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ENERGY LAW AND REGULATIONS IN INDIA WITH SPECIAL EMPHASIS ON RENEWABLE ENERGY

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Abstract
Energy law in India has moved from a conventional electricity-supply framework to a wider system of energy transition governance. Renewable energy is now regulated not only through tariff orders and generation licences, but also through renewable purchase obligations, open access, renewable energy certificates, grid-code requirements, domestic manufacturing policy, carbon-market rules and state-level implementation. This paper analyses the evolution, structure and effectiveness of Indian energy law with special emphasis on renewable energy. The study adopts a descriptive-analytical method and uses secondary data from statutes, regulations, government notifications, official capacity statistics, regulatory orders and selected scholarly literature. It argues that the Electricity Act, 2003 remains the backbone of power-sector regulation, while the Energy Conservation (Amendment) Act, 2022 and renewable-energy rules have expanded the regulatory architecture toward decarbonisation and demand-side obligations. However, the paper also finds that legal success is uneven. Renewable deployment is strong in capacity terms, but enforcement of obligations, DISCOM financial stress, transmission congestion, land acquisition, forecasting, storage, domestic manufacturing constraints and federal coordination continue to limit the full effect of law. The paper concludes that Indian renewable energy regulation is no longer only a promotion regime; it is becoming a system of mandatory compliance, market-based procurement and grid-management discipline. A stronger legal framework must combine investment certainty with consumer affordability, technological neutrality, state-level compliance and energy justice.

Keywords: energy law; renewable energy; India; Electricity Act 2003; renewable purchase obligation; green energy open access; renewable energy certificates; solar energy; wind energy; energy transition; carbon credit trading; electricity regulation

1. Introduction

Energy is central to economic development, industrialisation, household welfare and environmental protection. In India, energy law has become especially important because the country must meet rapidly rising electricity demand while reducing the carbon intensity of growth. The legal and regulatory structure of energy is therefore not only a technical system for licensing and tariff determination; it is also a policy instrument for climate action, energy security, public investment and social justice. Renewable energy is the most dynamic part of this transformation because it connects electricity law, environmental law, land regulation, fiscal incentives, industrial policy and international climate commitments.

India's energy law has historically focused on electricity supply, generation, transmission, distribution and consumer protection. The Electricity Act, 2003 consolidated earlier laws and introduced competition, open access, regulatory commissions and tariff principles. Over time, renewable energy moved from a peripheral policy objective to a legal obligation. State Electricity Regulatory Commissions were required to promote renewable generation and specify minimum renewable purchase obligations. Later, the Ministry of Power and the Ministry of New and Renewable Energy developed rules and schemes for solar parks, wind energy, green energy open access, renewable energy certificates, energy storage and green hydrogen. The 2022 amendment to the Energy Conservation Act further widened the field by enabling carbon credit trading and minimum non-fossil consumption obligations.

The current legal landscape is therefore multi-layered. Central statutes provide broad authority; central regulators such as the Central Electricity Regulatory Commission design interstate and market rules; state commissions determine tariffs and enforce state-level obligations; distribution companies procure electricity and manage consumer supply; and developers operate under project contracts, grid connectivity rules, land permissions and

financing conditions. This complexity makes renewable energy law both powerful and difficult to implement.

1.1 Background of Renewable Energy Governance in India

Renewable energy governance in India has developed through a combination of statutory mandates, policy targets and market instruments. Unlike a single renewable energy code, the Indian system consists of many interlinked instruments: the Electricity Act, 2003; the National Electricity Policy; the Tariff Policy; state RPO regulations; the Energy Conservation Act; CERC regulations; Ministry of Power rules; MNRE schemes; and state renewable policies. The result is a hybrid model in which law creates obligations, policy sets targets, and market rules enable procurement.

The shift is visible in the official capacity data. MNRE reported cumulative renewable energy capacity of 227.59 GW excluding large hydro. Solar was the largest component at 154.24 GW, followed by wind at 56.44 GW and large hydro at 51.41 GW. These figures show that renewable energy is no longer an experimental or marginal sector; it is now a major component of the national power system.

