DEVELOPMENT OF SOLAR ENERGY IN INDIA: POLICY, REGULATION AND LEGAL CHALLENGES

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I. INTRODUCTION

India possesses substantial solar-energy potential and has increasingly placed solar power at the centre of its renewable-energy transition. The development of solar energy has been driven by the need to strengthen energy security, reduce dependence on conventional fossil-fuel sources, address climate-change concerns, and expand access to cleaner electricity. The National Institute of Solar Energy has assessed India's solar potential at approximately 748 GW, while the National Solar Mission has made solar energy a central component of the country's renewable-energy policy.

The Government of India has, over the past decade, developed an extensive body of legislation, policies, regulations and schemes for promoting solar-energy generation and consumption. The Electricity Act, 2003 provides the principal statutory foundation for renewable-energy regulation, while the National Solar Mission, Renewable Purchase Obligations, tariff-based competitive bidding, rooftop-solar programmes and green-energy open-access mechanisms have progressively created a regulatory framework for the development of solar power. The National Solar Mission, launched on 11 January 2010, specifically sought to establish India as a global leader in solar energy by creating appropriate policy conditions for rapid diffusion of solar technology.

Despite substantial policy development, the expansion of solar energy continues to involve significant legal and regulatory challenges. These include land acquisition and land-use issues, grid connectivity and transmission constraints, intermittency and grid management, delays in regulatory approvals, disputes relating to power purchase agreements and tariffs, variations in State-level policies, and the financial position of distribution licensees. The fragmented allocation of regulatory responsibilities between central and State authorities further creates questions concerning consistency and coordination in the implementation of solar-energy policy.

This paper examines the development of solar energy in India from the perspective of policy, regulation and law. It analyses the evolution of the legal and institutional framework governing solar-energy development, examines the role of electricity regulatory authorities and evaluates the principal legal and regulatory challenges affecting the sector. The study further assesses whether the existing framework adequately facilitates sustainable solar-energy development and identifies areas requiring greater regulatory clarity, institutional coordination and legal reform.

II. HISTORICAL BACKGROUND: EVOLUTION OF SOLAR ENERGY POLICY AND LAW IN INDIA

The legal and policy framework for solar energy in India has developed progressively alongside the country's broader renewable-energy and climate objectives. The initial approach focused on the promotion of renewable-energy technologies through government programmes and institutional measures, but the increasing importance of solar power eventually required a more targeted policy framework. The **National Action Plan on Climate Change (NAPCC), 2008** provided an important policy foundation by identifying the National Solar Mission as one of its key missions and recognising solar energy as an important component of India's response to climate change and energy-security concerns.[1]

The **Jawaharlal Nehru National Solar Mission (JNNSM)** was formally launched on 11 January 2010 as one of the missions under the NAPCC. The Mission represented a significant shift towards a dedicated national policy for solar energy and sought to create the necessary policy conditions for the rapid diffusion of solar technology. It initially contemplated a target of 20,000 MW of solar capacity by 2022 and adopted a phased approach involving grid-connected and off-grid solar applications.[2]

The regulatory development of the sector occurred alongside the implementation of the National Solar Mission. The **Electricity Act, 2003** had already established the statutory foundation for promoting electricity generation from renewable sources. Section 86(1)(e) empowered State Electricity Regulatory Commissions to promote co-generation and generation of electricity from renewable sources through appropriate measures relating to grid connectivity and sale of electricity to distribution licensees. The **National Tariff Policy** and subsequent regulatory measures further developed renewable-energy procurement mechanisms, including Renewable Purchase Obligations and solar-specific procurement requirements.[3]

The policy framework was substantially expanded in 2015 when the Government increased the original solar target from 20,000 MW to **100,000 MW by 2022**. This expansion was accompanied by the development of solar parks, rooftop solar programmes, competitive procurement mechanisms and other schemes intended to facilitate large-scale and decentralised solar generation. The sector

[1] Ministry of Environment and Forests, Government of India, *National Action Plan on Climate Change*, 2008.
[2] "off-grid solar applications."
[3] Ministry of New and Renewable Energy, Government of India, *National Solar Mission*, noting the launch of the Mission on 11 January 2010 and its initial target of 20,000 MW by 2022.

consequently evolved from a relatively specialised renewable-energy programme into a significant component of India's electricity policy.

