Environmental Policy?, 37 J. ENV'T L. 443 (2025).
[19] European Environmental Bureau et al., Joint Statement of EU Environmental Organisations on the Revision of the Renewable Energy Directive under the RE Power EU Plan, https://eeb.org/library/joint-statement-of-eu-environmental-organisations-on-the-revision-of-the-renewable-energy-directive-under-the-repowereu-legislative-proposal/.

market across the Union. This integration is reinforced by the Court of Justice of the European Union, which can initiate infringement proceedings for non-compliance with directives.

With the adoption of the European Green Deal, renewable energy is no longer a sectoral issue but part of a comprehensive transformation strategy.[20] The "Fit for 55" package of laws aims to reduce EU greenhouse gas emissions by at least 55% by 2030.[21] It reformed aspects of emissions, trading, carbon border adjustment, and energy taxation, each of which shapes the economics of renewable energy deployment. These mechanisms create structural incentives for member states and industries to shift towards RE technologies, thereby integrating market-based approaches with regulatory mandates.

The EU's renewable energy regime is also enforceable in court. Member States have been taken to the Court of Justice of the European Union for failing to meet renewable energy obligations, and courts often interpret directives expansively to uphold EU climate ambitions. This level of enforceability is unique globally and significantly distinguishes EU implementation from Indian practice, in which international treaties may inform judicial interpretation but do not create automatic domestic obligations.

EU APPROACH TO GOVERNANCE IN THE ENERGY SECTOR

The energy governance architecture of the European Union (EU) is a deliberate and deeply institutionalised system. It aims to integrate energy markets across sovereign jurisdictions, ensure market competitiveness, and facilitate decarbonisation.

Article 194 of the Treaty on the Functioning of the European Union (TFEU)[22] provides the legal basis for this framework, enabling the EU to promote renewable energy while safeguarding the internal energy market, network interconnection, and Member State sovereignty over energy choices. Crucially, this provision permits systemic decarbonisation without imposing disproportionate burdens on workers or communities.

Building on this constitutional foundation, secondary legislation and policy instruments such as the Renewable Energy Directives (RED II and III), the Emissions Trading System (ETS), and the Effort Sharing Regulation operationalise cost-effective emissions reductions while addressing regional and

[20] Nadin Ozcelik et al., Enablers and Barriers to European Green Deal Implementation: A Systematic Review and Framework Proposal, 61 SUSTAINABLE PRODUCTION & CONSUMPTION 164, 165 (2025).
[21] European Commission, European Climate Law, https://climate.ec.europa.eu/eu-action/european-climate-law_en.
[22] Consolidated Version of the Treaty on the Functioning of the European Union art. 194, Oct. 26, 2012, 2012 O.J. (C 326) 47.

social disparities arising from the energy transition. Regulatory bodies, notably the Agency for the Cooperation of Energy Regulators (ACER) and national regulatory authorities, further support this framework by promoting market liberalisation, grid expansion, and cross-border trade. Initiatives such as the 'Fit for 55' package consolidate these objectives by raising renewable and energy-efficiency targets while explicitly incorporating equity considerations.

Collectively, this architecture situates *Just Transition* not as an accessory, but as the normative backbone of EU energy law. Further, ensuring that Europe's shift to a renewable-based system is both climate-aligned and socially inclusive.[23]

MULTI DIMENSIONS OF THE REGULATORY OVERSIGHT

The regulatory oversight of the European Union's energy sector has evolved through successive phases of market liberalisation, institutional consolidation, and climate-driven reform, culminating in a multi-layered governance framework aligned with long-term decarbonisation objectives. A notable shift could be said to have occurred in 2009, the EU witnessed a liberalisation wave which was further consolidated in the period from 2019 to 2024 via the compulsory separation of generation, operation and regulation of energy. This evolution reflects the EU's attempt to reconcile market integration with climate neutrality and social equity within a single regulatory architecture.

A decisive shift occurred with the launch of the European Green Deal (EGD), which formalised the EU's commitment to achieving climate neutrality by 2050. The EGD places decarbonisation, energy efficiency, and large-scale deployment of renewable energy at the centre of energy governance. Within this framework, existing instruments such as the Emissions Trading System (ETS) [24] and the Renewable Energy Directives (RED I and II) [25] were strengthened to serve as the primary regulatory and market-based mechanisms driving emissions reductions. While the ETS establishes a carbon price signal across energy-intensive sectors, renewable energy legislation sets binding targets and structural obligations to accelerate the transition away from fossil fuels.

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[23] Michael A. Mehling & Navraj Singh Ghaleigh, The Governance of the European Energy Union, 26 FORDHAM ENVTL. L. REV. 277, 279–81 (2015).
[24] European Commission, Impact Assessment: Proposal to Amend Directive 2003/87/EC, SWD(2015) 177 final, at 3–5 (2015).
[25] Directive 2003/87/EC, 2003 O.J. (L 275) 32.