1.2 Importance of the Study

The importance of this study lies in understanding law as a driver of energy transition. Renewable energy expansion is often discussed in terms of technology, finance and capacity addition. However, each of these depends on legal arrangements. Tariff certainty affects project finance; open access rules affect corporate procurement; transmission regulations affect project viability; renewable purchase obligations create demand; and carbon market rules influence industrial decarbonisation. A legal analysis is therefore necessary to understand why renewable energy grows quickly in some areas but faces barriers in others.

The study is also important because India's energy transition must balance four objectives: affordability, reliability, sustainability and justice. The law must support low-carbon energy without undermining consumer interests or grid security. It must encourage investment but also ensure transparent procurement. It must recognise national climate commitments but also respect the federal structure in which electricity is shared between the Union and the states. These tensions make renewable energy regulation a useful subject for research.

1.3 Objectives of the Study

To analyse the major statutes, rules and regulatory institutions governing energy and renewable energy in India.

To examine how the Electricity Act, 2003 and the Energy Conservation Act framework support renewable energy deployment.

To study renewable purchase obligations, green energy open access, renewable energy certificates and carbon-market instruments.

To interpret recent renewable energy capacity and compliance data through a legal-regulatory lens.

To identify implementation challenges and suggest policy and legal reforms for a more effective renewable energy transition.

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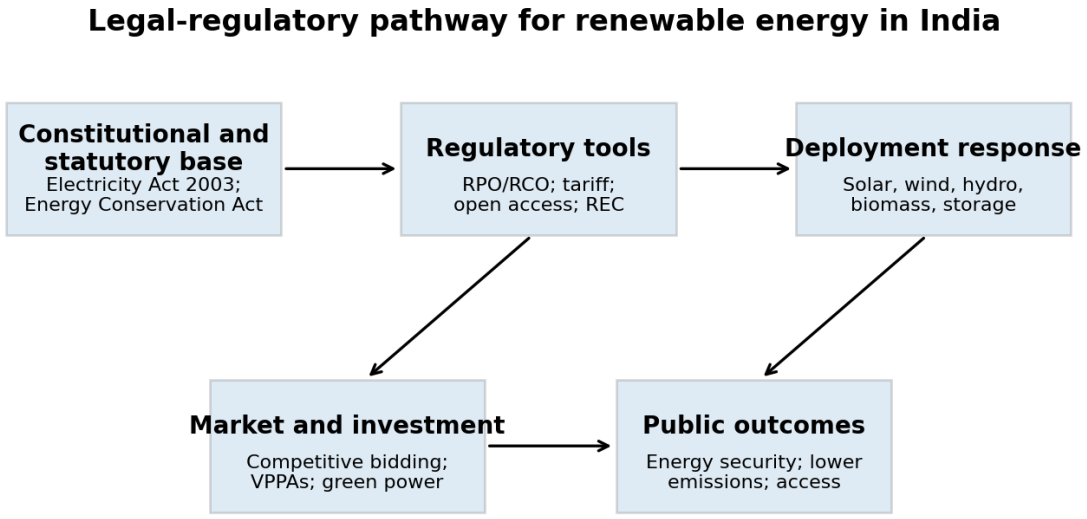

Source: Synthesized by the author from Indian electricity and renewable-energy law.

Figure 1. Analytical pathway linking Indian energy law, renewable energy regulation and public outcomes.

2. Conceptual and Legal Background

2.1 Meaning and Scope of Energy Law

Energy law refers to the body of statutes, regulations, policies, contracts and adjudicatory principles that govern the production, transmission, distribution, sale and consumption of energy. In India, the most developed part of energy law is electricity law because electricity is supplied through regulated networks and affects almost every sector of the economy. Renewable energy law is a specialised branch of this system. It regulates technologies such as solar, wind, hydro, biomass, waste-to-energy, hybrid projects and energy storage. It also governs access to transmission networks, procurement by distribution companies, tariffs, renewable certificates and consumer rights to purchase green power.