The historical development of solar-energy regulation therefore demonstrates a gradual movement from general renewable-energy promotion towards a more comprehensive framework involving electricity regulation, procurement obligations, tariff mechanisms, decentralised generation and dedicated government schemes. This evolution provides the foundation for examining the present legal and regulatory structure governing solar-energy development in India.

III. CONCEPT AND DEVELOPMENT OF SOLAR ENERGY IN INDIA

Solar energy refers to the utilisation of radiation received from the sun for the generation of electricity and heat. In the electricity sector, solar photovoltaic (PV) technology converts sunlight directly into electricity through photovoltaic cells, while solar thermal technologies utilise solar radiation for the production of heat and, in certain applications, electricity. The scalability and declining cost of photovoltaic technology have made solar power increasingly significant within India's renewable-energy framework.[4]

Solar-energy development in India broadly comprises utility-scale solar projects, rooftop solar systems and decentralised or off-grid applications. Utility-scale projects involve large solar generating stations connected to the electricity grid, whereas rooftop and decentralised systems enable electricity generation closer to the point of consumption. These different forms of generation have required regulatory mechanisms dealing with grid connectivity, electricity procurement, tariffs, metering and the rights and obligations of generating entities and distribution licensees.

The development of solar power has also been supported through dedicated government programmes and institutional mechanisms. The Jawaharlal Nehru National Solar Mission provided the principal national policy framework for accelerating solar deployment, while subsequent programmes relating to solar parks, rooftop solar and decentralised applications sought to expand the sector beyond conventional utility-scale generation. The regulatory framework under the Electricity Act, 2003 has operated alongside these policy measures by

[4] Ministry of New and Renewable Energy, Government of India, *Solar Energy Programme / Solar Overview*; International Renewable Energy Agency, reports on solar photovoltaic technology and deployment.

enabling renewable-energy promotion through regulatory commissions and electricity procurement mechanisms.[5]

The increasing penetration of solar energy has, however, introduced regulatory and technical issues that are different from those associated with conventional electricity generation. Solar generation is dependent upon solar irradiation and therefore varies according to time and weather conditions. This variability creates requirements relating to forecasting, scheduling, balancing, transmission capacity and grid management. At the same time, large-scale solar development raises issues concerning land availability, environmental considerations and coordination between generating companies, transmission utilities, distribution licensees and regulatory authorities.[6]

Solar energy in India must therefore be understood not merely as a technological alternative to conventional power generation but as a sector governed by an interconnected framework of legislation, government policy, regulatory orders and contractual arrangements. Its continued development depends upon the ability of this framework to facilitate investment and deployment while maintaining grid reliability, consumer interests and regulatory certainty.

IV. LEGISLATIVE AND POLICY FRAMEWORK GOVERNING SOLAR ENERGY IN INDIA

The development of solar energy in India is governed by a combination of legislation, national policies, regulatory instruments and government schemes. Unlike a standalone solar-energy statute, the Indian framework operates principally through the electricity-law regime supplemented by renewable-energy policies and regulatory measures. The Electricity Act, 2003 constitutes the principal statutory foundation, while the Ministry of New and Renewable Energy (MNRE), Central Electricity Regulatory Commission (CERC), State Electricity Regulatory Commissions (SERCs) and other institutions perform complementary functions.

