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RENEWABLE ENERGY IN INDIA: AN OVERVIEW

November 2025

LEGISLATIVE AND REGULATORY DEVELOPMENTS 2025

- Through the Union Budget 2025, the Government of India (**GoI**) announced the Viksit Bharat mission, with a target of achieving 1800 (one thousand eight hundred) GW of renewable energy capacity by 2047.
- *Proposed amendments to Electricity Act, 2003 (Electricity Act)*, *inter-alia* to empower Central or State electricity regulatory commissions (ERCs) to determine tariffs *suo moto* where there has been a delay by distribution companies in filing of tariff petitions; to include energy storage systems (ESS) within the definition of ‘power systems’; prescribe renewable purchase obligations on a national level and quantified penalties for failure; and to grant discretion to ERCs to determine eligibility criteria for captive generating plants.
- *Proposed amendments to Electricity Rules, 2005 (Electricity Rules)*, *inter-alia* to expand the definition of ‘ownership’ in a captive generating plant; and restricting captive consumption benefit to a maximum of 110% (one hundred ten percent) of the proportionate entitlement of each captive user.
- *Third Amendment to CERC (Connectivity and General Network Access to the Inter-State Transmission System) Regulations, 2022* which introduces significant changes to the procedures involved in the grant of connectivity, its withdrawal and relinquishment, the key conditions for grant of connectivity and general network access (GNA), change of control restrictions, etc.
- The Karnataka High Court in *Brindavan Hydropower Pvt. Ltd. v. Union of India*,¹ struck down the central Green Energy Open Access Rules as ultra vires the Electricity Act, 2003.
- *Fourth Amendment to CERC (Inter-State Transmission Charges and Losses) Regulations, 2020*, revising the earlier category of exemptions for battery ESS projects.
- Introduction of List-II for solar PV cells under the Approved List of Models and Manufacturers List, compliance with which will be mandatory from June 1, 2026.
- Introduction of Green Hydrogen Certification Scheme of India, 2025 which provides a national framework to certify hydrogen as ‘green’.
- The Ministry of New and Renewable Energy (MNRE) issued the *Scheme Guidelines (Revised) for Implementation of Pilot Projects for Production and Use of Green Hydrogen Using Innovative Methods/Pathways in the Residential, Commercial, Localized Community, Decentralized/Non-Conventional, Applications, Including Any Sector or Technology Not Covered in Previous Mission Schemes*.
- *Virtual Power Purchase Agreements (VPPAs)*: Introduction of Draft Guidelines for Virtual Power Purchase Agreements, 2025 making VPPAs non-transferable specific delivery contracts for facilitating renewable consumer obligations.
- *Fourth Amendment to the CERC (Sharing of Inter State Transmission Charges and Losses) Regulations, 2020* which revised the earlier category of exemptions from payment of inter-State transmission system (ISTS) charges.
- The Nuclear Power Corporation of India has initiated inclusion of private sector participants in the nuclear sector for the development of Bharat Small Reactors.
- Introduction of National Policy on Geothermal Energy, 2025 to enable the exploration and development of geothermal energy sources in India.

¹Writ Petition no. 11235 of 2024

INTRODUCTION

At present, India has the 4th (fourth) largest renewable energy installed capacity globally². As of June 30, 2025, India's energy mix constitutes a total of 242.78 (two hundred and forty two point seven eight) GW of renewable energy, including wind, solar, biomass, hydro, waste to energy, and nuclear sources³. Along with the traditional renewable energy sources, India is also focusing on the development of emerging sources of renewable energy and emerging forms of technology, such as green hydrogen, offshore wind energy, nuclear energy, and the integration of ESS with renewable energy generating plants.

India faces the challenge of maintaining its rapid economic growth while dealing with the impact of global climate change. While India's electricity sector has been predominated by fossil fuel-based sources such as coal, there is an increasing focus on the energy transition to clean energy sources. To intensify its actions towards its clean energy transition, India has been taking strides in the field of development of renewable energy. In this context, India has ratified the Paris Agreement and is thereby, obligated to submit Nationally Determined Contributions (NDCs). The updated NDCs to the United Nations Framework Convention on Climate Change in 2022 are to reduce emissions intensity of GDP by 45% (forty five percent) by 2030.

At the 26th (twenty sixth) session of the Conference of Parties held in Glasgow, United Kingdom, India announced its climate action plan – called the *Panchamrit* – which includes the 5 (five) key elements: (i) reaching a non-fossil fuel energy capacity of 500 (five hundred) GW by 2030; (ii) meeting at least 50% (fifty percent) of the energy requirements via renewable sources by

2030; (iii) reducing carbon emissions by 1 (one) billion tons by 2030; (iv) reducing carbon intensity below 45% (forty five percent) by 2030; and (v) achieving target of net-zero emissions by 2070. India has crossed the 200 (two hundred) GW (out of its targeted 500 (five hundred) GW generation capacity by 2030) mark of total renewable energy-based electricity generation capacity as of October 10, 2024. Further, through the Union Budget 2025, the GoI has announced the Viksit Bharat mission, with a target of achieving 1800 (one thousand eight hundred) GW of renewable energy capacity by 2047. As part of the Viksit Bharat mission, the GoI has also set a target for 100 (one hundred) GW of nuclear power capacity, with a view to augment nuclear power generation in India through policy reforms and private sector participation.

The Ministry of New and Renewable Energy (MNRE), efforts towards creating a clean energy transition-based ecosystem are reflected in its initiatives aimed to advance the adoption of renewable energy technologies on a large scale, including: (i) the PM KUSUM Scheme, formulated to provide decentralized solar power plants, standalone solar pumps, and solarized agricultural pumps to farmers; (ii) the PM Surya Ghar Muft Bijli Yojana which subsidizes the installation of rooftop solar panels for households; (iii) the Ministry of Power (MoP) Guidelines for Installation and Operation of Electric Vehicle Charging Infrastructure, 2024, to set out a framework for electric vehicles (EVs) charging infrastructure in India, applicable to manufacturers, owners, and operators of such infrastructure; and (iv) the PM E-Drive Scheme, which promotes the adoption of EVs through subsidized electric two-wheelers, three-wheelers, ambulances, and trucks.

The Ministry of Environment, Forest and Climate Change (MoEFCC) also launched the National

²<https://www.pib.gov.in/PressNoteDetails.aspx?id=155063&NoteId=155063&ModuleId=3>

³<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2144627>

Action Plan on Climate Change (NAPCC), in 2008 with the aim of enabling the country to adapt to the climate change and improving the sustainability of our development path. It focuses on maintaining a high growth rate which is essential for reducing the impacts of climate change. The NAPCC comprises of 8 (eight) national missions which focus on different areas such as adaptation and mitigation of climate change, energy efficiency and natural resource conservation. Under the NAPCC, the MoEFCC issued the National Mission for Enhanced Energy Efficiency.

ELECTRICITY SECTOR IN INDIA

The Electricity Act, 2003 is the parent legislation governing the electricity sector in India. The Electricity Act consolidated the various laws governing the electricity sector, such as, the Indian Electricity Act, 1910, the Electricity Supply Act, 1948 and Electricity Regulatory Commissions Act, 1998. The Electricity Act, *inter alia*, sought to create a more dynamic, relevant and robust framework for the development of the electricity sector, promoting competition, protecting interests of consumers, ensuring supply⁴ of electricity to all areas, regulating rationalisation of electricity tariff, ensuring access by all generating stations⁵ to the grid⁶ infrastructure on a non-discriminatory basis, providing impetus for development and growth of new technologies and ensuring transparent policies and promoting efficiency in the electricity sector.

Since the Electricity Act does not differentiate between energy generated from the conventional sources and energy generated from the renewable energy sources, the provisions of the Electricity Act do not provide a separate statutory framework for renewable energy generation. However, with a

view to incentivise the augmentation of renewable energy capacity in the country, particularly for solar, wind and solar-wind hybrid generation, both the GoI and various State governments have issued several policies, schemes and guidelines. These policies, schemes and guidelines primarily set out the incentives that the relevant government authority offers to a renewable energy generator at the Union and State level, as may be applicable.

The Electricity Act does not define the term ‘renewable energy’, however, there are regulations issued under the Electricity Act and policies issued by the nodal agencies of the States which clarify the ambit of the term. The CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2024 defines the term ‘renewable energy’ to mean “*the electricity generated from renewable energy sources*”. The term ‘renewable energy source’ has been defined to include “*sources of renewable energy such as hydro, wind, and solar, including its integration with combined cycle, biomass, biofuel cogeneration, urban or municipal waste, and such other sources as recognised or approved by the Union Government*” and ‘renewable energy project’ has been further defined to mean “*a generating station that produces electricity from renewable energy sources*”.

Draft Amendments to the Electricity Act and the Electricity Rules, 2005

- (i) Proposed amendments to the Electricity Act

On October 9, 2025, the MoP issued the draft Electricity (Amendment) Bill, 2025 (“**Draft Amendment**”) for public comments. The Draft Amendment

⁴Section 2(70) of the Electricity Act defines the term “supply”, in relation to electricity, to mean “the sale of electricity to a licensee or consumer.”

⁵Section 2(30) of the Electricity Act defines the terms “generation station” or “station” to mean “any station for generating electricity, including any building and plant with step-up transformer, switchgear, switch yard, cables or other appurtenant equipment, if any, used for that purpose and the site thereof; a site intended to be

used for a generating station, and any building used for housing the operating staff of a generating station, and where electricity is generated by water-power, includes penstocks, head and tail works, main and regulating reservoirs, dams and other hydraulic works, but does not in any case include any sub-station.”

⁶Section 2(32) of the Electricity Act defines the term “grid” to mean “the high voltage backbone system of inter-connected transmission lines, sub-stations and generating plants.”

proposes reforms to the power distribution sector in India, in order to address issues such as the financial burden on the power distribution sector, regulatory delays, and the adverse effect of cross-subsidies on Indian industries, and promote captive power generation, the clean energy transition, and energy storage.

The Draft Amendment aims to advance efficiency by permitting Central or State **ERCs**, as the case may be, to determine tariffs *suo motu* in case of delayed filing of tariff petitions by distribution companies.

Notably, the Draft Amendment recognises ESS within the framework of the Electricity Act and includes ESS within the definition of ‘power system’⁷, integrating ESS into the regulatory regime for planning, operations, and market framework for the electricity sector.

Other key amendments proposed through the Draft Amendment include: (a) promotion of renewable sources by State governments through renewable purchase obligations (**RPO**) to be prescribed on a national level by the Central Government and quantified penalties for shortfall in meeting RPO obligations; (b) discretion granted to the Central or State ERCs to determine the eligibility criteria for captive generating plants; (c) prescribed timelines for adjudication of disputes before the Central or State ERCs; and (d) empowering the Central or State ERCs, as the case may be, to introduce and regulate market platforms, intermediaries, and market products,

such as contracts-for-difference, electricity derivative contracts, and VPPAs.