Renewable energy law has a dual character. On one side, it is promotional because it encourages investment through policy incentives, competitive bidding, tax support, concessional land allocation and grid priority. On the other side, it is mandatory because obligated entities must purchase or consume a prescribed share of renewable energy. The relationship between promotion and obligation is the core feature of India's renewable energy framework.

2.2 Constitutional and Federal Context

Electricity is placed in the Concurrent List of the Constitution of India. This means both Parliament and state legislatures can make laws, subject to constitutional rules of repugnancy. As a result, renewable energy governance requires coordination between central and state institutions. The Union Government can frame national policy, issue rules, regulate interstate transmission, support central schemes and guide national climate commitments. States, through State Electricity Regulatory Commissions and distribution licensees, regulate distribution tariffs, approve procurement, implement RPO targets and manage local grid conditions.

This federal design has advantages because states can adapt renewable energy policy to local resources. Rajasthan and Gujarat have large solar and wind potential; Tamil Nadu and Karnataka have significant wind and solar portfolios; hill states may rely more on hydro; and industrial states may use open access procurement. However, federalism also produces uneven implementation. A national target can be legally strong only when state regulators and distribution companies enforce it consistently.

2.3 Electricity Act, 2003 as the Backbone of Renewable Energy Law

The Electricity Act, 2003 is the foundation of modern Indian power-sector regulation. It promotes competition, rational tariff determination, consumer protection, open access and independent regulation. For renewable energy,

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two provisions are especially important. Section 61(h) requires tariff regulations to be guided by the promotion of co-generation and generation of electricity from renewable sources. Section 86(1)(e) requires State Commissions to promote co-generation and renewable generation by providing suitable grid connectivity and by specifying a percentage of total electricity consumption that must be purchased from renewable sources.

These provisions created the legal basis for Renewable Purchase Obligations. RPO regulations convert renewable energy policy into a binding regulatory requirement. The Supreme Court in Hindustan Zinc Ltd. v. Rajasthan Electricity Regulatory Commission upheld the validity of renewable purchase obligations imposed on captive and open access consumers, treating the obligation as a legitimate environmental and regulatory measure. This judicial support strengthened the legal foundation of RPO enforcement.

2.4 Energy Conservation Act and Carbon Regulation

The Energy Conservation Act, 2001 was originally focused on energy efficiency, standards, labelling, designated consumers and demand-side management. The Energy Conservation (Amendment) Act, 2022 expanded its importance for renewable energy by introducing carbon credit certificates, carbon credit trading and broader recognition of non-fossil and renewable energy. It also empowered the Central Government to specify minimum consumption of non-fossil resources by designated consumers. This shift connects energy efficiency law with renewable energy consumption and carbon-market regulation.

The legal importance of this amendment is that renewable energy is now linked not only to electricity procurement but also to industrial decarbonisation. Large consumers may increasingly face obligations relating to non-fossil energy use, carbon credits and energy performance. Thus, renewable energy law is moving from supply-side generation policy to an integrated energy-transition framework.

3. Review of Literature

3.1 Renewable Energy and Energy Transition

The literature on India's renewable energy transition generally identifies solar and wind as the main drivers of decarbonisation. Studies of energy transition emphasise that falling technology costs and competitive bidding have made utility-scale solar and wind commercially attractive. However, scholarship also notes that renewable energy integration requires transmission planning, flexible generation, demand response and storage. Capacity addition alone does not guarantee clean generation if the grid cannot absorb variable power or if DISCOMs are financially unable to procure it.

3.2 Law, Regulation and Market Design

A second body of literature examines renewable energy through electricity regulation. This literature highlights the importance of RPOs, feed-in tariffs, competitive bidding, open access, net metering and certificates. In early years, preferential tariffs helped attract investment. Later, competitive bidding reduced tariffs and created large-scale procurement. More recently, market instruments such as renewable energy certificates, green day-ahead markets and VPPAs have become important because corporate consumers want to decarbonise electricity consumption without necessarily owning generation assets.