A. Electricity Act, 2003 and Renewable Energy Promotion

The Electricity Act, 2003 provides the principal legislative basis for integrating renewable energy into the electricity sector. Section 61(h) requires the Appropriate Commission, while specifying the terms and conditions for determination of tariff, to be guided by factors that encourage generation of

[5] Ministry of New and Renewable Energy, Government of India, *Jawaharlal Nehru National Solar Mission*; Electricity Act, 2003, §86(1)(e).
[6] Central Electricity Regulatory Commission, *Indian Electricity Grid Code Regulations* and related regulations concerning renewable-energy integration, forecasting and scheduling.

electricity from renewable sources. Section 86(1)(e) further requires State Electricity Regulatory Commissions to promote co-generation and generation of electricity from renewable sources by providing suitable measures for connectivity with the grid and sale of electricity to distribution licensees.

These provisions have enabled electricity regulators to develop renewable-energy procurement mechanisms and impose Renewable Purchase Obligations (RPOs). The Act therefore performs an important enabling function by incorporating renewable-energy promotion into the regulatory structure of the electricity market rather than treating solar generation as an entirely separate sector.[7]

B. National Solar Mission and Central Policy Framework

The Jawaharlal Nehru National Solar Mission, launched in 2010, established a dedicated national policy framework for accelerating solar-energy deployment. The Mission initially adopted a target of 20,000 MW by 2022, which was subsequently expanded as India increased its emphasis on solar generation. The policy framework has since been supplemented by programmes concerning solar parks, grid-connected projects, decentralised applications and rooftop solar.

The policy approach has increasingly moved from broad capacity expansion towards facilitating investment, improving project development conditions and integrating solar generation into the electricity system. The Central Government has also adopted schemes designed to support domestic manufacturing, decentralised generation and consumer-level adoption of rooftop solar.[8]

C. Renewable Purchase and Consumption Obligations

RPOs constitute an important regulatory mechanism for creating demand for renewable electricity. They require specified electricity distribution licensees and other covered entities to procure or consume a prescribed share of electricity from renewable sources. Renewable Energy Certificates (RECs) provide an additional mechanism for compliance where renewable electricity is not directly procured.

The framework has subsequently developed towards Renewable Consumption Obligations (RCOs) under the Energy Conservation Act, 2001, particularly for designated consumers. The obligation-based approach seeks to ensure that

[7] The Electricity Act, 2003, §§ 61(h) and 86(1)(e).
[8] Ministry of New and Renewable Energy, Government of India, *Jawaharlal Nehru National Solar Mission* and related solar-energy programmes.

renewable energy forms a defined part of electricity consumption and thereby creates a regulatory market for renewable generation.[9]

D. Tariff, Competitive Bidding and Power Purchase Agreements

Tariff regulation is another important component of the solar-energy framework. The Electricity Act, 2003 permits tariff determination through regulatory mechanisms and competitive bidding. Section 63 provides for adoption of tariffs discovered through a transparent process of competitive bidding in accordance with guidelines issued by the Central Government. Solar projects have increasingly been procured through competitive bidding, resulting in long-term Power Purchase Agreements (PPAs) between project developers and procuring entities.

The CERC Renewable Energy Tariff Regulations, 2024 provide a regulatory framework for tariff determination from renewable-energy sources, while Government bidding guidelines continue to govern competitive procurement of grid-connected solar photovoltaic projects. This framework seeks to combine tariff discovery through competition with regulatory oversight of renewable-energy procurement.[10]

E. Rooftop Solar, Grid Connectivity and Decentralised Generation

The regulatory framework also extends beyond large-scale solar projects to rooftop and decentralised generation. Rooftop solar involves electricity generation at or near the premises of consumers and consequently requires regulatory arrangements relating to connectivity, metering, settlement of electricity and interaction with distribution licensees.