A key aspect of the EU's energy system is integrating Competition law and State-aid rules to prevent market dominance, distortive subsidies, and unfair competition. It ensures that no single incumbent, such as an integrated utility, can stifle competition through vertical integration or preferential access.[26]

Further, the Central to EU-level coordination is the Agency for the Cooperation of Energy Regulators (ACER), established under the 2009 Third Energy Package and operational since 2011. [27] Institutions such as ACER and NRA play a critical but often underappreciated role in Just Transition governance. By enforcing market transparency, cross-border coordination, and non-discriminatory grid access, they reduce systemic risks that would otherwise disproportionately affect peripheral regions and vulnerable consumers. Regulatory independence also limits political capture, ensuring that decarbonisation costs are not arbitrarily shifted onto workers or households through distorted tariffs or delayed grid investments.[28]

Complementing this, each Member State maintains a National Regulatory Authority (NRA) that must be legally and financially independent, with responsibility for licensing, tariffs, network access, data collection and enforcement. This dual-regulator model balances supranational oversight with member-specific regulation and is a cornerstone of the integrated internal market.[29]

During the 2020s, the EU advanced comprehensive energy-market reform through the Fit for 55 package and revised electricity regulation, emphasising long-term contracting for renewables, enhanced consumer and equity protections, and the removal of cross-border and grid constraints to support an integrated, climate-neutral energy market. These reforms reflect an evolutionary shift in the system, from fragmented national electricity markets with limited cross-border trade to an integrated EU internal energy market, closely aligned to long-term climate and industrial policy.[30]

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[26] Directive 2009/72/EC, 2009 O.J. (L 211) 55; Directive 2009/73/EC, 2009 O.J. (L 211) 94; Regulation 713/2009, 2009 O.J. (L 211) 1; COM(2023) 131 final; Directive (EU) 2024/1711, 2024 O.J. (L 210) 1.

[27] Regulation (EC) No. 713/2009 of the European Parliament and of the Council of 13 July 2009 Establishing an Agency for the Cooperation of Energy Regulators, 2009 O.J. (L 211) 1, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009R0713.

[28] Id. arts. 6–7; Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 Concerning Common Rules for the Internal Market in Electricity, 2009 O.J. (L 211) 55, arts. 37–38, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0072.

[29] Directive 2009/72/EC, arts. 34–36 (electricity); Directive 2009/73/EC, arts. 34–36 (gas), 2009 O.J. (L 211) 94, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0073.

[30] European Commission, "Fit for 55" – Delivering the EU's 2030 Climate Target on the Way to Climate Neutrality, COM(2021) 550 final, at 1, 11 (2021), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:550:FIN; see also Regulation (EU) 2019/942 of the European Parliament and of the Council of 17 June 2019 on the Internal Market for Electricity, 2019 O.J. (L 158) 1, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019R0942.

Under the EU internal energy market, grid governance is entrusted to unbundled Transmission and Distribution System Operators (TSOs and DSOs), coordinated at the Union level by ENTSO-E. ENTSO-E oversees system operation, cross-border interconnections, and long-term planning through the biennial Ten-Year Network Development Plan, reviewed by ACER. In 2025, ACER reviewed the draft TYNDP 2024 and flagged areas needing improved interconnection capacity, third-party access, and more timely reporting, underscoring the evolving but still work-in-progress integration of the European grid. [31]

The TEN-E Regulation further institutionalises the principle of common interest through Projects of Common Interest, [32] enabling coordinated planning, cost allocation, and streamlined permitting for cross-border infrastructure. Recent reforms have strengthened regional coordination via Regional Coordination Centres (RCCs) and enhanced rules on capacity calculation, congestion management, and cross-border integration.

RELEVANCE FOR JUST TRANSITION IN THE EU

EU's architecture inherently supports **carbon finance**, the scalability of renewables, and pathways to a Just Transition. Through ETS, long-term market signals, integrated cross-border grids, and regulatory oversight, the EU ensures that carbon costs are internalised, renewable investments are incentivised, grid externalities are managed collectively, and future infrastructure planning spans borders.[33] Furthermore, the model enables **economies of scale.** For instance, interconnection allows surplus renewables in Spain to supply demand in Germany; therefore, storage and demand-response systems can aggregate across markets. Regulatory certainty and integrated infrastructure lower risk, making carbon-finance vehicles more viable.[34]

This systemic integration, market discipline, and regulatory coherence make the EU's system a valuable template, especially when juxtaposed with more fragmented national systems such as India's.