3.3 Renewable Purchase Obligations and Compliance

The RPO literature shows that obligations are essential for creating demand, but compliance has historically varied across states. Some DISCOMs have met targets through direct procurement; others have relied on renewable energy certificates or carried forward deficits. Weak penalty enforcement reduces the legal force of obligations. The newer renewable consumption obligation trajectory, notified under the Energy Conservation Act framework, attempts to standardise the minimum renewable share for distribution licensees. It therefore represents a shift from fragmented state-level policy toward stronger national compliance architecture.

3.4 Green Energy Open Access and Consumer Choice

Green Energy Open Access has been discussed as a major reform because it allows commercial and industrial consumers to procure renewable energy outside the traditional DISCOM supply model. The 2022 rules reduced the transaction threshold from 1 MW to 100 kW for green energy and created a time-bound approval process. The literature sees this as a way to expand corporate renewable procurement, but it also warns that cross-subsidy

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surcharge, standby charges, banking restrictions and state implementation can affect viability.

3.5 Grid Integration, Storage and Flexibility

Another major theme concerns grid reliability. Solar and wind are variable resources. High shares of renewable energy require forecasting, scheduling, deviation settlement, flexible thermal operation, energy storage, pumped hydro, battery storage and ancillary services. The National Electricity Plan projects a major requirement for storage by 2031-32. Legal rules must therefore move beyond capacity targets and address system flexibility. Grid codes, connectivity regulations and deviation settlement mechanisms are becoming central to renewable energy law.

3.6 Research Gap

Existing studies often discuss renewable energy as a technological or economic issue, while legal studies sometimes focus narrowly on statutory provisions. There is a need to connect the legal framework with actual renewable capacity, compliance tools, market evolution and implementation challenges. This paper addresses that gap by using a descriptive-analytical method to examine statutes, rules, institutional design, capacity data and policy problems together.

Table 1. Thematic synthesis of literature on Indian renewable energy law.

Theme	Representative insight	Relevance to renewable energy	Key sources
Statutory foundation	Electricity law creates tariff, open access and RPO powers.	Explains why RE promotion is legally enforceable.	Electricity Act, 2003; Hindustan Zinc case
RPO/RCO compliance	Mandatory procurement creates demand but depends on enforcement.	Links national targets to DISCOM and consumer obligations.	Ministry of Power notifications; SERC regulations
Grid integration	Variable renewable energy requires storage, forecasting and grid discipline.	Moves law from promotion to reliability regulation.	IEGC 2023; National Electricity Plan 2023
Energy justice	Transition affects tariffs, land, access and regional development.	Ensures renewable energy law remains socially legitimate.	Policy studies and public-law principles

4. Research Methodology

4.1 Research Design

This study uses a descriptive and analytical research design. It is descriptive because it identifies the major laws, rules, institutions and renewable energy mechanisms in India. It is analytical because it evaluates how those instruments affect renewable energy deployment, compliance and governance. The study is qualitative-dominant but uses official quantitative data to support the legal analysis.

4.2 Data Sources

The study relies entirely on secondary sources. Legal sources include the Electricity Act, 2003, the Energy Conservation Act, 2001 as amended in 2022, Green Energy Open Access Rules, CERC regulations, national policy documents and judicial decisions. Statistical sources include MNRE physical achievement data, PIB releases, CEA planning material and RPO/RCO trajectory notifications. Academic and policy literature is used to interpret themes such as energy transition, grid integration and regulatory enforcement.

4.3 Analytical Method

The method has three steps. First, doctrinal analysis is used to identify the legal authority for renewable energy regulation. Second, policy analysis is used to examine how rules such as RPO, green open access and REC mechanisms operate in practice. Third, descriptive data analysis is used to interpret capacity growth and regulatory targets. The aim is not to conduct econometric modelling but to provide an evidence-based legal and policy analysis.