Government programmes have supported this segment through financial assistance and institutional mechanisms. The PM-Surya Ghar: Muft Bijli Yojana, approved in 2024, provides central financial assistance for residential rooftop solar and seeks to expand rooftop deployment among households. Such programmes demonstrate the increasing movement of solar policy from large utility-scale generation towards distributed consumer participation.[11]

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[9] Ministry of Power, Government of India, notifications concerning Renewable Purchase Obligation/Renewable Consumption Obligation under the Energy Conservation Act, 2001. The Ministry's 2025–26 Annual Report records the revised RCO framework issued on 27 September 2025.

[10] Electricity Act, 2003, §63; Central Electricity Regulatory Commission, *Terms and Conditions for Tariff determination from Renewable Energy Sources Regulations, 2024*; CERC records the continuing use of competitive bidding for solar PV procurement.

[11] Ministry of New and Renewable Energy, *Grid Connected Rooftop Solar Programme*; PM-Surya Ghar: Muft Bijli Yojana Guidelines.

The legislative and policy framework governing solar energy in India is therefore multi-layered. The Electricity Act supplies the statutory foundation, regulatory commissions translate renewable-energy objectives into enforceable electricity-sector mechanisms, and central schemes provide financial and institutional support for deployment. The effectiveness of this framework, however, depends upon consistent implementation, adequate transmission infrastructure, timely regulatory decisions and coordination between central and state authorities.

V. JUDICIAL RESPONSE: CASE LAW ANALYSIS

Indian courts have played an important role in defining the limits of regulatory authority, interpreting renewable-energy contracts and addressing conflicts between renewable-energy development and environmental protection. Judicial decisions have consequently contributed to clarifying the legal framework within which solar-energy projects operate.

A. Regulatory Powers and Limits of Electricity Regulatory Commissions

In *Gujarat Urja Vikas Nigam Ltd. v. Solar Semiconductor Power Co. (India) Pvt. Ltd.*, (2017) 16 SCC 498, the Supreme Court examined the powers of a State Electricity Regulatory Commission in relation to a solar-power project and the extension of the control period applicable to the tariff. The Court emphasised that an Electricity Regulatory Commission is a creature of statute and cannot assume powers that have not been conferred upon it by the Electricity Act or the applicable regulations. The decision therefore reinforces the principle that regulatory discretion must remain within the statutory framework.[12]

The judgment is significant for solar-energy development because regulatory certainty is essential for long-term renewable-energy investments. While regulatory commissions possess important powers to facilitate renewable-energy generation, those powers must be exercised consistently with the governing statute, regulations and contractual arrangements.

B. Power Purchase Agreements, Tariff and Regulatory Intervention

The Supreme Court has also addressed the relationship between regulatory powers and long-term electricity contracts. In *Energy Watchdog v. Central Electricity Regulatory Commission*, (2017) 14 SCC 80, the Court considered issues relating to change in law, force majeure and the regulatory powers of the CERC in the context of long-term power-supply arrangements. The judgment

[12] *Gujarat Urja Vikas Nigam Ltd. v. Solar Semiconductor Power Co. (India) Pvt. Ltd.*, (2017) 16 SCC 498. The Supreme Court held that a statutory Commission cannot assume powers not conferred upon it by the parent statute.

recognised the statutory regulatory role of the Commission while also emphasising the contractual framework governing power projects.[13]

The principles emerging from such decisions are relevant to solar projects because their financial viability frequently depends upon long-term PPAs and predetermined tariff arrangements. Changes in law, delays in project implementation, alterations in regulatory conditions and disputes concerning contractual obligations may consequently require judicial or regulatory determination.

C. Renewable Energy Development and Environmental Protection

A significant development in the judicial treatment of renewable energy occurred in *M.K. Ranjitsinh v. Union of India*, 2024 INSC 280. The proceedings concerned the protection of the Great Indian Bustard and the impact of overhead transmission infrastructure in areas of Rajasthan and Gujarat. The Supreme Court examined the need to reconcile species conservation with the development of renewable energy and India's climate objectives. The judgment illustrates that expansion of renewable-energy infrastructure cannot be considered independently of environmental and biodiversity considerations.[14]

The decision is particularly relevant to solar-energy development because many large renewable-energy projects require extensive transmission infrastructure. Environmental protection, land use, transmission corridors and renewable-energy objectives may therefore intersect in project development. The judicial approach demonstrates the importance of balancing ecological protection with the broader objective of increasing renewable-energy generation.