(ii) Proposed amendments to the Electricity Rules, 2005 (**Electricity Rules**)

The regulatory framework for captive generating plants, as contained in Section 9 of the Electricity Act and Rule 3 of the Electricity Rules, has also been proposed to be amended through a draft amendment to Rule 3(1) of the Electricity Rules, issued by the MoP on September 23, 2025.

The proposed captive requirements, with an amended clause (c) are set out as below:

- (a) A minimum of 26% (twenty six percent) of ownership in the captive generating plant;
- (b) Minimum consumption of 51% (fifty one per cent) of the aggregate electricity generated by the captive generating plant; and
- (c) *In case of captive consumption by an association of persons, captive consumption benefit has been restricted to a maximum of 110% (one hundred and ten percent) of the proportionate entitlement of each captive user, with reference to their share in ownership of the captive generating plant.*

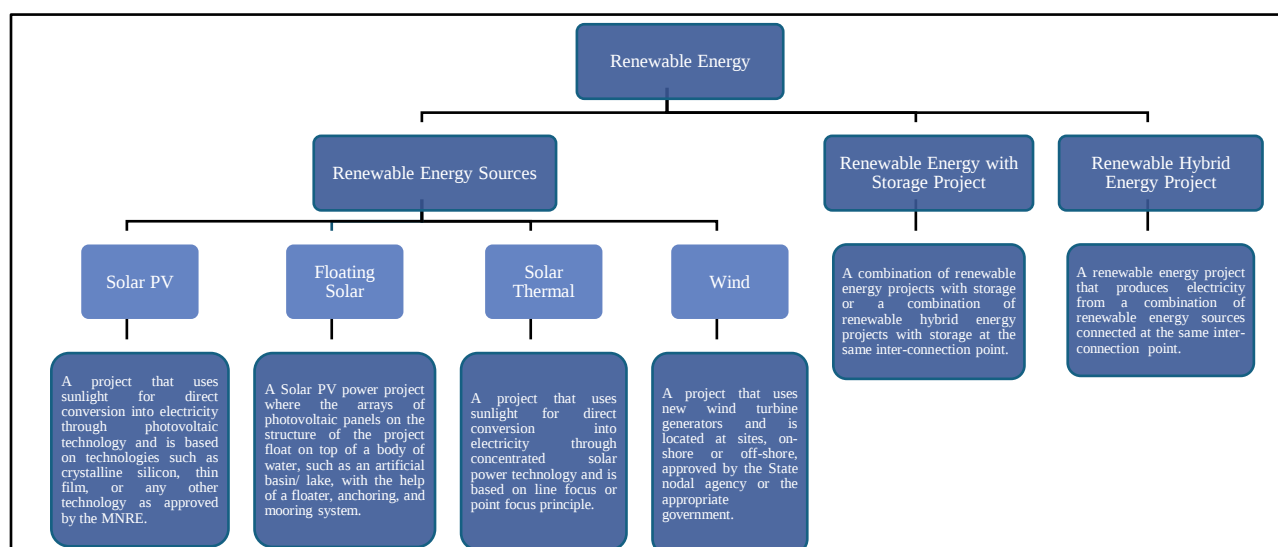
The condition in clause (c) replaces the earlier proportionality rule, which required captive users to consume not less than 51% (fifty one percent) of the aggregate electricity generated by the captive generating plant in proportion of their ownership, with a maximum

⁷“Power system” has been defined as “all aspects of generation, transmission, distribution, and supply of electricity”, including the following: (a) generating stations; (b) transmission or main

transmission lines; (c) sub-stations; (d) tie-lines; (e) load dispatch activities; (f) mains or distribution mains; (g) electric supply lines; (h) overhead lines; (i) service lines; and (j) works.

variation of +/- 10% (ten percent). The proposed amendment to this provision places an upper limit on captive consumption benefit, which, when breached, would result in the excess consumption not qualifying as captive, and consequently, not qualifying for the benefits extended to captive consumers.

The definition of ‘ownership’ in a captive generating plant is also proposed to be expanded to include direct or indirect proprietary interest and control over the captive generating plant through subsidiary companies.



POLICY FRAMEWORK

National Electricity Policy

The GoI in consultation with the State governments and the Central Electricity Authority (CEA), issued the National Electricity Policy on February 12, 2005. It aims to achieve the following goals: (i) ensuring the supply of reliable and quality power; (ii) improving financial turnaround and commercial viability of the electricity sector; (iii) preparation of a national electricity plan by the CEA; (iv) improving rural electrification; and (v) developing clean and renewable energy generation.

National Electricity Plan

The Electricity Act also provides for a National Electricity Plan where the GoI (through the CEA) sets developmental goals for the sector every 5 (five) years. This plan includes short-term and long-

term demand forecasts for different regions, suggested areas/locations for capacity addition in generation and transmission, losses in the system, load centre requirements, grid stability, security of supply, quality of power including voltage profile and environmental considerations including rehabilitation and resettlement, integration of potential generation locations with the transmission system and development of the grid.

The CEA has issued the National Electricity Plan (Volume – I) for the generation sector on May 31, 2023 and the National Electricity Plan (Volume – II) for the transmission sector in October, 2024.

State Policies

The State renewable energy policies are issued by the designated nodal agencies of each State and is based on: (i) specific source of renewable energy (such as, solar, wind and wind-solar hybrid); or (ii)

cumulative policies which capture all categories of renewable energy projects. They remain valid for a particular duration of time (typically, 3 (three) to 5 (five) years, which is referred to as the ‘control period’) and the projects commissioned within this validity period are eligible for the incentives allowed under the specific State policy.

These policies lay down the framework for the development of renewable energy sector in the relevant State which includes a push in the form of incentives, waivers, and simpler approval processes through single-window clearances, deemed conversion of agricultural land for non-agricultural purposes, etc. To avail these incentives, many States in India also require the renewable energy projects to be registered with the relevant nodal agency.

REGULATORY BODIES UNDER THE ELECTRICITY ACT

The Electricity Act envisages establishment of independent regulatory bodies (which are quasi-judicial in nature) for the electricity sector. These include the Central Electricity Regulatory Commission (**CERC**) at the Central level, the State Electricity Regulatory Commission (**SERC**) in each State, the CEA (which sets technical standards for the electricity industry and has advisory functions), the load despatch centres (i.e., National Load Despatch Centre, State Load Despatch Centres and Regional Load Despatch Centres), regional power committees and Central and State transmission utilities, which together are responsible for the day-to-day operations of the grid. We have set out below some of the key powers and functions of these various regulatory bodies.

CERC

⁸Section 2(28) of the Electricity Act defines a “generating company” to mean “any company or body corporate or association or body of individuals, whether incorporated or not, or artificial juridical person, which owns or operates or maintains a generating station.”

The Electricity Act sets out the ambit of the CERC’s functions which include regulating and determining tariffs of generating companies supplying power to more than one state, regulating inter-State electricity transmission and tariff determination, issuing licenses (including transmission licenses) for inter-State power transactions and adjudicating disputes involving generation companies, inter-State transmission licensees or distribution companies (**Discoms**) (when a generating company⁸ is supplying power to Discoms in more than one state).⁹

SERC

The Electricity Act sets out the powers and functions of the SERCs, which include determining tariffs for generation, distribution and transmission of power within a State, regulating the power procurement process of distribution licensees, regulating intra-State electricity transmission, issuing licenses, including distribution and transmission licenses for transactions within the State and adjudicating disputes involving generation companies, distribution licensees or intra-State transmission licensees.¹⁰

Appellate Tribunal for Electricity (APTEL)

APTEL has been constituted under the Electricity Act¹¹ to adjudicate appeals against the orders of the CERC or the SERCs. Therefore, the APTEL exercises an appellate jurisdiction over the CERC and SERCs and for the purposes of discharging its functions under the Electricity Act, has been vested with the powers of a ‘civil court’. APTEL has the power to issue any orders, instructions or directions to the CERC and the SERCs for performance of their statutory functions. Any challenges to the constitutionality of regulations formulated by the CERC and SERCs lie before the appropriate High

⁹ Section 79(1) of the Electricity Act.

¹⁰ Section 86(1) of the Electricity Act.

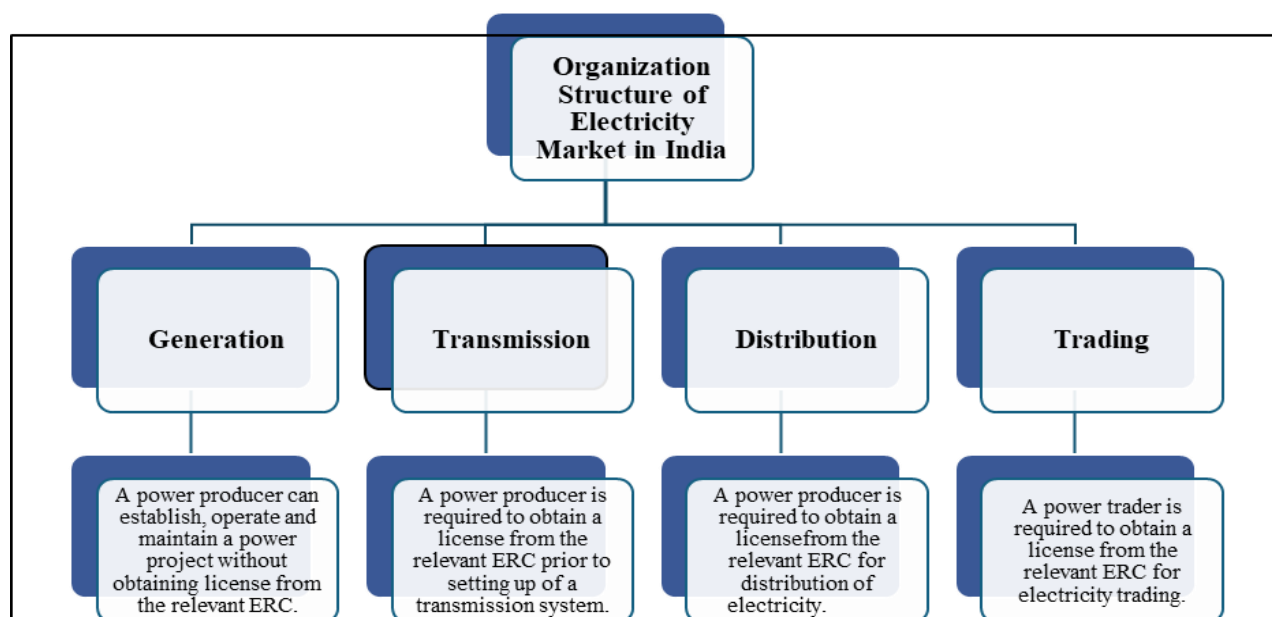
¹¹ Section 110 of the Electricity Act.

Court¹² and any appeals against the orders of a High Court lie before the Supreme Court of India. Therefore, if the validity of a regulation formulated by the CERC and SERCs, under the Electricity Act, is challenged, then the appropriate forum for adjudication of such challenge would be the relevant High Court and not APTEL. This is because regulations formulated by the CERC and SERCs are in the nature of delegated legislations, and their validity can be tested only in a judicial review and a quasi-judicial body, such as APTEL, has not been granted the powers for judicial review under the Electricity Act. If, however, a dispute arises regarding the interpretation of the regulations

issued by the CERC and SERCs, in that case any appeal would have to be made before the APTEL.