[31] European Union Agency for the Cooperation of Energy Regulators (ACER), ACER on ENTSO-E's 2024 Draft Ten-Year Electricity Network Development Plan: Progress Made, but Room for Improvement (May 27, 2025), https://www.acer.europa.eu/news/acer-entso-es-2024-draft-ten-year-electricity-network-development-plan-progress-made-room-improvement.
[32] Florence School of Regulation (FSR), The TEN-E Regulation (May 26, 2020), https://fsr.eui.eu/the-ten-e-regulation/.

[33] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 Establishing a Scheme for Greenhouse Gas Emission Allowance Trading Within the Community and Amending Council Directive 96/61/EC, 2003 O.J. (L 275) 32, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32003L0087.
[34]ENTSO-E, TYNDP 2024: Europe's Electricity Infrastructure Plan (2025), https://tyndp.entsoe.eu/outlooks/tyndp/20.

ARCHITECTURE OF THE INDIAN ENERGY SECTOR

The Indian system of governance is unique in that it combines features of both a unitary and a federal system. The governments at the central and state levels function on the basis of the division of matters and powers as enumerated in the 03 lists of the constitution, in the 7th schedule into the Union list, the State list, and the Concurrent list, as per Article 246 of the Indian Constitution.[35] The concurrent list is where the centre and the state government share responsibilities. While Electricity, water, and land for energy-related projects are a subject of the concurrent list, Atomic energy and minerals are subjects of the Union list. Thus, giving us a glimpse of the nature of the complexity in the field of Energy laws and its handling in India. [36]

STRUCTURE OF THE INDIAN ENERGY SECTOR

At the central level, the energy sector is managed by multiple ministers responsible for specific areas, such as the Ministry of New and Renewable Energy, the Ministry of Power, the Ministry of Petroleum and Natural Gas, and several others.[37] The central government supervises the functioning of these ministries and ensures cooperative inter-ministerial coordination. Further, the central government also looks into inter-state functioning, international collaborations and private player operations in the area of energy. Meanwhile, the state government ensures the generation, management and distribution of power in its jurisdiction. It also serves as an advisory body to the central government.

However, in the evolution of governance in this sector, multiple other bodies have been placed to handle specific agendas, such as the SERC and CERC for electricity management, SECI for solar power and PNGRB for petroleum and natural gas. While the current structure provides space and flexibility for innovation through state experimentation and learning, and a healthy competitive market, the scattered and overlapping jurisdictions remain a herculean challenge.

[35] India Const. art. 246, Seventh Schedule (Union List, State List, Concurrent List), https://www.mea.gov.in/images/pdf1/S7.pdf.
[36] India Const. art. 77(3); see also M.P. Singh, *Indian Federalism* 180–85 (2018).
[37] India Const. art. 77.

RENEWABLE ENERGY INFRASTRUCTURE IN INDIA

India's renewable energy infrastructure has undergone a significant transformation in recent years, reflecting the centrality of clean energy to national development and climate objectives. The Union Budget 2024–2025 allocated ₹10,925 crore to renewable energy, signalling continued fiscal commitment to large-scale deployment, grid integration, and emerging priorities such as the National Green Hydrogen Mission. [38] According to recent Ministry of Power data, [39] renewable sources now meet over 50 per cent of India's power demand, with installed renewable capacity surpassing 200 GW. This shift marks renewable energy as a core pillar of India's power ecosystem rather than a supplementary resource. [40]

Solar energy remains the backbone of this transition.[41] MNRE data indicate that utility-scale solar parks such as Bhadla, Pavagada, Kutch, and Kurnool, [42] have driven rapid capacity addition, largely through centrally coordinated planning and competitive bidding. However, these mega-parks often generate limited local economic spillovers, particularly in land-scarce or ecologically sensitive regions. At the decentralised level, rooftop solar has received renewed momentum through schemes such as the PM Surya Ghar Muft Bijli Yojana, which has revived previously stalled installations caused by DISCOM resistance and revenue concerns. At the same time, hybrid renewable models combining solar, wind, and limited storage have emerged as the fastest-growing segment, particularly in Rajasthan, Gujarat, and Tamil Nadu. These projects signal a shift toward integrated energy zones rather than isolated generation assets.

Wind energy, despite its long-standing presence in India's renewable mix, has witnessed slower technological advancement. [43] The National Repowering Policy seeks to address this by replacing ageing turbines with higher-capacity models, especially in wind-rich states such as Tamil Nadu, Gujarat, and

[38] Ministry of Finance, Government of India, Union Budget 2024–25: Expenditure Budget Volume I, Ministry of New and Renewable Energy, Demand No. 37, at 234 (2024), https://www.indiabudget.gov.in.
[39] Ministry of New and Renewable Energy, Year-Wise Achievement, https://mnre.gov.in/en/year-wise-achievement/.
[40] Ministry of Power, Press Release: India Achieves 50% Non-Fossil Generation in Power Mix, PIB, PR No. 2183866, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2183866.
[41] Ministry of New and Renewable Energy, Annual Report 2023–24, https://mnre.gov.in.
[42] Id.; see also MNRE, Solar Parks and Ultra-Mega Solar Power Projects, https://mnre.gov.in/solar-parks.
[43] Forum of Regulators, Report on Net Metering and Rooftop Solar in India (2022).