D. Emerging Judicial Approach

The judicial response to solar and renewable-energy disputes indicates that courts generally approach the sector through existing principles of electricity regulation, contractual law and environmental protection rather than through a separate body of solar-energy law. The decisions discussed above demonstrate three recurring concerns: statutory limits on regulatory authorities, protection of contractual and tariff certainty, and reconciliation of renewable-energy development with environmental obligations.

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[13] *Energy Watchdog v. Central Electricity Regulatory Commission*, (2017) 14 SCC 80. The Supreme Court considered the regulatory powers of the CERC and issues concerning change in law and force majeure in electricity PPAs.

[14] *M.K. Ranjitsinh v. Union of India*, 2024 INSC 280, W.P. (C) No. 838 of 2019, decided on 21 March 2024. The judgment considered the interaction between protection of the Great Indian Bustard, overhead transmission infrastructure and renewable-energy development.

Judicial intervention has therefore contributed to defining the boundaries within which solar-energy policy must operate. At the same time, the continuing emergence of disputes concerning tariffs, PPAs, transmission and environmental impacts indicate the need for clearer regulatory coordination and greater certainty in the implementation of solar-energy projects.

VI. CHALLENGES IN IMPLEMENTATION OF SOLAR ENERGY PROJECTS

Despite the substantial expansion of solar-energy capacity in India, implementation of solar projects continues to face several legal, regulatory, financial and infrastructural challenges. The existence of a comprehensive policy framework has not completely eliminated difficulties arising at the project-development and implementation stages.

A. Land Acquisition and Project Development

Large-scale solar projects require substantial areas of land, creating difficulties relating to land acquisition, land-use conversion, ownership disputes and competing claims over land. Delays in securing land and obtaining statutory approvals can affect project timelines and increase development costs. The availability of suitable land is therefore an important consideration in the expansion of utility-scale solar projects.

B. Grid Connectivity and Transmission Infrastructure

The intermittent nature of solar generation creates challenges for electricity-grid management. Solar generation varies with sunlight and cannot independently provide continuous electricity throughout the day. Increasing solar penetration consequently requires adequate transmission capacity, forecasting, scheduling, balancing mechanisms and storage solutions. Delays in transmission infrastructure may also result in difficulties in evacuating power generated by solar projects.

C. Power Purchase Agreements and Payment Risks

Solar projects generally depend upon long-term PPAs for revenue certainty. Disputes concerning tariffs, change in law, commissioning delays, curtailment and contractual obligations can adversely affect project viability. The financial condition of distribution licensees has also remained an important concern because delayed payments can create cash-flow difficulties for renewable-energy generators.

D. Regulatory Fragmentation and State-Level Variation

Solar-energy development involves multiple authorities at the central and state levels. Differences in regulations, approval procedures, open-access arrangements, charges and implementation practices across States may increase uncertainty for project developers. Coordination between MNRE, CERC, SERCs, transmission authorities and distribution companies are therefore essential for consistent implementation.

E. Environmental and Technological Concerns

Solar projects and associated transmission infrastructure may create environmental concerns relating to land use, biodiversity and ecological impacts. At the same time, the increasing deployment of photovoltaic modules raises future questions concerning recycling, disposal and management of solar-panel waste. The regulatory framework must consequently address the environmental implications of solar development while continuing to facilitate renewable-energy expansion.

The challenges demonstrate that the principal difficulty is no longer merely the formulation of solar-energy policy but its effective implementation. Land, transmission, contractual certainty, regulatory coordination and environmental considerations must operate together if India's solar-energy objectives are to be translated into sustainable electricity generation.