ORGANIZATION STRUCTURE OF ELECTRICITY MARKET IN INDIA

The Electricity Act categorizes the Indian electricity market into four broad categories, i.e., generation, transmission, distribution and trading of electricity at both the inter-State and intra-State levels. A brief overview of the organization structure of the electricity market in India is set out below:



¹² *PTC India Ltd. vs. Central Electricity Regulatory Commission thr. Secy.* [2010 INSC 146] decided by the Supreme Court of India on March 15, 2010.

Generation of Electricity

The Electricity Act¹³ de-licensed the activity of generation of power thereby allowing any entity to establish, operation and maintain a power project or generating station without the requirement of obtaining any license from the CERC or the SERCs.

However, approvals and compliance under other legislations, including compliance with the technical and safety requirements laid down by CEA for the construction of a generating plant, approvals for the connectivity to the grid, labour and land laws apply to the construction and establishment of power plants. The evacuation of power, and the operation and maintenance of power evacuation facilities are also regulated.

Generation Tax

While the generation of electricity has been delicensed, States such as Gujarat, Maharashtra and Tamil Nadu have imposed mandatory registration requirements for renewable energy projects with State nodal agencies. There are certain States who have also started levying fees or facilitation charges on development of renewable energy projects. In this regard, MNRE has clarified that imposition of taxes/duties on generation of electricity is illegal and ultra-vires the Constitution of India and further directed the States to remove any such development fee/charges/fund on generation of electricity from thermal, hydro and renewable energy sources.

Transmission of Electricity

The transmission of electricity is a licensed activity and therefore, any entity which intends to engage in the business of transmission of electricity is required to obtain a license from the CERC or the SERCs, as may be applicable. The transmission systems in India are divided into: (i) ISTS (for transmission of power from one state to another); and (ii) intra-State transmission system (for transmission of power within a state). The ISTS is largely owned and operated by Power Grid Corporation of India Limited (a public sector undertaking), while the intra-state transmission systems are maintained by state transmission utilities.

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¹³ Section 7 of the Electricity Act.

Right of Way

- (a) *The renewable energy project developers as well as transmission asset developers are required to obtain the right of way for laying of overhead transmission lines for connecting the project to the nearest sub-station of the relevant transmission utility. The developers are, required to ensure that the right of way is unhindered and uninterrupted during the construction stage and for the entire operational life of the project.*
- (b) *The developer can either execute easement or right of way agreements or obtain an approval under Section 164 of the Electricity Act (which empowers the person laying the overhead transmission lines, the statutory right to exercise the powers of a telegraphic authority while carrying out the works for laying of overhead transmission lines).*
- (c) *Once an approval under Section 164 of the Electricity Act has been obtained, the developer or the licensee can proceed with the placing of electric supply lines or electric poles for the transmission of the electricity in or over any land, without acquiring such land and without the requirement to obtain any prior consent of the individual landowners.*
- (d) *The Ministry of Power, GoI has issued the Guidelines for Payment of Compensation in regard to Right of Way for Transmission Lines, 2024 which requires developers to pay appropriate compensation to the landowners prior to laying the overhead transmission lines.*

Trading of Electricity

Trading of electricity is a licensed activity in India. As per the CERC (Procedure, Terms and Conditions for grant of trading license and other related matters) Regulations, 2020 (**CERC Trading License Regulations**), trading of electricity can be inter-State¹⁴ and intra-state.¹⁵

The Electricity Rules¹⁶, read with the CERC Trading License Regulations, allow an inter-State trading licensee to undertake intra-State trading of electricity without requiring a separate intra-State trading license from the relevant SERC. There are two modes for trading of electricity – firstly, through back-to-back contractual arrangements, and secondly, through sale on the power exchanges.

Insights

Principally speaking, the tariff for sale of power to a trader through back-to-back arrangements is not regulated under the Electricity Act (if the procurement of power does not involve the Discoms), and the CERC Trading License Regulations only regulate the 'trading margin' that a trader is allowed to charge. However, in case of trading of power through back-to-back contracts which involves the Discoms (such as in case of competitive bidding), the tariff for such sale of power is regulated by the appropriate commissions under Section 63 of the Electricity Act, while the trader can only charge a 'trading margin' as per the ceiling limits provided under the CERC Trading License Regulations.

¹⁴ Regulation 2(1)(n) of the CERC Trading License Regulations.

¹⁵ Regulation 2(1)(o) of the CERC Trading License Regulations.

¹⁶ Rule 9 of the Electricity Rules.

Sale of Power

Since generation of electricity is a delicensed activity, generators can choose to sell power through various channels depending upon the business model adopted by such generator – this

includes sale of power to Discoms, third party open access consumers, captive consumers, through the power exchanges or through the blockchain model.

The various modes for sale of electricity in India are set out below:

Modes of Sale of Power	
<i>Sale of power at ERC determined tariff</i>	Section 62 – An ERC is empowered to determine tariff including for sale of power. Section 63 – Adoption of tariff discovered through competitive bidding process which is to be adopted by the relevant ERC.
<i>Third-Party Sale and Open Access of Power</i>	Sale of power by generators, directly to third party consumers on mutually agreed tariffs using the open access route.
<i>Rooftop Solar</i>	Existing business models for installation are – standard OPEX model and CAPEX model.
<i>Captive Sale of Power</i>	The generators may sell power to captive users who must fulfill the captive requirements.
<i>Trading of Electricity</i>	Sale of power to a power trader operating through a trading license either on a power exchange or through back-to-back contracts.
<i>Sale through Blockchain PPAs</i>	A Blockchain PPA is a <u>smart-contract</u> which facilitates P2P transactions and encodes the terms of a PPA.

(i) *Electricity Regulatory Commission (ERC) determined tariff*

The power purchase agreements (**PPAs**) executed with Discoms are standard form contracts that have been approved by the relevant ERC and are usually non-negotiable and have a term ranging from 13 (thirteen) to 25 (twenty five) years. The tariff under such PPAs is determined by relevant ERCs under the Electricity Act¹⁷ through tariff orders, which have a specified control period (typically, 3 (three) to 5 (five) years). Key risks involved in such PPAs have been set out below:

¹⁷ Section 62 of the Electricity Act.

Key risks under Discom PPAs

- (a) *Considerable delays in adoption of tariff have been a bottleneck for power developers since the adoption of tariff is typically a condition precedent for the effectiveness of the PPA (to be satisfied within 60 (sixty) to 90 (ninety) days). While the standard bidding guidelines allow extension of the scheduled commercial operation date if the ERCs delay in passing the tariff adoption order, power developers have no relief for any delay on the part of the Discoms to file the petitions.*
- (b) *Ever since the discovery of low tariffs under the prevalent competitive bidding regime in the renewable energy sector, many Discoms in various states have resorted to re-opening of executed PPAs under the feed-in-tariff regime (i.e., tariff determination under Section 62 of the Electricity Act). While the Andhra Pradesh High Court has settled this issue and held that once the tariff has been concluded under the PPAs, it cannot be re-negotiated, various States continue their efforts to re-negotiate already determined or ERC approved tariffs, through petitions brought before the respective ERCs.*
- (c) *Renewable energy projects in India have been granted a “must-run” status (i.e., duly commissioned renewable energy projects cannot be directed to backdown their generation, except due to reasons of grid security). However, there are frequent instances of curtailment by Discoms to avoid purchase of power and payment of tariff. The MoP has introduced the Electricity (Promotion of Generation of Electricity from Must-Run Power Plants) Rules, 2021, to compensate renewable energy generators (as per the PPA tariff) in case of grid backdown instructions even in cases where the PPA does not provide such relief.*
- (d) *In centrally bid out projects, the intermediary procurer’s obligation under the PPA is on ‘pay-when-paid’ basis and is dependent on receipt of payment from the Discom under the power sale agreement (PSA). Considering all key obligations are ‘back-to-back’, such lack of privity between the two contracts affect the bankability of the projects as the developer is dependent on the intermediary procurer to initiate action against Discom under the PSA to be able to successfully claim any relief under the PPA.*
- (e) *Discoms often default in their payment obligations under the PPAs or under the PSAs (with the intermediary procurer). The Electricity (Late Payment Surcharge and Related Matters) Rules, 2022 places a firm obligation on Discoms to provide a payment security, failing which the power generators, transmission licensees and trading licensees can reduce the supply of power to the defaulting Discoms.*
- (f) *The PPAs often require project SPVs to maintain minimum 51% (fifty one percent) shareholding for a certain period after commissioning, and changes in shareholding may require approval from the Discom or bidding authority. Bidding authorities usually do not grant these approvals, and transactions are structured to avoid these control restrictions.*

(ii) Competitive bidding

Generators may sell power to the Discoms, or

to intermediary procurers, under the competitive bidding route. Tariff under this mode is discovered under the Electricity Act¹⁸ and the competitive bidding is required to be

¹⁸ Section 63 of the Electricity Act.

conducted as per the standard bidding guidelines. The tariff discovered in the competitive bidding is adopted by the relevant regulatory commission¹⁹ after ascertaining that the bidding process has been conducted in a transparent manner and in accordance with the competitive bidding guidelines issued by the GoI. MNRE has also issued separate standard guidelines for tariff-based competitive bidding under Section 63 of the Electricity Act, for various forms of technology prevailing in the present renewable energy market such as solar photovoltaic power, wind power, wind-solar hybrid, round-the-clock power, and firm and dispatchable power.

The MNRE Guidelines for Tariff Based Competitive Bidding Process for Procurement of Firm and Dispatchable Power from Grid Connected Renewable Energy Power Projects with Energy Storage Systems (“**FDRE Guidelines**”) issued on June 9, 2023 and last amended on February 12, 2025 provide for bidding guidelines specific to power generators who supply firm and dispatchable renewable energy, i.e., power supply at a rated capacity at any hour of the day as per the demand of the procurer, with ESS integrated in their generating systems in order to meet the procurer’s power requirements entirely from renewable sources and with energy storage facilities.

The FDRE Guidelines are targeted towards power supply with energy storage facilities and promote the integration of standalone or co-located battery energy storage systems (**BESS**), or other forms of energy storage, with renewable energy generating systems. Please refer to Page 27 for a detailed description of ESS.

(iii) **Third Party Sale and Open Access of Power**

Generators may also sell power directly to

third party consumers on mutually agreed tariffs through the open access route (i.e., obtaining open access to the Discoms’ and/or transmission utility’s network). The generators can use the transmission licensee or Discoms’ network to supply power without building its own transmission network.

(iv) **Rooftop Solar or Onsite Solar Projects**

The two prevailing business models for installation of solar roof top projects that are prevalent in the current market are: (a) standard OPEX (operational expenditure) model where the developer installs and develops the rooftop solar system and sells the power to the owner (as consumer); and (b) CAPEX (capital expenditure) model where the developer acts as the contractor, and the owner owns the rooftop solar system and bears all the capital expenditure.