4.4 Scope and Limitations

The scope of the paper is limited to India and focuses on electricity-related renewable energy regulation. It does not

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examine petroleum law, coal mining law or nuclear liability in detail except where they affect non-fossil energy targets. The study does not conduct interviews or field surveys. It also recognises that capacity data measures installed capacity, not actual generation, grid availability or social impact. Therefore, the findings should be read as a legal-regulatory assessment rather than a complete energy-system model.

Table 2. Methodological framework of the study.

Element	Description	Data/material used	Purpose
Research type	Descriptive and analytical	Statutes, regulations and official data	To connect legal framework with RE outcomes
Core method	Doctrinal and policy analysis	Electricity Act, Energy Conservation Act, rules and CERC regulations	To identify legal powers and compliance tools
Data method	Descriptive secondary data analysis	MNRE capacity data, RPO trajectory, CEA planning data	To assess regulatory progress
Unit of analysis	Indian renewable electricity sector	National and regulatory indicators	To study implementation and governance
Limitation	No field survey or econometric modelling	Published sources only	To define the scope of claims

5. Data Collection and Regulatory Analysis Strategy

5.1 Key Legal Instruments Used in the Paper

The legal instruments selected for analysis were chosen because they directly shape renewable energy development. The Electricity Act, 2003 provides the basic regulatory architecture. The Energy Conservation (Amendment) Act, 2022 introduces carbon and non-fossil consumption instruments. The Green Energy Open Access Rules, 2022 and amendment rules regulate consumer procurement. CERC REC Regulations govern certificates and their use for compliance. The Indian Electricity Grid Code and connectivity regulations govern technical integration. RPO/RCO notifications specify the minimum renewable share required from obligated entities.

Table 3. Major legal and regulatory instruments relevant to renewable energy in India.

Instrument	Legal/regulatory function	Renewable energy relevance
Electricity Act, 2003	Creates regulatory commissions, tariff principles, open access and licensing framework.	Basis for RPOs, grid connectivity and renewable tariff promotion.
Energy Conservation Act, 2001 as amended in 2022	Regulates energy efficiency, designated consumers, carbon credits and non-fossil consumption.	Links renewable energy with carbon-market and industrial decarbonisation obligations.
Green Energy Open Access Rules, 2022	Provides procedure and eligibility for green power procurement through open access.	Expands voluntary green power purchase by commercial and industrial consumers.
Indian Electricity Grid Code, 2023	Sets rules for grid operation, scheduling, reliability and resource adequacy.	Important for integration of variable solar and wind generation.
RPO/RCO trajectory notifications	Specifies mandatory renewable consumption shares by year and category.	Creates compliance demand up to 2029-30 and beyond.

5.2 Indicators Used for Analysis

The analysis uses three categories of indicators. First, installed capacity by renewable source is used to assess

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deployment. Second, RPO/RCO trajectory percentages are used to understand legal demand creation. Third, storage projections are used to assess whether the legal framework is adapting to grid-integration needs. These indicators are appropriate because renewable energy law is intended to produce capacity, compliance and reliable integration.

Table 4. Renewable energy and non-fossil capacity in India

Source	Capacity (MW)	Capacity (GW)	Regulatory relevance
Solar power	154,236.11	154.24	Largest RE source; central to solar parks, rooftop solar and open access.
Wind power	56,436.59	56.44	Key source for RPO categories and hybrid/FDRE projects.
Biomass and cogeneration	10,869.17	10.87	Supports distributed and agricultural energy linkages.
Waste-to-energy including off-grid	877.36	0.88	Relevant to urban waste management and green energy rules.
Small hydro	5,171.36	5.17	State-level resource with grid and local development relevance.
Large hydro	51,414.67	51.41	Included in total RE and non-fossil capacity.
Total renewable energy	279,255.26	279.26	Shows scale of clean capacity including large hydro.
Nuclear power	8,780.00	8.78	Non-fossil capacity but not renewable energy.
Total non-fossil	288,035.26	288.04	Relevant to NDC and national non-fossil targets.