VII. CRITICAL ANALYSIS: ADEQUACY OF THE POLICY AND REGULATORY FRAMEWORK

India has developed a substantial policy and regulatory framework for promoting solar energy, supported by the Electricity Act, 2003, national missions, renewable-energy obligations, competitive procurement mechanisms and various government schemes. The framework has created the institutional foundation necessary for large-scale solar deployment. However, its effectiveness must be assessed not only by the expansion of installed capacity but also by the consistency, predictability and enforceability of the regulatory environment.

A significant strength of the existing framework is the statutory recognition of renewable-energy promotion within electricity regulation. Sections 61(h) and 86(1)(e) of the Electricity Act provide a legal basis for regulatory measures promoting renewable generation. The development of RPOs, competitive bidding

and renewable-energy tariff regulations has further created mechanisms for integrating solar generation into the electricity market.[15]

At the same time, the framework remains substantially distributed across different statutes, policies, regulations, schemes and administrative authorities. This multi-layered structure can create uncertainty where central policies interact with State-level regulatory decisions. Differences in implementation by SERCs and distribution licensees may affect project developers and consumers differently across jurisdictions. The absence of a single comprehensive legislative framework specifically addressing solar energy also means that several issues must be resolved through general electricity law and regulatory instruments.

Contractual and financial certainty remains another important concern. Solar projects generally involve significant initial investment and long-term PPAs. Changes in regulatory requirements, delays in approvals, curtailment, tariff disputes and payment delays may affect the economic assumptions on which projects are established. Judicial decisions have demonstrated that regulatory authorities must exercise their powers within statutory limits while contractual arrangements remain subject to the applicable legal framework.

The framework also requires stronger integration of environmental considerations. Solar energy is renewable and can reduce dependence on fossil fuels, but large-scale projects and associated transmission infrastructure may create land-use and biodiversity concerns. The Supreme Court's decision in *M.K. Ranjitsinh v. Union of India* demonstrates that renewable-energy expansion must be reconciled with constitutional and environmental obligations rather than being treated as an objective operating independently of ecological protection.[16]

Overall, India's solar-energy framework provides a substantial legal and institutional foundation, but its effectiveness depends upon implementation. Greater regulatory consistency, stronger coordination between authorities, improved contractual certainty, timely transmission development and clearer environmental safeguards are necessary to ensure that policy objectives translate into sustainable and legally predictable solar-energy development.

[15] Electricity Act, 2003, §§ 61(h), 86(1)(e); Central Electricity Regulatory Commission, *Terms and Conditions for Tariff determination from Renewable Energy Sources Regulations, 2024*.
[16] *M.K. Ranjitsinh v. Union of India*, 2024 INSC 280.

VIII. SUGGESTIONS FOR REFORM

The development of solar energy in India requires not only continued expansion of generating capacity but also improvements in the legal, regulatory and institutional framework. The following measures may strengthen the implementation of solar-energy policy:

1. **Greater Regulatory Coordination:**
   Coordination between the Central Government, MNRE, CERC, SERCs, transmission authorities and distribution licensees should be strengthened. Greater consistency in regulatory procedures and renewable-energy requirements can reduce uncertainty for project developers.

2. **Strengthening Grid and Transmission Infrastructure:**
   Solar-energy expansion should be accompanied by timely development of transmission infrastructure, forecasting systems, energy-storage facilities and grid-balancing mechanisms. Grid planning should anticipate increasing renewable-energy penetration rather than responding only after generation capacity has been established.

3. **Improved Contractual and Payment Security:**
   Greater certainty should be provided in relation to long-term PPAs, change-in-law claims, curtailment and tariff-related disputes. Distribution licensees should maintain effective payment-security mechanisms so that delayed payments do not adversely affect renewable-energy generators.