Net Metering v. Gross Metering

In India, solar rooftop projects are set up using either gross metering, or net metering at the facility of the power offtaker. Gross metering is an arrangement under which the total energy generated from the solar rooftop project is injected into the grid, while the consumer’s power requirements are met through supply of power from the Discoms. The tariff for the power injected to the grid is determined by the SERCs and the consumer pays the retail tariff for power consumed from the Discom.

Net metering is an arrangement of energy metering under which the solar rooftop project installed at an eligible consumer’s premises and delivers solar power simultaneously with the power supplied by the Discom to the consumer’s premises. The net consumption after adjusting the power generated by the

¹⁹ Section 63 of the Electricity Act.

solar power system is measured and displayed for the applicable billing period.

The government's planned expansion of net metering or onsite solar to urban households has been initiated through the City Accelerator Program launched by the MNRE on June 20, 2025²⁰. This initiative is part of the PM Surya Ghar Muft Bijli Yojana and diversifies the scheme by targeting urban areas as opposed to the earlier focus on agricultural and rural

areas. In the first phase of the City Accelerator Program, 30 (thirty) cities across 10 (ten) Indian states have been shortlisted, and the program aims to build institutional and infrastructural capacity for onsite solar projects, improve the economic understanding of such projects and their benefits for Discoms and other key stakeholders of the power sector, and foster policy innovation and innovative business models for onsite solar projects in cities.

Insights

In recent years, most states have actively moved away from the net metering regime by restricting net metering to only small-scale projects (< 1 (one) MW) and giving preference to gross metering projects. Even the MoP under the Electricity (Rights of Consumers) Rules, 2020, has permitted net metering only for projects with a load up to 500 (five hundred) kW and gross metering for projects with a load exceeding 500 (five hundred) kW. Net metering originally was only envisaged for low tension consumers (such as residential consumers or small industries). With the growth of solar rooftop projects due to its inherent cost efficiency, high tension consumers moved towards the solar rooftop model for self-consumption thereby availing significant benefits through net metering. Several States in India, through their solar policies and net metering regulations, have in recent times either specifically excluded high tension consumers or have reduced the maximum project capacity threshold for grant of net metering.

(v) Captive Sale of Power

A generating station, to qualify as a captive generating plant, is required to fulfil the following requirements: (a) 26% (twenty six percent) of the ownership of the entity owning the captive generating plant should be held by its captive consumers (i.e., the end consumer of the electricity); (b) 51% (fifty one percent) of the aggregate electricity generated by a captive generating plant should be consumed by the captive consumers, on an annual basis; and (c) proportionate consumption by group captive consumers, i.e., each captive consumer should consume power proportionate to its shareholding in the captive generating plant. These conditions are to be complied with annually – every financial year. The Supreme Court in *M/s Dakshin Gujarat Vij Company Limited vs. M/s Gayatri Shakti Paper and*

*Board Limited and Anr.*²¹, has specified a 'unitary qualification ratio' as a fundamental principle for group captive consumers to meet the proportionality test. In this context, it was further held that, for every 1% (one percent) equity shareholding owned by a group captive consumer, it will be required to consume 1.96% (one point nine six per cent) of the electricity generated by the captive generating plant, with a permissible variation of +/- 10% (ten per cent).

Key risks in commercial and industrial (C&I) PPAs, which may include captive PPAs as well as PPAs executed to implement third-party sale of power, are as set out below:

- (a) *Change in law:* Power generation and distribution is subject to changes in applicable electricity law, which may

²⁰ [Press Release: Press Information Bureau](#)

²¹ 2023 SCC OnLine SC 1276.

include increase or fluctuations in regulatory charges, introduction of new compliance requirements or costs, or fluctuations in the tax regime. In order to protect the interests of the power generator and minimize the impact on the project costs, PPAs should contain change in law provisions which permit the power generator to claim monetary relief from the offtaker in case of increase in project costs due to change in law. In situations where PPAs do not provide for change in law relief, parties may initiate dispute resolution under the PPAs for pass-through of additional charges on account of change in law to the offtakers.

(b) *Delays in commissioning:* Power generating projects are long-term arrangements which involve high capital expenditure for construction and development of supporting infrastructure. The timelines for project development are subject to delays due to various external factors, and PPAs typically contain provisions for the levy of delay liquidated damages by the offtaker, payable by the power generator, which entails additional costs to the power generator.

(c) *Payment security:* As previously discussed in point (e) of key risks in

Discom PPAs on Page 12, the power generation sector is prone to delayed payments and resulting financial instability. Although the Discoms have been mandated to provide and maintain payment security (typically, in the form of a letter of credit or bank guarantee), C&I PPAs are not required to contain such obligations as they are agreements executed between private parties on the basis of negotiated terms. Payment security provisions in C&I PPAs, which create an obligation on the offtaker to provide and maintain payment security which may be encashed by the power producer in case the offtaker defaults on timely tariff payments, should be incorporated to safeguard the interests of the power producer and provide them with alternate remedies in case of delayed payment.

(vi) *Trading of Electricity*

Power may be sold to a power trader operating through a trading license either through back-to-back contracts or on the power exchanges. Tariff for sale of power to a trader is not regulated. The trading licensee is entitled to charge a trading margin up to 7.0 (seven point zero) paise/kWh for inter-State trading transactions under short-term contracts (including through sale on power exchanges).

Insights

In view of developing a market for renewable sources, CERC has launched Green – Term Ahead Market (GTAM) in August 2020 through which any open access consumer, captive client, Discoms can meet their RPO by procuring renewable power through GTAM. In the GTAM, the trades are executed on daily basis for the next day based on availability/ requirement of renewable power. Further, the CERC introduced the green day ahead market, in which the renewable energy generators will be eligible to sell provided they have a no objection certificate from the load despatch centre which specifies the maximum quantity and the renewable energy source.

(vii) *Sale of Power through Blockchain PPAs*

A blockchain PPA is a ‘smart contract’ that encodes the terms of the PPA and eliminates the need for intermediaries while automating payments based on electricity usage thereby ensuring a transparent record for all parties involved. Blockchain PPAs facilitate peer-to-peer (**P2P**) transactions and enable more efficient and secure transactions,²² achieving renewable energy integration, empowerment of consumers, cost savings, grid resilience, innovation in technology and regulatory evolution in comparison to existing arrangements.²³

GRID CONNECTIVITY

The evacuation of power by a power generator in India is segregated in two stages – (i) grant of connectivity (for physical inter-connection to the grid); and (ii) grant of non-discriminatory open access to the transmission utility or the Discoms’ network. Electricity Act requires each transmission licensee to provide non-discriminatory use of transmission lines or associated facilities to a licensee, consumer or a generator. Grid connectivity in India can either be to – (i) the national grid, i.e., the ISTS; or (ii) State grid, i.e., the intra-State transmission network and/or Discom’s network.

Connectivity to the National Grid

- (i) Grant of connectivity and open access to the ISTS network is governed by the CERC (Connectivity and General Network Access to the inter-State Transmission System)

Regulations, 2022 (**CERC GNA Regulations**). The CERC GNA Regulations have introduced the concept of “GNA-renewable energy” (**GNA-RE**), i.e., open access to the ISTS for drawing power exclusively from renewable energy sources. Through the GNA-RE, renewable power producers and off-takers have dedicated access to the ISTS network under: (a) GNA; and (b) temporary GNA (T-GNA).

- (ii) An entity granted connectivity under the CERC GNA Regulations is deemed to have been granted GNA, therefore, generators are no longer required to obtain a separate open access.
- (iii) The CERC issued the third amendment to the CERC (Connectivity and General Network Access to the Inter-State Transmission System) Regulations, 2022, (**GNA Third Amendment**) on August 31, 2025. The GNA Third Amendment refines the GNA framework by tightening application discipline and aligning connectivity milestones. It prescribes: (a) stage-wise consequences for withdrawal of application for grant of connectivity and relinquishment; (b) enables RE generating stations (**REGS**) based on wind (with or without storage) or standalone ESS to seek connectivity based on “non-solar hour access”²⁴ (and “solar hour access”²⁵ where relevant); and (c) restricts any change in control²⁶ of the connectivity grantee until the project is commissioned (any deviation from this restriction requires the prior approval of the nodal agency²⁷).

²²<https://renewablewatch.in/2023/08/19/blockchain-benefits-growing-role-in-promoting-renewable-energy-utilisation/>.

²³https://kerc.karnataka.gov.in/uploads/media_to_upload1705925039.pdf.

²⁴GNA Third Amendment defines the term “non-solar access” to mean “access with injection scheduling rights during non-solar hours and drawl rights throughout the day in accordance with Regulation 5.11 and Annexure-IV of these regulations”

²⁵GNA Third Amendment defines the term “solar access” to mean “access with injection scheduling rights during solar hours for the quantum of Connectivity and injection scheduling rights during non-

solar hours for the capacity other than solar source limited to quantum connectivity and drawl rights throughout the day in accordance with Regulation 5.11 and Annexure-IV of these regulations”

²⁶GNA Third Amendment defines the term “change in control” to mean “

²⁷GNA Third Amendment defines the term “nodal agency” to mean “(i) the agency designated for Connectivity or GNA to the ISTS, which shall be the Central Transmission Utility (CTU), for the purpose of Regulations 3 to 25 and Regulation 37 of these regulations; (ii) the agency designated for T-GNA for bilateral

- (iv) It also mandates REGS (other than hydro generating station or ESS (excluding PSPs)) to provide details of their promoters and shareholding pattern along with tentative generation and drawl profile for the capacity sought.²⁸ The requirement to provide Conn BG2 in cases where the applicant (a) proposes to construct a terminal bay on its own; (b) seeks connectivity for a terminal bay which is already constructed; (c) a distribution licensee or a bulk consumer seeking to directly connect to the ISTS; and (d) applicants seeking connectivity through electrical system or switchyard of generating station has been dispensed with. The GNA Third Amendment permits RE developers to change the RE source for which in-principal connectivity or final connectivity has been granted, subject to

certain conditions such as (a) the change in the renewable energy source must be for the same connectivity quantum; (b) the application for such change must be submitted within 18 (eighteen) months from the in-principle grant of connectivity or 18 (eighteen) months prior to the effective date of the GNA, whichever is later; (c) no change in the renewable energy source will be permitted if the requirement of 50% (fifty percent) land for the revised source exceeds the extent of land for which documents have been submitted; (d) the change of source will be considered for entities with solar access only to the extent the non-solar access has not been granted to other entities; and (e) the change of source will be granted only once for a connectivity grantee. The conditions precedent for allowing this change of RE source are to be issued by the nodal agency.²⁹

Insights

In terms of seeking access to the grid, the CERC GNA Regulations mark a shift from the earlier regime under the CERC (Grant of Connectivity, Long-term Access and Medium-term Open Access in Inter-state Transmission and related matters) Regulations, 2009. While, under the earlier regulatory framework, either the generator or the off-taker could obtain the connectivity for transmission of power according to their contractual arrangement, the CERC GNA Regulations exempt power producers who are already connected to the grid to obtain separate access for transmission of power. However, off-takers (such as, Discoms) are still required to obtain access to the transmission network for transmitting power from the point of drawl to the point of consumption.