Karnataka. Additionally, revised bidding guidelines for coastal states have renewed interest in offshore wind. Yet, the sector faces persistent implementation challenges, including port retrofitting, availability of specialised vessels, and the development of underwater cabling infrastructure. [44]

The expansion of renewable generation has simultaneously intensified pressure on grid and storage infrastructure. Battery Energy Storage Systems (BESS) have gained prominence, reflected in rising tender activity, while Pumped Hydro Storage projects are attracting attention in the Western Ghats and Himalayan foothills. [45] Grid modernisation initiatives, particularly the Green Energy Corridor Phase II, have improved inter-state transmission capacity. Nevertheless, states such as Rajasthan and Gujarat continue to experience congestion and curtailment. As India moves toward a more decentralised and variable generation profile, investments in smart grids, advanced forecasting, flexible thermal capacity, and storage are no longer optional but foundational to sustaining renewable growth. [46]

THE POLITICAL ECONOMY OF LAND, TRANSMISSION AND ENERGY CORRIDORS

The intertwined political and infrastructural factors in the country affect energy infrastructure development. Land is scarce and highly contested in India's 1.45 billion population, leading to disputes between the government and landowners over projects. Regional disparities exist, with resource-rich states concentrating RE capacity, while others lack means and overuse land due to high population. Despite central schemes like GNA and ISTS to streamline processes, progress in building energy corridors is slow. Disputes over right-of-way, multi-agency coordination issues, and fragmented approvals hinder timely development. The financing framework for renewables is evolving, with investor confidence vital to India’s RE growth. Despite lower capital costs than a decade ago, DISCOM payment delays hinder liquidity. New instruments like green bonds, InvITs, and blended finance attract global capital. In 2025, India also operationalised early-stage platforms for domestic carbon markets under the Carbon Credit Trading Scheme, offering developers an additional revenue stream.

[44] MNRE, National Repowering Policy for Wind Power Projects (2016), https://mnre.gov.in.
[45] Ministry of Power, Battery Energy Storage System (BESS) Tender Activity and Policy Support, https://powermin.gov.in.
[46] Central Electricity Authority, Pumped Hydro Storage Projects in India, https://cea.nic.in.

PURCHASE OBLIGATIONS AND RENEWABLE ENERGY CERTIFICATES

India's Renewable Purchase Obligations (RPOs) are governed by a two-tier system, central and state, with specific RPOs for targeted energy sources within its diverse energy sector market.[47]

Under RPO mandates, state commissions set binding renewable energy targets, allowing adjustments across states. RECs are tradable instruments representing the environmental attributes of one MWh of renewable electricity grid.[48] These certificates are traded on CERC-approved power exchanges like IEX and PXIL. [49] If an Entity is unable to procure sufficient renewable electricity, it can purchase RECs to demonstrate compliance. Therefore, REC trading acts as a flexible compliance route that mitigates locational and infrastructural mismatches in energy availability[50].

The RPO–REC framework enables flexibility by separating renewable generation from consumption obligations, provides renewable energy producers with predictable revenue that attracts investment, and helps internalise environmental externalities, thereby supporting equitable participation and achievement of national clean energy targets.[51]

The system has limitations, especially regarding "Just Transition." RECs only represent environmental attributes, not actual green power, allowing obligated entities to meet compliance without reducing fossil fuels or changing energy sources. This leads to "paper greening," where benefits are superficial, and load patterns stay the same. Critics argue excessive reliance on RECs may weaken real renewable demand and delay infrastructure reforms or direct procurements.[52]

The tradable certificate model doesn't ensure social equity or Just Transition outcomes. It overlooks regional issues like energy poverty, displaced communities, and fossil-sector workers needing support.

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[47] Ministry of Power, Government of India, Renewable Purchase Obligation (RPO) Trajectory for 2025–2030, Notification (Oct. 2023), https://cdnbbsr.s3waas.gov.in/s3716e1b8c6cd17b771da77391355749f3/uploads/2023/10/2023100511804047 75.pdf [hereinafter MoP RPO Trajectory].

[48] Renewable Energy Certificate Registry of India, About REC, https://www.recregistryindia.nic.in/index.php/publics/AboutREC.

[49] G. P. Girish & S. Vijayalakshmi, Role of Energy Exchanges for Power Trading in India.

[50] Govt. of India, Ministry of Power, Order No. 536793/2022/RCM.

[51] Central Electricity Regulatory Commission (CERC), Annual Report 2022–23: Chapter V – Market Monitoring, https://cercind.gov.in/2023/market_monitoring/Annual-2022-23/Chapter-V/AR-22-23_Chapter-V.pdf.