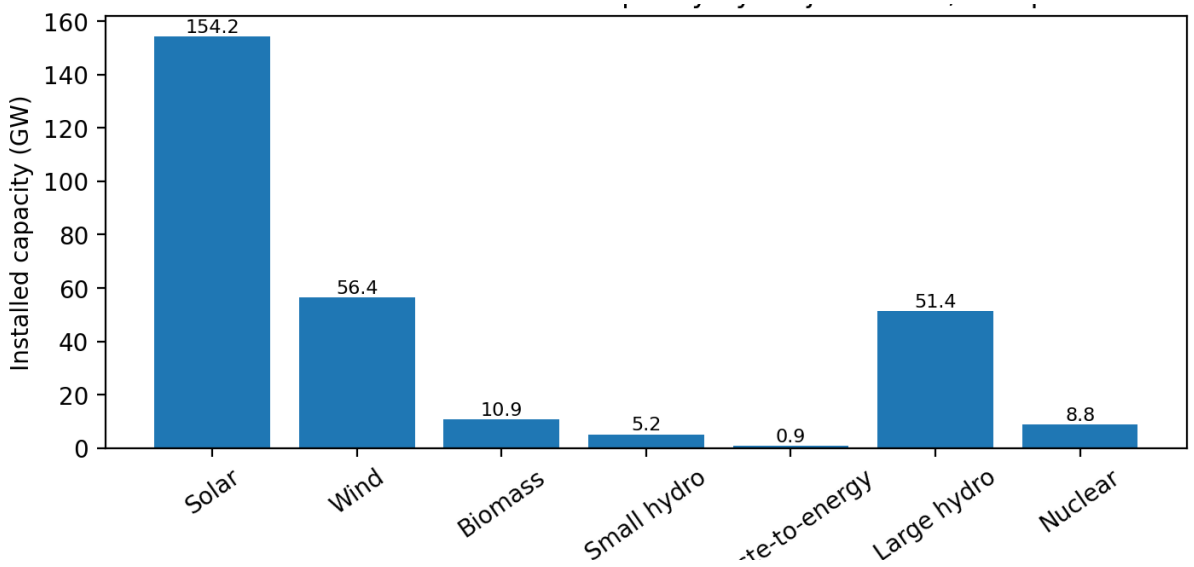

Figure 2. Renewable and non-fossil installed capacity by major source in India.

6. Data Analysis and Findings

6.1 Renewable Capacity Growth and Legal Significance

The first major finding is that Indian renewable energy law has supported rapid capacity expansion. Solar power is the clearest example. Its growth is supported by solar park policy, competitive procurement, rooftop schemes, net metering, manufacturing-linked incentives and open access demand. Wind power has grown more gradually but

remains important for hybrid projects and for balancing solar output across time and geography. Large hydro, small hydro, biomass and waste-to-energy add diversity to the renewable portfolio.

Capacity growth shows that legal and regulatory instruments have created a credible market. Competitive bidding under Section 63 of the Electricity Act has helped discover lower tariffs. RPOs create demand from distribution licensees and obligated entities. Open access enables corporate consumers to procure renewable electricity. However, capacity figures do not by themselves show complete success. Renewable energy must be generated, transmitted, paid for and integrated into the grid. Therefore, law must now focus more on system integration, storage and compliance quality.

6.2 Green Energy Open Access

Green Energy Open Access represents a major shift from utility-driven procurement to consumer-driven renewable procurement. The 2022 rules allow eligible consumers to obtain green energy through open access, reduce the transaction threshold for green energy from 1 MW to 100 kW and provide a time-bound approval process. The rules also entitle consumers to demand green power from DISCOMs, making green electricity not only a developer policy but also a consumer right.

The practical importance of open access is high for commercial and industrial consumers. Many companies have renewable energy targets, export-market decarbonisation requirements or environmental, social and governance commitments. Open access allows them to buy renewable electricity directly or through group captive arrangements. However, implementation depends on state-level charges. Cross-subsidy surcharge, additional surcharge, standby charges, banking rules and scheduling requirements can make projects less attractive. The law therefore needs consistency between central rules and state regulatory practice.