Eligibility for GNA

- (a) Generating station, with or without ESS, with an installed capacity of 50 (fifty) MW and above, either individually or in aggregate;
- (b) Captive generating plant or standalone ESS with injection capacity of 50 (fifty) MW or above;
- (c) Standalone ESS with an installed capacity of 50 (fifty) MW and above, individually or in aggregate;
- (d) Renewable power park developer; or
- (e) Renewable energy project or standalone ESS with installed capacity of 5 (five) MW or above applying for connectivity to ISTS through the electrical system of an existing generating station.

transactions which shall be RLDC of the region where point of drawal is located, for the purpose of Regulations 26 to 36 of these regulations; (iii) the agency designated for T-GNA for collective transactions which shall be NLDC, for the purpose of Regulations 26 to 36 of these regulations; (iv) the agency for implementation and

operation of NOAR which shall be NLDC, for the purpose of Regulation 27 of these regulations”

²⁸ [Third Amendment to the GNA Regulations – Key Highlights](#)

²⁹ Ibid

The GNA Third Amendment restricts the quantum for which connectivity can be sought by a REGS (other than hydro generating station or ESS (excluding pumped storage plant (PSP))). Such an applicant is eligible to apply for connectivity up to the quantum awarded in the letter of award or executed as provided under the power purchase agreement, whichever is lower. There also exist provisions for claiming additional capacity by evidencing land documents or bank guarantees as required. It is pertinent to note that the GNA Third

Amendment permits land parcels presented to the nodal agency to be changed both partly and completely.

The CERC GNA Regulations allow individual generators to combine their project capacities and apply for a common connectivity to the ISTS at a single inter-connection point – by authorizing one of the generators in the combination so formed, as a lead generator or lead ESS.

Insights

While the CERC (Grant of Connectivity, Long-term Access and Medium-term Open Access in Inter-state Transmission and related matters) Regulations, 2009 required the connectivity applicant to provide details of the potential off-takers, point of drawl (i.e., the point of consumption by the end consumer), or proof of contractual arrangements evidencing tied-up capacity, the CERC GNA Regulations provide flexibility to the generators by providing them connectivity (and, deemed GNA) without having to specify the injection point and the drawl point. The generator is only required to specify the preferred point of connection with the ISTS along with the maximum quantum of power proposed to be evacuated through the ISTS.

Green Energy Open Access

The Green Energy Open Access Rules, 2022 (**Green Energy Open Access Rules**) allow consumers with a contracted demand of 100 (one hundred) kW or more to obtain green energy open access, and there is no load limitation for captive consumers. The Green Energy Open Access Rules intend to create a simplified process for consumers to procure renewable energy through open access.

In 2025, Green Energy Open Access (**GEOA**) saw divergent, state-led implementation rather than central amendments. Several states such as Madhya Pradesh, Maharashtra Gujarat and Haryana³⁰ have incorporated or aligned their open access frameworks with the Green Energy Open Access Rules.

It is pertinent to mention that the Karnataka High Court in *Brindavan Hydropower Pvt. Ltd. v. Union of India*,³¹ struck down the central Green Energy Open Access Rules as ultra vires the Electricity Act, 2003 and concurrently invalidated the Karnataka Electricity Regulatory Commission's 2022 GEOA regulations framed under those Rules, holding that open access regulation lies within the exclusive domain of state electricity regulatory commissions and that central policy directions cannot bind their adjudicatory discretion. Following the judgment, Karnataka government has implemented a fresh state regime, 'the Karnataka Electricity Regulatory Commission (Terms and Conditions for Open Access) Regulations, 2025',³² resetting charges (such as commission-set wheeling, cross-subsidy and additional surcharges, monthly banking with an 8% (eight percent) charge, and standby supply at 125% (one hundred twenty five percent) of normal energy rates) and procedures for the state.

³⁰[Center and States Must Align Better for Accelerated Solar Open Access Growth](#)

³¹Writ Petition no. 11235 of 2024

³²[DOC-20250326-WA0018_.pdf](#)

Connectivity to the State Grid

The grant of connectivity and open access to the intra-State network or the Discom's network is governed by the respective grid connectivity and open access regulations issued by the SERCs and the State-level grid codes. The SERCs have started issuing the green energy open access rules in accordance with the Green Energy Open Access Rules, which now governs grant of open access for consumption from renewable energy sources.

Regulatory Charges

Under the Green Energy Open Access Rules, a consumer is required to pay various regulatory charges for consumption of power, such as (a) transmission charges; (b) wheeling charges; (c) standby charges, wherever applicable; (d) banking charges; and (e) other fees and charges such as load despatch centre fees and scheduling charges, deviation settlement charges.

Waiver of Transmission Charges

At present, the MoP has waived the transmission charges and losses for inter-State solar and wind power projects commissioned before June 30, 2025, for a period of 25 (twenty five) years from the date of its commissioning. On June 26, 2025 the MoP issued the fourth amendment to the CERC (Inter-State Transmission Charges and Losses) Regulations, 2020, revising the earlier category of exemptions for BESS projects – (i) for BESS connected at a substation where RE generating station is connected and is charged from such renewable energy generating station, the waiver from ISTS charges is at 100% (one hundred per cent) for a period of 12 (twelve) years; (ii) for BESS connected at a substation where (a) no RE generating station is connected; or (b) RE generating station is connected but the BESS is charged from grid or a source other than RE generating station; or (c) any other BESS not

covered under the first exemption, the waiver from ISTS charges is at 100% (one hundred percent) for a period of 12 (twelve) years (for projects commissioned on or before June 30, 2025) and is gradually tapered by 25% (twenty five percent) on a yearly basis starting from July 1, 2025 until June 30, 2028 (where there are no exemptions available); (c) REGS co-located with BESS and installed only for the purpose of charging such ESS with no additional connectivity quantum at the ISTS substation has been qualified to fall under category (a) discussed above, the waiver from ISTS charges is at 100% (one hundred percent) for a period of 12 (twelve) years for projects commissioned on or before June 30, 2028.³³

In case of any delay in commissioning of any under-construction renewable energy project beyond June 30, 2025 (as opposed to the original scheduled commercial operation date provided under the PPA), this waiver will not be available for such renewable energy projects. While the transmission charges are billed to the Discom, typically, the burden of the transmission charges payable on account of any delay in commissioning due to the generator's default is passed onto the generator under the PPA.

SOLAR MANUFACTURING – REGULATORY FRAMEWORK IN INDIA

PLI Scheme for National Programme on High Efficiency Solar PV Modules

To enhance the domestic manufacturing of solar PV cells and modules, the PLI Scheme for National Programme on High Efficiency Solar PV Modules (**National Programme**) was approved by the Cabinet in 2021. The National Programme is aimed at building an ecosystem for domestic manufacturing of high efficiency solar PV modules and reduce the reliance on import of renewable energy. The National Programme provides for production linked incentive (**PLI**) to

³³[200.pdf](#)

the selected solar PV module manufacturers for a period of 5 (five) years after commissioning, on manufacture and sale of high efficiency solar PV modules. In this regard, MNRE has also issued guidelines to regulate the National Programme.

Approved List of Models and Manufacturers (ALMM) List and Revised List Models and Manufactures (RLMM) List

The MNRE issued the ‘Solar Photovoltaics, Systems, Devices and Components Goods (Requirements for Compulsory Registration) Order, 2017 to standardize the quality and testing of solar modules and cells. This led to the publication of the ALMM, a two-part list that sets out models and manufacturers of modules and cells, which models have been approved, and manufacturers are registered with the MNRE (**ALMM List**). This ALMM List has been subsequently amended and the MNRE by its notification dated October 7, 2022 has clarified that the requirement to use ALMM listed modules does not apply to open access and net-metered solar power projects in specific cases. The MNRE by its office memorandum dated March 29, 2024 imposed the requirement to comply with the ALMM order for every project that receives solar PV modules at the project site after April 1, 2024. The MNRE through office memorandum dated December 9, 2024 introduced List-II for solar PV cells as a response to the country’s rapidly growing solar manufacturing capabilities. Compliance with this List-II would be mandatory from June 1, 2026. The ministry had also provided a cut-off date to protect ongoing projects from the amendment thus, projects whose last date of bid submission was on or before December 9, 2024 have been exempted from ALMM List-II requirements. The MNRE vide its frequently asked questions dated September 23, 2025³⁴ has issued an updated clarification with regards to the

implementation of ALMM for solar PV cells in India. It specifies the applicability of ALMM requirements on the basis of project types, bid submission dates and commissioning timelines and also includes provisions of exemptions and mandatory compliance³⁵.

On January 28, 2025 the MNRE notified the Solar Systems, Devices and Components Goods Order, 2025 (**Goods Order**) which applies to manufacturers, importer, distributors retailers, sellers and lessors of solar PV systems and components. The Goods Order makes it mandatory for all solar PV modules, inverters and storage batteries to conform to the latest Indian Standards as notified by Bureau of Indian Standard (**BIS**) and bear the standard mark under a license from BIS. It has introduced a minimum efficiency criterion (standard test conditions) for Mono Crystalline Silicon, Thin-Film PV Modules and Poly Crystalline Silicon.³⁶

With respect to the wind power projects, the MNRE maintains a list of approved manufacturers of wind turbine generators (**WTGs**) known as the “Revised List of Models and Manufacturers of Wind Turbines” (**RLMM List**). On July 31, 2025 the MNRE renamed RLMM as ALMM (Wind) and has amended the procedure to apply for inclusion of a wind turbine model in the RLMM List. It has made it mandatory for use of major wind turbine components from the ALMM (Wind Turbine components).³⁷ The MNRE also issues a list of type and quality certified WTG models eligible for installation in the country.³⁸

³⁴Office Memorandum (FAQs) of MNRE dated September 23, 2025 [202509261151535288.pdf](#)

³⁵[ALMM/RLMM Compliance: A Regulatory Deep Dive](#)

³⁶Solar Systems, Devices and Components Goods Order, 2025, [202501282101643660.pdf](#)

³⁷Office Memorandum of MNRE dated July 31, 2025 uploaded at [doc2025731596401.pdf](#)

³⁸ The RLMM list is frequently updated. Such updated lists are uploaded by the MNRE at <https://mnre.gov.in/wind-manufacturing/>.

RENEWABLE PURCHASE OBLIGATION, RENEWABLE CONSUMPTION OBLIGATION, AND RENEWABLE ENERGY CERTIFICATES

Renewable Purchase Obligation

The Electricity Act, requires SERCs to promote generation of electricity from renewable energy sources and thereby, specify a minimum percentage of electricity to be procured from renewable energy sources by ‘obligated entities’ within the respective State. This minimum percentage is known as the RPO, i.e., an identified obligation to utilize power from renewable energy sources in the total energy consumption mix.