[52] S.K. Soonee, Minaxi Garg & Satya Prakash, Renewable Energy Certificate Mechanism in India, in *Proceedings of the 16th National Power Systems Conference* 92– (Dec. 15–17, 2010), https://www.recregistryindia.nic.in/pdf/Others/Renewable_Energy_Certificate_Mechanism_in_India,_16th_NATIONAL_POWER_SYSTEMS_CONFERENCE.pdf.

RECs focus on tradeable instruments rather than local development. While RPO–REC mechanisms support decarbonisation and investment, over-reliance on paper compliance can weaken transformation, social inclusion, and the credibility of carbon finance without spatial safeguards.[53]

JUST TRANSITION IN INDIA

India, with its diverse topography, offers a range of resources distributed across its geography. A summary of the researchers' findings is shown in the table below.

S. No	Resource	Key States	Share of National Potential
1	**Solar**	Rajasthan, Gujarat, Andhra Pradesh, Karnataka	**Rajasthan**: 14% of national solar potential **Gujarat**: 11%
2	**Wind (Onshore)**	Tamil Nadu, Gujarat, Maharashtra, Rajasthan, Karnataka	**Tamil Nadu**: 31% of wind potential **Gujarat**: 16%
3	**Wind (Offshore)**	Gujarat, Tamil Nadu, Maharashtra coasts	**Gujarat coast**: 35 GW potential **Tamil Nadu coast**: 28 GW
4	**Hydro (Small)**	Himachal Pradesh, Uttarakhand, Arunachal Pradesh	**Himachal Pradesh**: 25% small hydro potential
5	**Biomass**	Punjab, Maharashtra, Uttar Pradesh	**Punjab**: 18% biomass potential

Table 1Resources and major contributing states

As the country shifts away from coal, balancing nature and development becomes urgent. Equally important is social equity and JT for all stakeholders, especially those directly impacted.

[53] Prayas (Energy Group), A Comprehensive Review of State RPO Framework and Regulations: Learnings for Effective Implementation, https://energy.prayaspune.org/our-work/research-report/a-comprehensive-review-of-state-rpo-framework-and-regulations-learnings-for-effective-implementation.

Unlike in the EU, where the concept has moved beyond the realm of literature and is now incorporated into a legally binding system, backed by a dedicated financial system, in India, it's still at a nascent stage. The term JT has not been statutorily defined here yet. India, however, in its international commitments such as Nationally Determined Contributions (NDC, 2022) and Long-Term Low-Emission Development Strategy (LT-LEDS, 2022)[54] explicitly acknowledge JT principles does acknowledge and highlight the JT policy. There is a range of policy-based instruments addressing this phenomenon, which clearly recognise that climate-compatible development must be evaluated not only in terms of gigawatts and emissions but also in terms of jobs, displacement, community welfare, and ecosystem stability.[55]

Coal Economy

The Indian economy relies heavily on coal, supporting many workers in extraction, logistics, and services, hence bringing JT into relevance utmost here. RE sectors depend more on machinery than human labour, limiting employment to construction and initial supervision stages. Without a unified national law, states are taking their own measures capacity. Jharkhand's draft Just Transition Policy (2025) [56] and Odisha's Coal Belt Diversification Mission[57] are examples of this. The Ministry of Coal has pioneered the move toward Just Transition by establishing a division for Sustainable Development and JT. [58] Prior to this, they had an exclusive Sustainable Development Cell. States with heavy coal footprints, such as Jharkhand, have now begun full-fledged research with a dedicated task force in place to understand the ground-level lacunae and accordingly map strategies.[59] Another significant leap was

[54] Government of India, India's Updated First Nationally Determined Contribution Under the Paris Agreement (2021–2030) (Aug. 26, 2022), https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20Nationally%20Determined%20Contrib.pdf (last visited Jan. 28, 2026); Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA), Synthesis Report on Long-Term Low-Emission Development Strategies, FCCC/PA/CMA/2022/8 (Oct. 26, 2022), https://unfccc.int/sites/default/files/resource/cma_2022_08.pdf.

[55] Energy Conservation (Amendment) Act, 2022, No. 31, Acts of Parliament, 2022 (India); Electricity (Promoting Renewable Energy Through Green Energy Open Access) Rules, 2022, G.S.R. 770(E) (India); India, Updated Nationally Determined Contribution Under the Paris Agreement (Aug. 2022); Carbon Credit Trading Scheme, 2023, G.S.R. 790(E) (India), operationalised 2024; see also Ministry of New and Renewable Energy (MNRE), Draft National Framework for Sustainable and Just Energy Transition (2025).

[56] Jharkhand Task Force on Sustainable Just Transition, Vision Document: Nav-Nirman Ki Ore Agrasar (2023), https://www.cif.org/just-transition-toolbox/example/jharkands-task-force-sustainable-just-transition-india.