6.3 Renewable Energy Certificates and Virtual Power Purchase Agreements

Renewable Energy Certificates are market-based instruments that separate the environmental attribute of renewable generation from the physical electricity. They allow obligated entities to meet RPO/RCO requirements when direct renewable procurement is difficult. CERC's 2022 REC Regulations aimed to develop the market in power from renewable sources through certificates. Under the amendment, certificates issued to a generator that has entered into a VPPA are transferred to the consumer or designated consumer and may be used to meet RPO or RCO obligations. Certificates used for compliance are extinguished, and surplus certificates above compliance may be carried forward but not traded through exchanges or traders.

This reform is legally significant because it gives corporate renewable procurement a clearer compliance value. VPPAs allow consumers to support renewable projects without necessarily taking physical delivery at the same location. This can unlock renewable financing, especially where physical open access is difficult. However, VPPA regulation must be carefully designed to avoid double counting, speculative trading and confusion between financial settlement and electricity delivery.

6.4 Solar, Wind, Hybrid and Storage Regulation

Solar energy dominates India's renewable capacity. Legal support includes solar park development, rooftop schemes, net metering, open access and procurement through central agencies. The PM Surya Ghar rooftop scheme and state net-metering regulations are part of a broader move toward distributed renewable energy. Distributed solar can reduce distribution losses and empower consumers, but it also requires metering reform, consumer awareness and DISCOM business-model adjustment.

Wind energy remains essential because it provides generation patterns different from solar. The regulatory challenge for wind is forecasting, repowering older turbines, land and evacuation infrastructure. Hybrid projects that combine solar, wind and storage are increasingly important because they can provide more stable supply. Firm and Dispatchable Renewable Energy tenders reflect the movement from cheap intermittent energy toward reliable renewable supply.

Storage law must address ownership, market participation, tariff recovery, ancillary services, transmission charges, safety standards and environmental management of batteries. Without storage and flexible resources, renewable energy may face curtailment and reliability concerns.

7. Analytical Discussion

7.1 Strengths of the Indian Renewable Energy Legal Framework

The Indian framework has several strengths. First, it has a clear statutory base in the Electricity Act, 2003. Second, it uses independent regulators, which reduces direct political control over tariff and grid decisions. Third, it combines obligations with market instruments: RPOs create demand, RECs provide flexibility and open access creates consumer choice. Fourth, it has supported competitive bidding, which has reduced tariffs and attracted investment. Fifth, newer instruments such as VPPAs, storage planning and carbon credit trading show that the law is adapting to a more complex energy transition.

7.2 Weaknesses and Implementation Gaps

The weaknesses are equally important. The first is fragmented implementation across states. Since distribution is state-regulated, national renewable policy can be weakened by state-level delays, charges or restrictive banking rules. The second is DISCOM financial stress. If distribution companies delay payments or resist open access because they fear loss of high-paying consumers, renewable investment becomes uncertain. The third is grid congestion. Renewable-rich states may have high capacity potential but limited evacuation infrastructure. The fourth is weak compliance transparency. Without public, timely and comparable data on RPO fulfilment, obligations may not function as true legal commands.

The fifth weakness concerns social and environmental governance. Large renewable projects require land, transmission corridors and local consent. If land acquisition, biodiversity concerns and community impacts are not handled properly, renewable energy can generate social conflict. Energy transition law must therefore include procedural justice, local benefit-sharing and environmental safeguards.

7.3 From Renewable Promotion to Renewable Governance

India's renewable energy law is moving through three phases. The first phase was promotion: preferential tariffs, fiscal incentives and early solar and wind policies. The second phase was scale: competitive bidding, solar parks, interstate transmission and national targets. The third phase, now emerging, is governance: compliance obligations, carbon markets, storage rules, grid codes, VPPAs and energy justice. This transition is important because a high-renewable electricity system cannot be regulated only by incentives. It requires enforceable rules for reliability, financial settlement, forecasting, market conduct and consumer rights.