The SERC of each State issues its RPO regulations, which identifies the ‘obligated entities’ and their RPO. Typically, the ‘obligated entities’ include the Discoms of the State, open access consumers and the captive consumers. The State’s RPO regulations also mandate RPO obligations for each source of renewable energy (such as, minimum percentage to be purchased from solar sources and minimum percentage to be purchased from non-solar sources) which is typically applicable for Discoms. The RPOs can be met by the ‘obligated entities’ either through procurement of power from renewable energy sources or through purchase of renewable energy certificates (**RECs**) as per the relevant State’s RPO regulations.

Renewable Consumption Obligation

Renewable consumption obligation (**RCO**) is a mechanism introduced under the Energy Conservation (Amendment) Act, 2022 (“**EC Amendment Act**”) under which ‘designated consumers’ are required to consume a specified percentage of electricity from non-fossil sources as part of their total energy consumption mix. The Bureau of Energy Efficiency (**BEE**) has been

designated with the responsibility to maintain the data related to compliance of renewable energy utilization by the designated consumers and is required to submit reports to the GoI on an annual basis.

Designated consumers include specific industrial and commercial entities identified by the Central Government under Section 14(e) of the Energy Conservation Act, 2001, as amended through the EC Amendment Act, based on their energy consumption levels.

RECs

A REC is a market-based tradable instrument (electronic or paper) that allows ‘obligated entities’ to meet their RPOs. A REC can also be voluntarily purchased by entities intending to offset their carbon footprints. In India, at present, there are two (2) kinds of RECs – solar based RECs and non-solar based RECs³⁹.

The CERC (Terms and Conditions for Renewable Energy Certificates for Renewable Energy Generation) Regulations, 2022 (**CERC REC Regulations**) govern the issuance, accreditation, pricing and the life cycle of a REC or certificates.⁴⁰ Pursuant to the CERC REC Regulations, the CERC has also issued the Procedure for Implementation of REC Mechanism in December, 2022, which sets out the detailed procedure for the various processes involved in the life-cycle of a REC.

Entities Eligible to Issue RECs

As per the CERC REC Regulations, following entities are eligible to issue RECs:

- (i) **Renewable Energy Projects**: A renewable energy project can issue RECs, if the tariff for such project has not been determined or adopted by the relevant ERC or the electricity

³⁹ <https://www.ixindia.com/products.aspx>

⁴⁰ Regulation 2(1)(c) of the CERC REC Regulations defines a “certificate” to mean “the renewable energy certificate issued by the Central Agency in accordance with these regulations.”

generated from such project is not sold directly or through an electricity trader or in the power exchange, for RPO compliance by an obligated entity; and such project has not availed of any waiver of or concessional transmission charges/ wheeling charges.

- (ii) Captive Power Plant: A captive generating plant based on renewable energy sources can issue RECs, if it meets the conditions as discussed in (a) above. However, RECs issued to captive generating plants cannot be sold, to the extent of their self-consumption.

Captive Generating Plant vis-à-vis the Electricity (Amendment) Rules, 2024

The MoP has recently amended the Electricity Rules to increase the scope of relaxation for captive generating plants. Under the Electricity Act, a captive generating plant has been exempted from procuring a licence to establish, operate or maintain a dedicated transmission line for connectivity to the grid.⁴¹

- (iii) Discoms and Open Access Consumers – The Discoms and open access consumers are eligible for issuance of RECs, if they purchase electricity from renewable energy sources in excess of their RPOs (as determined by the SERCs), to the extent of excess renewable energy purchased.

Carbon Credits

A carbon credit is a tradable certification or permit issued to an entity that represents a certified reduction of 1 (one) ton of carbon dioxide equivalent from the atmosphere on account of action(s) taken by that entity or through climate action projects by that entity. The threshold of 1 (one) ton of carbon dioxide equivalent is formulated on the pretext that an average human leaves 1 (one) ton of carbon footprint in a month. In order to promote sustainable development in India and meet the national net-zero targets, the GoI intends to integrate carbon offset mechanisms⁴² into its national climate change strategies.

In this regard, the MoEFCC notified the Carbon Credit Trading Scheme, 2023 (CCTS) on June 28, 2023. The CCTS sets out the framework for the establishment of an Indian carbon market (ICM) and a framework for reducing, sequestering or avoiding greenhouse gas (GHG) emission across sectors of the Indian economy. In accordance with the CCTS, the BEE has in July, 2024 issued the 'Detailed Procedure for Compliance Mechanism under the CCTS' (**Compliance Mechanism**) and the 'Accreditation Procedure and Eligibility Criteria for Accredited Carbon Verification Agency' (**Accreditation Procedure**). While the Compliance Mechanism mandates the obligated entities to comply with the GHG emission intensity targets and envisages establishment of the National Steering Committee for Indian Carbon Market which will be responsible for the governance, oversight and functioning of the ICM, the Accreditation Procedure, lays down the eligibility criteria for the qualification of an Accredited Carbon Verification (ACV) Agency.

⁴¹Section 9 of the Electricity Act.

⁴²As per the notification issued by the MoP on December 19, 2023 amending the CCTS, "offset mechanism" has been defined to mean, "a mechanism where the non-obligated entities can

register their projects for accounting greenhouse emission reduction or removal or avoidance for issuance of Carbon Credit Certificates."

Insights

Given that the carbon credit market in India is still at a nascent stage in India, there are no dedicated exchanges for the trading of carbon credits at present. Further, India's carbon market is currently a voluntary market transitioning into a compliance market. This transition is evidenced by the issuance of compliance mechanisms such as the CCTS, which mandates obligated entities to obtain carbon credits, but also provides non-obligated entities with the option to engage in the trading of carbon credits. In the absence of a regulatory framework with clear procedures for trading of carbon credits, identification of obligated entities and carbon pricing mechanism, the processes involved in the trading of carbon credits such as accreditation of entities, price determination, issuance, and redemption of carbon credits remain ambiguous.

Energy Saving Certificates

Under Section 14A of the EC Act, Energy Saving Certificates (**ESCs**) can be issued to a designated consumer in the event the energy consumption of such designated consumer is below the prescribed norms and standards as specified. In the event, the energy consumption of such designated consumer is more than the prescribed norms and standards, such designated consumers will be obligated to purchase ESCs to comply with prescribed norms and standards as set out in this regard. The CERC (Terms and Conditions for Dealing in Energy Savings Certificates) Regulations, 2016 (**CERC ESC Regulations**) read with Energy Conservation (Energy Consumption Norms and Standards for Designated Consumers, Form, Time within which, and Manner of Preparation and Implementation of the Scheme, Procedure for Issuance of Energy Saving Certificates and Value of Per Metric Ton of Oil Equivalent of Energy Consumed) Rules, 2012 regulate the manner of issuance of and dealing in ESCs in India. In accordance with the CERC ESC Regulations, all trading and dealing in ESCs is required to be undertaken on the power exchanges. The Grid Controller of India will act as the registry for the purpose of holding of ESCs on the power exchanges in India.

Green Credit Rules, 2023

The Green Credit Rules, 2023 (**Green Credit Rules**) were notified by the MoEFCC under the Environment Protection Act, 1986. The Green

Credit (**GC**) programme was launched in order to incentivize environment-positive actions through a market-based mechanism, which allow for the generation and trading of GCs. The GC programme facilitates entities to meet their existing obligations and/or encourage other persons and entities, to undertake voluntary environmental measures by generating or purchasing GCs. Under the Green Credit Rules, a person or entity is required to submit an application to the administration to register any environment-positive activity for the issuance of GCs.

NEWER FORMS OF RENEWABLE ENERGY

Technological developments in the renewable energy sector and increased regulatory emphasis on emerging technology and modes for harnessing renewable energy provide an impetus to India's efforts towards its renewable energy targets and long-term climate goals.

The Ministry of Finance, GoI with support from MNRE issued the draft Renewable Energy Integration Investment Plan (**Draft Integration Plan**) on October 24, 2024, to seek financial support and technical expertise for initiatives aimed at enhancing integration of renewable energy. The Draft Integration Plan focuses on the integration of all the renewable energy sources by the deployment of ESS to increase grid flexibility, the development and fortification of supporting infrastructure to facilitate the generation of renewable energy, technical assistance across the renewable energy

value chain, and private sector investment in renewable energy.

In this regard, some of the new and emerging forms of renewable energy and key technological advancements in this sector, in India are:

(i) Green Hydrogen

Green Hydrogen is produced by using either of the 2 (two) process: (a) electrolysis, where water is split into hydrogen and oxygen using electricity generated from renewable sources like solar, wind, or hydropower; or (b) conversion of biomass, which involves the gasification of biomass to produce hydrogen. Both these production methods are clean and sustainable, which makes green hydrogen an attractive alternative for the transition to a low-carbon future.

Green Hydrogen Policy

To further India's NDCs goals, the MoP notified the Green Hydrogen Policy on February 17, 2022 which intends to incentivize the production of green hydrogen and its derivatives like green ammonia in India and transition from using conventional sources of energy like fossil fuel or fossil fuel-based stocks in hard-to abate sectors to using green hydrogen and its derivatives in order to reduce GHG emissions from these sectors.

In accordance with India's goal of becoming Aatmanirbhar (*self-reliant*) by using clean technology and significant decarbonisation of the economy, reduced dependence on import of fossil-fuels, MNRE notified the National Green Hydrogen Mission (NGHM) on January 23, 2023 with an outlay of INR 19,744 crores (Indian Rupees nineteen thousand seven hundred forty four crores) which provides a comprehensive and integrated

approach and targets production capacity build-up of 5 (five) MMT per annum by 2030 with a potential to reach 10 (ten) MMT per annum with the growth of export markets. This includes transition from using hydrogen which is produced from fossil-fuel sources to green hydrogen in ammonia production and use of green hydrogen derivatives such as green ammonia, green methanol, etc. in sectors such as transportation, shipping, and aviation. The NGHM also facilitates wide-ranging benefits such as creation of export opportunities for green hydrogen and its derivatives. As of March 2025, 5 (five) pilot projects for hydrogen fueled buses and trucks have been initiated as a part of the NGHM. These pilot projects are expected to be commissioned in the next 2 (two) years.⁴³

Strategic Interventions for Green Hydrogen Transition (SIGHT)

One of the key features of the NGHM is the introduction of a comprehensive incentive programme to enable reduction in the cost of green hydrogen production further facilitating its uptake in emerging sectors. It includes both financial incentives as well as non-financial measures required to encourage production of low-cost green hydrogen and domestic manufacturing of related equipment and technologies. The SIGHT scheme will also identify and regulate development of green hydrogen hubs which will be the regions capable of supporting large-scale production of green hydrogen and its derivatives. The SIGHT scheme provides for PLIs for the green hydrogen sector, which are granted on the basis of a competitive bidding process wherein the successful bidders are provided with financial incentives for the production of green hydrogen for a period of 3 (three) years

⁴³ [Press Release: Press Information Bureau](#)

from the date of commencement of production.

Green Hydrogen Certification Scheme of India

The Green Hydrogen Certification Scheme of India (**Scheme**) was introduced in September 2024 for stakeholder consultation and has been notified on April 29, 2025.