[57] Odisha State Planning Board, Odisha Energy Survey 2024: Chapter 1 (2024), https://pc.odisha.gov.in/sites/default/files/2024-07/OES%20Chapter_1%28Main%20Booklet%29_0.pdf.

[58] Ministry of Coal, Government of India, Annual Report 2023–24, ch. 7; Ministry of Coal, Sustainable Development Cell Guidelines (2018), https://coal.nic.in.

[59] Jharkhand Task Force on Sustainable Just Transition, District-Level Action Plans for Coal Transition (2024–25), cited in Climate Policy Initiative, Roadmap for Equitable Green Economic Diversification in Jharkhand (Jan. 2026).

when the Mining plan and Mine closure guidelines were modified to include the creation of an exclusive corpus for the JT actions.[60]

Community Displacement And Renewable Energy Development

India's socio-legal landscape extends well beyond just workers. Large renewable projects, such as solar parks, pump storage, and wind corridors, have led to new land acquisitions, often affecting regions with Scheduled Tribes, forest dwellers, and farming communities, therefore extending the application of JT to these realms as well. The legal frameworks, including the 2013 Land Acquisition Act, the Forest Rights Act, and diverse state-level RE park policies[61], do not consistently ensure community participation or benefit-sharing. Recent incidents, such as the land disputes around Gujarat's 20 GW Hybrid Park and the expansion of RE corridors in Rajasthan[62], highlight ongoing conflicts between environmental development goals and constitutional duties of distributive justice. To demonstrate true JT, India's energy laws must include procedural safeguards, enforce meaningful consent, and provide transparent compensation mechanisms, especially as renewable energy projects expand into ecologically and culturally sensitive areas.

COMPARATIVE ANALYSIS

GOVT STRUCTURE AND ALLOCATION OF COMPETENCE

The European Union operates under a supranational constitutional framework in which energy is classified as a shared competence under Article 194 of the Treaty on the Functioning of the European Union (TFEU). This enables the EU to legislate binding renewable energy targets while preserving Member States' autonomy over their energy mix. The result is a coordinated yet flexible system in which strategic direction is set at the Union level and operational implementation is carried out domestically.

India, by contrast, follows a federal constitutional structure with energy-related subjects distributed across the Union, State, and Concurrent Lists under the Seventh Schedule of the Constitution. This fragmented allocation produces overlapping jurisdictional authority and regulatory complexity. While the EU's supranational structure facilitates harmonisation, India's cooperative federalism relies heavily

[60] Ministry of Coal, Mine Closure Rules, 2020, Gazette of India, G.S.R. 844(E), amended 2024; Ministry of Coal, O.M. No. 21012/15/2024-CA, Guidelines for Utilization of Mine Closure Fund for Just Transition (Dec. 2024).
[61] Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, No. 30 of 2013, §§ 4, 41 (India) [hereinafter LARR Act 2013]; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, No. 2 of 2007, §§ 3, 4 (India) [hereinafter FRA 2006].
[62] Gujarat 20 GW Hybrid RE Park (Khavda) Land Acquisition Protests, reported in DOWN TO EARTH, Kutch Solar Park: Farmers Demand Compensation, Aug. 15, 2024; Rajasthan Jaisalmer-Bhadla RE Corridor Expansion, PIL No. 8923/2023 (Rajasthan H.C.).

on negotiation, executive coordination, and state-level discretion, often resulting in uneven implementation across regions.

REGULATORY AND INSTITUTIONAL FRAMEWORKS

The EU's renewable energy regime is characterised by strong, independent regulatory institutions operating within a unified internal market. Bodies such as the European Commission, the Agency for the Cooperation of Energy Regulators (ACER), and the Court of Justice of the European Union (CJEU) ensure uniform interpretation, compliance, and enforcement of energy law. National Regulatory Authorities (NRAs) are legally and financially independent and are required to align domestic regulation with EU directives.

In India, regulatory oversight is exercised primarily through the Central Electricity Regulatory Commission (CERC) and State Electricity Regulatory Commissions (SERCs). While these bodies play a critical role in tariff-setting, grid access, and renewable purchase obligations, their independence and capacity vary significantly across states. Moreover, the absence of a central-level enforcement mechanism across various formats energy sources means that compliance with renewable targets and obligations depends largely on executive will and judicial intervention rather than on automatic legal sanctions.

RENEWABLE ENERGY POLICIES AND MARKET DESIGNS

EU renewable energy governance relies on a combination of binding targets, market-based instruments, and integrated infrastructure planning. The Renewable Energy Directives (RED II and III) impose legally enforceable obligations on Member States, complemented by carbon pricing through the Emissions Trading System (ETS). Long-term contracts, cross-border power trading, and integrated grid planning through ENTSO-E and the Ten-Year Network Development Plan enable efficient scaling of renewables while minimising regional disparities.