8. Policy Recommendations

First, RPO and RCO enforcement should be made more transparent. A national dashboard should report state-wise and DISCOM-wise compliance, REC use, carried-forward deficits and penalties. Public disclosure would strengthen accountability.

Second, central and state open access rules should be harmonised. Charges such as cross-subsidy surcharge, standby charges and banking fees should be predictable, transparent and consistent with the purpose of green energy procurement. State deviations should be justified through reasoned regulatory orders.

Third, renewable energy certificates and VPPAs should be supported by strong accounting rules. Certificates should not be double counted, and the distinction between physical electricity, financial settlement and environmental attributes should be clear. This is essential for corporate claims and international credibility.

Fourth, storage should be treated as a core energy asset rather than an accessory to generation. Legal rules should clarify storage ownership, market participation, ancillary service revenue, safety standards and tariff recovery. Pumped storage and battery storage require separate but coordinated regulatory treatment.

Fifth, DISCOM reform must be connected to renewable energy reform. Payment discipline, cost-reflective tariffs, targeted subsidies and digital metering will help distribution companies procure renewable energy without worsening financial stress.

Sixth, renewable project approval should include stronger social and environmental safeguards. Land mapping, biodiversity screening, local consultation, benefit-sharing and grievance mechanisms can reduce conflict and improve legitimacy.

Seventh, domestic manufacturing policy should be aligned with deployment targets. Domestic content, ALMM rules, PLI schemes and import monitoring can support self-reliance, but sudden changes can increase project costs. Predictability is crucial for investors.

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Table 5. Policy implications for strengthening renewable energy law in India.

Regulatory issue	Suggested reform	Expected effect
RPO/RCO compliance	Public dashboard, stricter reporting and credible penalties.	Improved enforceability and demand certainty.
Open access	Harmonised charges and time-bound approvals.	Greater corporate procurement and consumer choice.
REC and VPPA markets	Clear accounting, extinguishment and anti-double-counting rules.	Credible green claims and market confidence.
Storage and flexibility	Define storage as generation/load/market resource with revenue streams.	Better integration of solar and wind.
DISCOM finances	Payment discipline and targeted subsidy reform.	Reduced investor risk and smoother procurement.
Energy justice	Local consultation, safeguards and benefit-sharing.	Social legitimacy of renewable projects.

9. Limitations and Future Scope

This paper has three main limitations. First, it relies on secondary data and does not conduct primary interviews with regulators, developers, DISCOM officials or consumers. Second, it focuses mainly on electricity-related renewable energy and does not provide detailed analysis of petroleum, coal, nuclear or transport-energy law. Third, official capacity data does not fully capture actual generation, curtailment, payment delays or local social impacts.

Future research can extend this study through state-level comparisons of RPO compliance, empirical analysis of green open access approvals, case studies of renewable project land governance, interviews with corporate consumers using VPPAs and legal analysis of carbon credit trading once the market becomes fully operational. Another important area is the relationship between renewable energy law and international trade, especially domestic manufacturing requirements, solar module imports and supply-chain security.

Summary

This paper examined energy law and regulations in India with special emphasis on renewable energy. The analysis shows that India has developed a complex and increasingly mature renewable energy legal framework. The Electricity Act, 2003 remains the backbone of power-sector regulation because it provides the legal foundation for tariff principles, renewable purchase obligations, open access and independent regulatory commissions. The Energy Conservation (Amendment) Act, 2022 has expanded the framework by connecting renewable energy with carbon credit trading and non-fossil consumption obligations.

The findings show that legal and policy instruments have helped India achieve rapid renewable capacity growth. Renewable energy capacity including large hydro was about 279.26 GW, while total non-fossil capacity was about 288.04 GW. Solar power has become the dominant renewable source, and wind continues to be important for diversity and hybrid projects. RPO and RCO trajectories create mandatory demand, while Green Energy Open Access and REC mechanisms enable market-based procurement.

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