The Scheme makes certification mandatory for green hydrogen production facility/producers where (a) any incentive/subsidy is being received from the central government under the ‘Strategic Interventions for Green Hydrogen Transition Scheme’; (b) it intends to sell or use green hydrogen in India; and (c) any type of exemption/concession from the government is being received. The Scheme exempts green hydrogen production facilities having a capacity of 10 (ten) tons or less and green hydrogen producers with 100% (one hundred percent) export capacity who do not avail any exemptions or concessions from the government from seeking Green Hydrogen Certificate. The Scheme will operate at the project level of green hydrogen production including the stages up to compression, purification and onsite storage of hydrogen for transportation, while excluding processes such as transportation and storage of hydrogen outside plant boundaries, conversion into hydrogen carriers, reconversions, and utilization and sets out governance stakeholders to facilitate certification, implementation and monitoring which includes BEE, an implementing agency as may be designated by the MNRE, technical committee, green hydrogen producers and the ACV agency⁴⁴.

The Scheme also prescribes 2 (two) pathways which are considered eligible for green hydrogen production: (a) through electrolysis; or (b) through conversion of biomass (such as biogas reforming and biomass gasification). The green hydrogen producers who intend to engage in the Scheme and further claim certification are required to, within a period of 1 (one) month of completing their respective evaluation cycle, engage an ACV agency for the purposes of verification of their GHG emissions and compliance with the requirements of the Scheme.

Types of Certificates

In this regard, the Scheme provides for 2 (two) types of certificates which may be issued by the technical committee post review for green hydrogen production facilities which includes: (a) concept certificate (initial stage); and (b) facility level certificate (commissioning certificate). Further, the Scheme also provides for 2 (two) types of certificates which may be issued by the technical committee post review for green hydrogen production which includes: (a) provisional certificate; and (b) final certificate.

Under the Scheme, for certification, the green hydrogen producers have to comply with the materiality threshold as provided under the Scheme.

Key issues:

- (a) Under the SIGHT scheme, the amount of incentive for a given year is calculated on the basis of the allocated capacity for production or the quantity of green hydrogen produced in that year. Since the financial incentives under SIGHT are dependent on the produced quantity of green hydrogen, government support

⁴⁴The Scheme defines ‘ACV agency’ to mean, “an agency accredited by the Bureau of Energy Efficiency to carry out

validation and verification activities under the carbon credit trading scheme (offset ACV Agency).”

through financial or other incentives for the pre-commissioning stages have not been addressed under the SIGHT schemes. While certain states such as Andhra Pradesh, Rajasthan and Maharashtra have issued policies for the promotion of green hydrogen production which include incentives that are not linked to production or financial in nature, the centrally issued SIGHT scheme is limited to financial incentives that are released upon the production of green hydrogen or green ammonia on an annual basis.

- (b) While most of the renewable energy projects are exempted from obtaining the consent to establish or the consent to operate in accordance with the Central Pollution Control Board's circular dated March 07, 2016, 'hydrogen' has been classified under the 'red' category subject to the category of the main plant, which obligates a power project developer to obtain a consent to establish or the consent to operate prior to start of construction at the project site. However, there is a lack of clarity on industrial classification of 'green hydrogen'.
- (c) Since the green hydrogen market in India is at a nascent stage, the initial capital expenditure for manufacturing of electrolyzers and infrastructure is very high which acts as a deterrent for producers.

Scheme Guidelines (Revised) for Implementation of Pilot Projects for Production and Use of Green Hydrogen Using Innovative Methods/Pathways in the Residential, Commercial, Localized Community, Decentralized/Non-Conventional, Applications, Including Any Sector or Technology Not Covered in Previous Mission Schemes (Revised MNRE Scheme)

The Revised MNRE Scheme supports pilot projects for decentralized production and utilization of Green Hydrogen in residential, commercial, community and other new sectors not covered by prior mission schemes, with a budget outlay of Rs. 200 (two hundred) crores through financial year 2025–26. It funds equipment/retrofitting for innovative production pathways (e.g., floating solar, biomass, wastewater) and utilization (cooking, heating, off-grid power, city gas blending, off-road vehicles), implemented via designated scheme implementing agencies (SIAs) designated for specific sectors and evaluated by a Screening Committee.

The MNRE has proposed these pilot projects for increasing production and consumption of green hydrogen for community level application. Replacing conventional fuels in household usage would thus, result in aiding India's efforts of decarbonization. These pilot projects will help understand operational issues and gaps in terms of current technology, regulations, implementation challenges, infrastructure and supply chains, thus serving as valuable inputs in future growth of the renewable energy.

(ii) Virtual Power Purchase Agreements (VPPAs)

A VPPA is a financial settlement contract that is executed between the generator and the consumer outside of the power market, without involving any physical delivery of electricity generated. The generator, under a VPPA, continues to sell the power generated from its renewable energy project on the power exchange (as 'brown power'), while the green attributes are transferred to the consumer with whom the VPPA is executed.

In VPPAs, the 'strike price' is determined between the generator and consumer, which is compared with real-time prices of power in the power exchange where the generator sells the physical power or 'brown power'. The

difference between the two prices is settled through either of the two mechanisms:

- (i) *Two Way VPPA* – If the market price is below the ‘strike price’, the consumer compensates the generator for the difference. If the market price is higher than the ‘strike price’, the differential needs to be paid by the generator to the consumer.
- (ii) *One Way VPPA* – Only the consumer is liable to compensate the generator, if the market price is below the ‘strike price’.

VPPAs allow corporate consumers to achieve their decarbonization goals by purchasing the environmental attributes, while retaining the flexibility to meet their power demands through the utilities or otherwise.

On March 3, 2025, the CERC was requested by the MoP to develop a suitable regulatory framework for VPPAs as non-transferable specific delivery contracts for facilitating RCO for regulated entities. The CERC, thus, in exercise of its powers under the CERC Power Market Regulations, issued the Draft Guidelines for Virtual Power Purchase Agreements on May 22, 2025, as a significant step towards setting out a regulatory framework for VPPAs in India.

The CERC, through proposed amendments to the CERC (Power Market) Regulations, 2021 issued on June 17, 2025, (**CERC Power Market Regulations**) intends to expand the scope of over-the-counter power markets to include VPPAs, including VPPAs in the power trading framework and providing statutory recognition to the VPPA structure. The amendment to the CERC (Power Market) Regulations is in the draft stage and has not been notified as yet.

For a detailed analysis on the VPPA framework in India, please refer to ‘Draft Guidelines for Virtual Power Purchase Agreements – The India VPPA Story’, accessible at:

<https://www.azbpartners.com/bank/draft-guidelines-for-virtual-power-purchase-agreements-the-india-vppa-story/>.

(iii) *Energy Storage Systems*

The integration of BESS with renewable energy generating systems is undertaken to ensure the uninterrupted supply of power, as power storage reduces the risk of unavailability and reduces the burden on the grid. There are several energy storage technologies available, broadly – mechanical, thermal, electrochemical, electrical and chemical storage systems.

Amongst other forms of energy storage, the use of battery storage, particularly lithium-ion based BESS, is viewed as a preferred solution for connecting renewable energy plants to the electricity grid, due to its comparatively higher efficiency, power density, and the existence of fewer geographic risks in its development cycle.⁴⁵

In India, apart from the co-location of BESS in power plants, other models of BESS as adopted in the electricity distribution network include standalone BESS, pole-mounted BESS for localized energy needs, and BESS in urban micro-grids for the management of various components of power generation and distribution systems, supported by energy storage and battery back-up.

On February 18, 2025, the CEA issued an advisory recommending the co-location of

⁴⁵ Business Guide to Energy Storage Adoption in India, World Business Council for Sustainable Development; accessible at:

<https://www.wbcsd.org/wp-content/uploads/2023/09/WBCSD-Business-guide-to-energy-storage-adoption-in-India.pdf>

ESS in all future solar project tenders,⁴⁶ and the tenders issued by Solar Energy Corporation of India for solar projects offering firm and dispatchable power integrate BESS with the development of the solar project in order to ensure round-the-clock power and energy storage linked to the project as well as the electricity grid.⁴⁷ The MoP has issued the Guidelines for Procurement and Utilisation of BESS as part of Generation, Transmission, and Distribution Assets on March 11, 2022, which provide the use cases and procedure for procurement of BESS⁴⁸.

Separately, by way of a notification dated June 10, 2025, the MoP has announced a 100% (one hundred percent) waiver of ISTS charges for co-located BESS projects which are commissioned on or before June 30, 2028.

(iii) *Offshore Wind Energy*

In order to ensure the optimum utilization of the available offshore wind energy capacity of India, the tender documents for setting up India's first offshore wind plant with a total capacity of 4 (four) GW in the coastal states of Gujarat and Tamil Nadu were recently issued. The government has also approved the viability gap funding scheme with a total outlay of INR 7,453 crores (Indian Rupees seven thousand four hundred fifty three crores) for the construction of the offshore plants and the upgradation of ports and logistical requirements. The development of

offshore wind energy plants is also strategic in light of the other ocean based economic activities which the government intends to capitalize.

India launched the National Offshore Wind Energy Policy in 2015 (**National Offshore Wind Energy Policy**) to catalyze the available offshore wind energy. The National Offshore Wind Energy Policy is targeted at: (a) exploring and promoting the deployment of offshore wind farms in the Exclusive Economic Zone (EEZ); (b) promoting investment in the energy infrastructure of India; (c) promoting optimum planning and management of maritime renewable energy resources in the EEZ via incentives; (d) achieving energy security; (e) reducing carbon emissions; and (f) facilitating development of EPC and operation and maintenance regarding offshore wind industry. Further, the policy also provides that the MNRE will act as the nodal ministry for development of offshore wind energy in the EEZ of India and also that the National Institute of Wind Energy will act as the nodal agency for the development of offshore wind energy in India as well as calling for proposal, entering into contracts with various developers, etc.