India's approach is more decentralised and policy-driven. Instruments such as Renewable Purchase Obligations (RPOs), Renewable Energy Certificates (RECs), competitive bidding mechanisms, and central schemes like the National Solar Mission drive renewable deployment. While these tools have helped rapidly expand installed capacity, they lack the systemic market integration seen in the EU. REC-

based compliance, in particular, allows obligated entities to meet targets without structural changes to consumption patterns, raising concerns from a Just Transition perspective.

JUST TRANSITION AND CLIMATE FINANCING IMPLEMENTATIONS

The most pronounced divergence between the EU and India lies in the institutionalisation of Just Transition. In the EU, Just Transition has been embedded into binding law and fiscal policy through mechanisms such as the Just Transition Mechanism (JTM), the Just Transition Fund (JTF), and earmarking of ETS revenues for social and regional transition. These instruments explicitly target coal-dependent regions, fund worker reskilling, support economic diversification, and require territorial Just Transition plans as a precondition for accessing finance.

In India, Just Transition remains largely aspirational and policy-oriented. Although international commitments, national climate strategies, and recent initiatives by the Ministry of Coal acknowledge the social impacts of energy transition, there is no unified statutory framework or dedicated national transition fund. Measures addressing coal phase-down, worker reskilling, and community rehabilitation are fragmented across ministries and states, leading to uneven protection and limited accountability.

RESEARCHER'S CONCLUSION

The EU model demonstrates that climate ambition and social equity need not be mutually exclusive. By integrating Just Transition principles into regulatory design, fiscal instruments, and institutional mandates, the EU has reduced the distributive risks associated with decarbonisation. India's experience, while successful in terms of capacity addition and cost reduction, exposes the limits of a transition driven primarily by market efficiency and policy targets without a corresponding social justice framework. This comparative analysis underscores that the effectiveness of renewable energy regulation cannot be assessed solely by the number of gigawatts installed or the amount of emissions reduced. Instead, it must be evaluated through the lens of governance quality, legal enforceability, and the extent to which transitions are fair, inclusive, and constitutionally aligned. In this respect, the EU and India represent two distinct pathways toward decarbonisation, offering valuable insights into the role of law in shaping a just energy transition.

STRUCTURAL LESSONS FOR INDIA FROM THE EU EXPERIENCE

This chapter does not advocate directly for transplanting the EU's renewable energy or Just Transition framework into India. The EU's system is rooted in a supranational legal order, a well-integrated energy market, and higher fiscal capacity. India, with a federal system, developmental priorities, and socio-economic diversity, differs significantly. However, the EU's experience provides val*uable insights* into turning Just Transition Principles into governance. These lessons highlight differences rather than serve as models to copy.

INSTITUTIONALISING INCLUSIVE AND CONTINUOUS STAKEHOLDER PARTICIPATION

One of the most significant divergences between the EU and India lies in the institutionalisation of stakeholder participation. In the EU, participation is embedded *ex ante* within energy and climate governance. It is ensured that there is due consultation with the workers' representatives, local authorities, civil society organisations, and affected communities through the mandates put in place by not one, but various channels like the renewable energy directives, territorial Just Transition plans, and environmental governance frameworks. Hence, we see that social dialogue is not treated as a discretionary policy choice but as an integral component of regulatory compliance and legitimacy.

In India, stakeholder engagement is largely project-centric and procedural. It is typically confined to public hearings under environmental clearance or land acquisition processes. These consultations often occur late in the decision-making process and further often serve as formalities rather than substantive deliberative forums. The lack of institutionalised mechanisms for regional or sector-wide participation hampers affected workers and communities, especially in coal-dependent and renewable energy areas, from influencing transition paths. The EU's experience shows the importance of shifting from occasional consultation to ongoing, institutionalised participation in planning energy transitions.

RING-FENCED AND PREDICTABLE FINANCIAL SUPPORT FOR TRANSITION REGIONS

The EU's Just Transition framework is distinguished by dedicated, ring-fenced financial instruments. They have an exclusive Just Transition Fund (JTF), and their Just Transition Mechanism (JTM) is broader in nature. Furthermore, there is a strategic use of revenues generated under the Emissions Trading System (ETS). Access to these funds is conditional upon the preparation of territorial Just

Transition plans, thereby linking financial support to long-term regional development strategies and accountability mechanisms.

India's renewable energy expansion, by contrast, is financed through a mix of budgetary allocations, competitive bidding mechanisms, multilateral lending, and private investment. While these instruments have been effective in reducing costs and scaling capacity, they do not systematically address the socio-economic dislocation associated with the phase-down of fossil fuels or large-scale renewable infrastructure development. Financial support for affected regions remains fragmented across schemes and ministries, with limited predictability and continuity. The EU experience highlights the importance of stable, region-specific transition finance insulated from short-term political and fiscal fluctuations.