4. **Simplification of Land and Approval Procedures:**
   A coordinated mechanism for land identification, land-use permissions and statutory approvals can reduce delays in solar-project development. Solar parks and previously identified suitable areas may be utilised to minimise conflicts concerning land use and project acquisition.

5. **Strengthening Distributed and Rooftop Solar:**
   Regulatory and administrative barriers affecting rooftop and decentralised solar generation should be reduced. Simplified connectivity, metering procedures and timely implementation of consumer-oriented schemes can encourage greater participation by households and small establishments.

6. **Environmental and End-of-Life Regulation:**
   Environmental assessment and biodiversity considerations should be integrated into project planning without creating unnecessary regulatory duplication. At the same time, a clear framework for the collection, recycling and disposal of solar photovoltaic modules should be

strengthened to address the environmental consequences associated with the increasing volume of solar waste.

7. **Long-Term Regulatory Certainty:**
   Solar-energy policies and regulatory mechanisms should provide greater predictability for investors and consumers. Frequent changes in project conditions or inconsistent implementation can undermine long-term planning. Stable regulations, transparent decision-making and timely dispute resolution are therefore essential for sustainable development of the sector.

These reforms would help move India's solar-energy framework from a primarily capacity-oriented approach towards a more integrated system combining renewable-energy expansion with regulatory certainty, grid reliability, consumer participation and environmental sustainability.

IX. CONCLUSION

The development of solar energy has become an important component of India's transition towards a cleaner and more diversified electricity sector. Over the years, India has moved from general renewable-energy promotion towards a more comprehensive solar-energy framework supported by legislation, national policy, regulatory mechanisms and government programmes. The Electricity Act, 2003, the National Solar Mission, renewable-energy obligations, competitive procurement mechanisms and rooftop-solar programmes have collectively established the legal and institutional foundation for the expansion of solar power.

The existing framework has contributed significantly to the growth of solar generation, but the expansion of capacity alone cannot determine the effectiveness of solar-energy regulation. Challenges relating to land availability, transmission infrastructure, grid integration, contractual disputes, payment delays and differences in regulatory implementation continue to affect the development of projects. The increasing scale of solar deployment also requires greater attention to environmental protection, biodiversity and the management of photovoltaic waste.[17]

Electricity Regulatory Commissions occupy a particularly important position within this framework. Their role extends beyond tariff determination to the promotion of renewable-energy generation, enforcement of renewable-energy obligations and supervision of electricity-sector arrangements. However, regulatory powers must be exercised within the statutory framework and with

[17] Ministry of New and Renewable Energy, Government of India, *Annual Reports* and solar-energy programmes; Electricity Act, 2003.

sufficient consistency to provide certainty to project developers, distribution licensees and consumers. Judicial decisions concerning regulatory authority, contractual obligations and environmental protection demonstrate the need to balance competing legal and policy considerations.[18]

The future development of solar energy in India therefore requires an approach that combines continued investment and capacity expansion with regulatory certainty, reliable transmission infrastructure, effective grid management and meaningful environmental safeguards. Greater coordination between central and state institutions, improved contractual and payment mechanisms, simplified project approvals and stronger support for distributed solar can contribute to a more effective framework.

Ultimately, India's solar-energy transition is not merely a question of increasing renewable-energy capacity. It requires a stable and coherent legal and regulatory environment capable of reconciling energy security, economic development, consumer interests and environmental sustainability. Strengthening these aspects will be essential for ensuring that the growth of solar energy remains legally predictable, environmentally responsible and sustainable in the long term.[19]

[18] *Gujarat Urja Vikas Nigam Ltd. v. Solar Semiconductor Power Co. (India) Pvt. Ltd.*, (2017) 16 SCC 498; *Energy Watchdog v. Central Electricity Regulatory Commission*, (2017) 14 SCC 80; *M.K. Ranjitsinh v. Union of India*, 2024 INSC 280.

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