To support the nation's goals of developing offshore wind energy and to reduce the cost of generation of energy from offshore wind energy projects, the Central government has

⁴⁶https://cea.nic.in/wp-content/uploads/notification/2025/02/Advisory_on_colocating_Energy_Storage_System_with_Solar_Power_Projects_to_enhance_grid_stability_and_cost_efficiency.pdf;
<https://www.mercomindia.com/government-mandates-two-hour-energy-storage-integration-in-solar-tenders>

⁴⁷SECI Tender for Floating Solar project with BESS:
<https://www.seci.co.in/tender-details/NT14MzExMTJhZjJlZjA0ZDVhN2I2MTA5ODhIM2Y0M2I3NzAwMzAzNWU5YjAxYWU4OTY0NWU2OWU3NDljZGQxNzVjODU3OTk4OTYxOGVhZmZmZWU1NzdhMDM1ZmZiNDY5MDg4NDMwYzQxYmVhMTIyY2Q2YTRkOWE4MWE1OGFh>

[ZDhRY0pLOEtUy3Nld2paVjNCOVRvb1BGcXBxRWQzNER5SHFMOTE2UGJxVjJlZPQ](https://www.seci.co.in/tender-details/MTE0MGU4MTVjZGExYzNlZTFiYzFkYWVjNDk0OTY4NjQ5NmFiNzg4Y2JjZTU4YmI4NDY2NTJhMzM5NzZjOGU1ODJmY2JmN2ZkOTIiMWI2NjEyZDlxMjg5N2RiNTZkOWIxM2Y2NjE0YTQ4Njk3NWUwNjdmM2YxZGY2MjgyNDA4MTIgeiVabk45bnFqbIBid1FzVnBsSkZoaFhhK0NoQ01qT01Felp6eXl2RTEOPQ); SECI Tender for Solar projects with ESS:
<https://www.seci.co.in/tender-details/MTE0MGU4MTVjZGExYzNlZTFiYzFkYWVjNDk0OTY4NjQ5NmFiNzg4Y2JjZTU4YmI4NDY2NTJhMzM5NzZjOGU1ODJmY2JmN2ZkOTIiMWI2NjEyZDlxMjg5N2RiNTZkOWIxM2Y2NjE0YTQ4Njk3NWUwNjdmM2YxZGY2MjgyNDA4MTIgeiVabk45bnFqbIBid1FzVnBsSkZoaFhhK0NoQ01qT01Felp6eXl2RTEOPQ>

⁴⁸<https://cdnbbsr.s3waas.gov.in/s3716e1b8c6cd17b771da77391355749f3/uploads/2023/08/202308281880799825.pdf>

exempted offshore wind energy projects commissioned before December 31, 2032 from paying out inter-State transmission charges. To simplify the procedure for acquisition of land to develop offshore wind energy projects, Ministry of External Affairs issued the Offshore Wind Energy Rules, 2023 to regulate the acquisition of land and leasing of offshore wind energy projects in India. MNRE has also issued the Guidelines for implementation of the Viability Gap Funding Scheme in 2024 with the objective of commissioning 1000 (one thousand) MW of offshore wind energy projects in India.

The Central government issued the Offshore Wind Energy Lease Rules, 2023 (**Lease Rules**) in December 2023 to regulate the leasing mechanism of offshore areas in order to develop the offshore wind energy projects. The Lease Rules provide a framework for granting lease of seabeds in domestic territorial waters and EEZ for constructing wind energy and transmission projects. The leased areas for offshore wind energy projects will be valid for an initial period of 3 (three) years which can be further extended for a period of 2 (two) years. For the construction and operation of projects, the lease period can be extended for 35 (thirty five) years.

The Central government has waived off ISTS charges applicable to offshore wind projects commissioned on or before December 31, 2032.

(iv) Regulatory Framework for Electrical Vehicles

India's transition to electric mobility is guided by three main imperatives - energy security, curbing local air pollution and curtailing GHG emissions from the transport sector. Unlike conventional internal combustion engines, EVs operate, either partially or fully, on an electric motor.

- (a) *Draft Battery Swapping Policy*: The Niti Aayog released the Draft Battery Swapping Policy for electric two-wheelers in India in 2022. This is yet to be notified.
- (b) *e-Amrit*: Niti Ayog, at the COP-26 Summit in Glasgow, launched e-Amrit, a web portal on EVs. It is a one-stop site for all the relevant information regarding EVs such as subsidies, policies, incentives and business requirements.
- (c) *E-Vehicle Policy, 2024*: The GoI approved the E-Vehicle Policy in March 2024 in order to promote India as a manufacturing destination for EVs. Various States in India have also rolled out their respective E-Vehicle policies.
- (d) *Automotive Mission Plan 2026 and 2047*: The Automotive Mission Plan 2026 is a vision document of the GoI which sets out the path of development of the automotive ecosystem of India. The Ministry of Heavy Industries is currently working with Society of Indian Automobile Manufacturers and Automotive Components Manufacturers Association on developing the Automotive Mission Plan 2047 with an aim of meeting 30% (thirty percent) of target of exporting auto and auto components by 2030 and realizing up to 50% (fifty percent) by 2047.
- (e) *Production Linked Incentive Scheme for Automobile and Auto components*: The Production Linked Incentive Scheme for Automobile and Auto components and its guidelines were notified on September 23, 2021, and will be operational for a period of 5 (five) years until 2027. It is aimed at enhancing the manufacturing of advanced automotive technology products as well as facilitating the

creation of domestic and global supply chain.

- (f) *Scheme of Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME)*: Under the National Electric Mobility Mission Plan, 2020 (which was unveiled in 2013), the Phase-I of the FAME scheme was launched in 2015 for an initial period of 2 (two) years starting from April 01, 2015, and has been extended from time-to-time. It was aimed at supporting progressive induction of reliable, affordable and efficient electric and hybrid vehicles. The FAME-I was subsequently extended up to March 31, 2019.

Upon its culmination, the GoI approved the Phase-II of FAME scheme for a period of 3 (three) years commencing from April 01, 2019. It is targeted at providing reasonable and environment-friendly public transportation and will be applicable to vehicles used for public transportation or those vehicles which are registered for commercial use in the e-3W, e-4W and e-bus segments. The incentives and subsidies available under the scheme were extended until March 31, 2024.

- (g) *PM Electric Drive Revolution in Innovative Vehicle Enhancement (PM E-DRIVE) Scheme*: The Ministry of Heavy Industries notified the PM E-DRIVE Scheme on September 29, 2024, for faster adoption of EVs, setting up of charging infrastructure, and the development of the EV manufacturing eco-system in the country. It will remain in effect from October 01, 2024, till March 31, 2026. The scheme will be implemented through incentives in the form of subsidies and capital grants. It subsumes the expenditure under the

Electric Mobility Promotion Scheme, 2024.

- (h) *Guidelines for Installation and Operation of Electric Vehicle Charging Infrastructure 2024 (Guidelines for EV Infrastructure)*: The MoP had previously issued the Draft Revised Guidelines on Electric Vehicle Charging Infrastructure for EVs, 2024 for public comments, pursuant to which the Guidelines for EV Infrastructure were notified by the MoP on September 17, 2024. The Guidelines for EV Infrastructure were revised with an aim of providing sufficient number of EV charging stations and to deal with the challenges which are being met by the EV charging industry/stakeholders. It is also focused on improving business feasibility of the EV charging stations.

Key issues for adoption of EVs

- (i) A major hurdle for transitioning to EVs in India is the overall cost because EVs are likely to incur a higher upfront cost than traditional internal combustion engine vehicles.
- (ii) The cost of batteries used in EV accounts for a major part of the overall cost of the EV. Since the batteries are significantly expensive, it constitutes a significant expense which increases the initial cost of electric vehicles, thereby making them a less attractive option for many consumers.
- (v) *Nuclear energy in India*

The Electricity Act does not apply to nuclear energy, and nuclear power generation is governed by the Atomic Energy Act, 1962

(**Atomic Energy Act**), and the rules framed thereunder. The Atomic Energy Act regulates the development, control and use of atomic energy to ensure welfare of the citizens of India and provides the regulatory framework for activities related to atomic energy programme and use of ionising radiation in India. It provides that a license from the Central government is mandatorily required for control and use of atomic energy. The Atomic Energy (Amendment) Act, 2015 introduced that a license for acquisition, production, possession, use, disposal, export or import of any plant designed or adapted or manufactured for the production, development and use of atomic energy can only be obtained by the Central government or a government company.

Presently, the Nuclear Power Corporation of India (**NPCIL**) established under the Department of Atomic Energy (**DAE**) serves as the public sector undertaking (**PSU**) responsible for the design, construction, commissioning, and operation of nuclear power reactors. While the Atomic Energy Act presently restrict private participation, there are discussions about potential reforms in this sector, including allowing private sector involvement in the nuclear energy sector through public private partnership (**PPP**) mode. The Atomic Energy Act was amended in 2015 to allow NPCIL to form joint ventures with government companies⁴⁹.

The Central Government set up the Atomic Energy Regulatory Board as the regulatory authority responsible for grant, renewal, withdrawal and revocation of consents for nuclear and radiation facilities, pursuant to the Atomic Energy Act. The Atomic Energy Act provides for control over radioactive substances and also provides for special provisions related to safety.

The Supreme Court has upheld the provisions of the Atomic Energy Act which prohibit private companies from obtaining licences for nuclear energy. The Supreme Court observed that the provisions serve a “*salutary public purpose*” by ensuring that nuclear energy is used only for peaceful purposes under strict government control.

As of January 2025, India has an installed nuclear capacity of 8180 (eight thousand one hundred and eighty) MW, from 24 (twenty four) nuclear reactors.

The inclusion of private sector participants in the nuclear sector has been initiated, to a certain extent, by NPCIL for the development of Bharat Small Reactors (**BSRs**). NPCIL has issued a Request for Proposal dated December 31, 2024, inviting industries to set up 220 MWe Pressurized Heavy Water Reactor BSRs, to meet their power requirements. Such BSRs would be captive generating plants, though rules and regulations governing the same have not yet been enacted. While the beneficial ownership of the BSR and the electricity generated will remain with the industry/entity establishing the BSR, the BSR will be developed under the supervision and control of the NPCIL, resulting in a form of PPP. Similarly, upon construction, it will be transferred to the NPCIL for operation.

The nuclear sector is also governed by the Civil Liability for Nuclear Damage Act, 2010 (**CLND Act**), which provides for a domestic liability framework for events of nuclear damage aligning with principles of strict and absolute civil liability.

The Central Government is undergoing discussions with various industry

⁴⁹“Government company” means a company in which (i) not less than fifty-one per cent. of the paid-up share capital is held by the Central Government; or (ii) the whole of the paid-up share capital is

held by one or more of the companies specified in sub-clause (i) and which, by its articles of association, empowers the Central Government to constitute and reconstitute its Board of Directors.

stakeholders to implement amendments to the Atomic Energy Act, CLND Act and the FDI Policy to open nuclear energy to the private sector, and make nuclear energy more attractive for foreign investment.

(vi) *Geothermal Energy in India*

Geothermal energy refers to energy generated through harnessing heat stored in the Earth's crust, primarily through sources such as geysers, hot springs, hot rocks, and shallow ground layers. Geothermal energy, though challenging to access and an untapped source of renewable energy, offers advantages such as round-the-clock electricity generation, reliable baseload supply, enhanced grid stability, and lower life-cycle greenhouse gas emissions⁵⁰. It serves as a site-specific renewable source suitable to cater to the power needs of remote areas.

On September 15, 2025, the MNRE issued the National Policy on Geothermal Energy ("**Geothermal Policy**"), in order to enable the exploration and development of geothermal energy sources in India. It aims to improve research capabilities on geothermal energy development and deployment, exploration, and use-cases, incorporate global best practices in the exploration, assessment, and deployment of geothermal energy, to deploy geothermal heating and cooling solutions, and to build a public-private ecosystem for the long-term development of the geothermal sector.

⁵⁰MNRE: National Policy on Geothermal Energy, issued on September 15, 2025. Accessible at:

<https://cdnbbsr.s3waas.gov.in/s3716e1b8c6cd17b771da77391355749f3/uploads/2025/09/202509152136711668.pdf>

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