INTEGRATING ENVIRONMENTAL RESTORATION INTO ENERGY TRANSITION GOVERNANCE

Another structural divergence concerns the integration of environmental restoration within energy transition planning. In the EU, mine closure, land rehabilitation, and ecological restoration are increasingly treated as integral elements of Just Transition governance. These processes are supported by cohesion policy funds and climate finance instruments, and are linked to employment generation, regional revitalisation, and long-term land-use planning.

In India, although mine closure guidelines and environmental regulations exist, restoration efforts are often underfunded, delayed, or treated as post-facto compliance obligations. Weak enforcement and limited transparency undermine their effectiveness. The EU model demonstrates that environmental restoration should not be peripheral to energy transition but embedded within planning frameworks, with clear timelines, accountability mechanisms, and community participation.

FROM PROJECT-CENTRIC REGULATION TO REGIONAL TRANSITION PLANNING

EU Just Transition governance is fundamentally territorial. The requirement to prepare regional transition plans allows for differentiated strategies based on local economic structures, labour markets, and environmental conditions. This territorial approach enables tailored interventions rather than uniform national prescriptions and supports coherence between energy policy, employment strategy, and regional development.

India's energy governance remains predominantly project-centric, focusing on individual power plants, mines, or renewable parks. Although national missions and state-level policies exist, there is limited use

of integrated regional transition roadmaps that link energy planning with land use, labour markets, and social welfare. A central lesson from the EU experience is the value of regional planning as a governance tool capable of reconciling decentralisation with strategic coherence.

SUB-NATIONAL EXPERIMENTS WITHIN THE EU: RELEVANCE FOR INDIAN FEDERALISM

Within the EU, sub-national and national-level experiments provide additional insights relevant to India's federal structure. Scotland's Just Transition Commission exemplifies an advisory yet influential model that combines expert analysis, stakeholder consultation, and policy guidance without displacing democratic accountability. Germany's coal phase-out strategy, supported by long-term compensation packages and legally defined timelines, illustrates how federal systems can manage structural transition through negotiated settlements between the state, industry, and labour.

These experiences suggest that India does not need to rely exclusively on centralised mandates. Instead, empowering states to develop context-specific Just Transition strategies—supported by central funding, technical assistance, and minimum statutory standards—may offer a constitutionally compatible pathway.

TOWARDS AN INDIAN MODEL OF JUST TRANSITION

The comparative analysis demonstrates that India's primary challenge is not a lack of climate ambition but a lack of institutionalisation. An Indian Just Transition framework need not mirror the EU's supranational mechanisms, but it should articulate minimum statutory principles, establish dedicated and predictable financing channels, and embed participatory governance structures. Anchoring Just Transition within constitutional values such as distributive justice, cooperative federalism, and the right to life offers a viable pathway for aligning decarbonisation with social equity.

Ultimately, the EU experience shows that Just Transition is not a constraint on climate ambition but a condition for its legitimacy and durability. For India, internalising this lesson is essential to ensuring that the renewable energy transition strengthens, rather than undermines, constitutional commitments to justice, development, and social welfare.

CONCLUSION

This study compares how the EU and India regulate renewable energy through the lens of a Just Transition. While both pursue ambitious climate targets and rapid renewable expansion, they differ

sharply in how social equity, labour protection, and regional justice are built into their energy governance. The EU represents a more mature transition model, where binding legislation, market instruments, and fiscal tools work together to support renewables while managing the social costs of decarbonisation. Frameworks such as the Renewable Energy Directives, the Emissions Trading System, and the Just Transition Mechanism embed redistribution and long-term planning, particularly for coal-dependent regions, demonstrating that climate action and social protection can advance together.

India's transition, by contrast, is shaped by development priorities and decentralised governance. The country has scaled renewable capacity rapidly through competitive bidding, flexible policy design, and falling technology costs. Mechanisms like Renewable Purchase Obligations and Renewable Energy Certificates have supported deployment and investor confidence. Yet, Just Transition remains weakly institutionalised. It is recognised in policy discourse and international commitments but lacks a coherent statutory framework, predictable finance, and region-specific planning, leaving workers and communities exposed to uneven transition risks.

The core challenge in India is not normative absence but regulatory translation. Constitutional jurisprudence already embeds sustainability and intergenerational equity; what is missing is enforceable design. Fragmented institutions and project-centric approaches risk disconnecting renewable growth from social transformation. The EU offers structural lessons that are predictable transition finance, stakeholder participation, and territorial planning that can be adapted to India's federal system through cooperative federalism. Ultimately, renewable transitions cannot be judged by capacity alone. Without social inclusion, rapid decarbonisation risks instability. Institutionalising Just Transition is therefore essential to making India's energy transition both green and just.