
CHAMBERS GLOBAL PRACTICE GUIDES

Power Generation, Transmission & Distribution 2024

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India: Law and Practice & Trends and Developments

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INDIA

Law and Practice

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Trilegal is one of India's top-tier, full-service law firms, with offices in four of India's major cities – Mumbai, New Delhi, Gurgaon and Bangalore, with over 950 lawyers and 126 partners. Trilegal has represented domestic and foreign clients on a large number of complex and high-value transactions, in India as well as globally, leading to our key practices winning top industry awards and accolades. Trilegal has a market-leading energy and infrastructure practice, which advises all types of market participants, including

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1. Structure and Ownership of the Power Industry

1.1 Law Governing the Structure and Ownership of the Power Industry

Principle Laws Governing the Power Sector

India has a quasi-federal constitutional structure where legislative powers are delineated between the centre and the states. Electricity is a concurrent subject under the Constitution of India, and therefore, both the centre and states can legislate on this matter. While central government authorities under the Government of India (GoI) exercise jurisdiction over inter-state electricity matters, states are responsible for intra-state sale, purchase, supply, and distribution of electricity.

The Electricity Act, 2003 (the “Act”) is the primary central legislation that governs various aspects of generation, transmission, trading, supply, and distribution of electricity.

The Act is supplemented by: (i) the Electricity Rules, 2005 (the “Rules”), which provide a regulatory framework for the Act’s effective implementation; (ii) the national electricity policy, 2005, which lays down guidelines for the power sector’s accelerated development, providing electricity to all areas, and protecting consumer interests; and (iii) the tariff policy, 2016, which lays down guidelines to attract investments into the electricity sector and ensure reasonable consumer charges.

In addition to the central laws, various regulations enacted by the relevant State Electricity Regulatory Commission (SERC) and policies issued by the state governments are applicable in the states. Therefore, the legal and regulatory regime governing the power sector varies from state to state.

Unbundling of the Electricity Sector

With the introduction of the Act, the previous electricity laws were repealed, and the legal framework for the unbundling and privatisation of the Indian electricity sector was consolidated. To achieve the unbundling of the electricity sector, the various state electricity boards that were earlier responsible for electricity generation, transmission, and distribution were restructured into separate entities dealing specifically with generation, transmission, and distribution.

The Act deregulated power generation, and consequently, power producers do not require a licence to generate electricity. Transmission, distribution, and trading of electricity are regulated activities, and any entity undertaking these activities requires a license.

System of Ownership

The Act permits both public and private sector entities to participate in generation, transmission, distribution and trading of electricity, the trends for which are as follows:

- Generation of electricity has seen a high participation from the private sector, which owns approximately 50% of the market share.
- Transmission is predominately controlled by central and state-owned entities due to the high investment required for building the transmission infrastructure. That said, private players such as Tata Power Company Limited and Sterlite Power Transmission Limited are also undertaking transmission activities in India.
- Distribution of power to end users is predominately controlled by state-owned electricity distribution companies (Discoms) that own the majority of the distribution infrastructure. That said, in some states such as Maharash-

tra and Delhi, distribution is also undertaken by private distribution licensees.

- Power trading is typically undertaken by licensed “intermediary procurers” such as the Solar Energy Corporation of India (SECI), NTPC Limited, Tata Power Trading Company Limited, etc, which purchase power directly from power generating companies by executing a power purchase agreement (PPA), and thereafter trade/sell power to distribution licensees under a power sale agreement, for further supply to consumers. Trading of power may also take place on the power exchanges by “members” admitted on the power exchange (without requiring a trading license) under the rules of the relevant exchange. There are three power exchanges in India, namely Power Exchange of India Limited, Indian Energy Exchange Limited, and Hindustan Power Exchange Ltd., each of which has been approved by the Central Electricity Regulatory Commission (CERC).

1.2 Principal State-Owned or Investor-Owned Entities

Generation

Principal state-owned entities that own and operate generating plants in India include:

- NTPC Limited;
- National Hydroelectric Power Corporation;
- North Eastern Electric Power Corporation;
- THDC India Limited;
- Rajasthan Rajya Vidyut Utpadan Nigam Limited;
- Haryana Power Generation Corporation Limited; and
- Uttar Pradesh Rajya Vidyut Utpadan Nigam Limited.

Some major private entities that own generating plants include:

- Adani Power Limited and Adani Green Energy Limited;
- Tata Power Company Limited;
- Reliance Power Limited;
- ReNew Power;
- JSW Energy Limited; and
- Hero Future Energies.

Transmission

The Power Grid Corporation of India Limited is the largest power transmission utility in India, with over 1,77,790 circuit kilometres of transmission lines. The state transmission utilities (STUs) (such as Gujarat Energy Transmission Corporation Limited, Maharashtra State Electricity Transmission Company, etc) also own and operate a major share of the intra-state transmission facilities.

While the majority market share is with the state-owned entities, Adani Energy Solutions Limited, Tata Power Company Limited, Powerlinks Transmission Limited, and Sterlite Power Transmission Limited are some principal private entities that own and operate transmission facilities.

Distribution

Distribution is undertaken by the Discoms, which control the majority market share. That said, Torrent Power Limited in the state of Gujarat, Tata Power Company Limited in the state of Maharashtra, and BSES Yamuna Power Limited and BSES Rajdhani Power Limited in the state of Delhi are some of the principal private entities undertaking distribution in India.

1.3 Foreign Investment Review Process

Foreign direct investment (FDI) by a person resident outside India (PROI) is primarily governed by the Foreign Exchange Management Act, 1999 (FEMA), the Reserve Bank of India’s (RBI) rules and regulations and the FDI policy (the “FDI Reg-

ulations”). Under the FDI Regulations, a PROI’s equity investment in an Indian entity is permitted only through investment in equity shares, share warrants, or other instruments which are fully, compulsorily, and mandatorily convertible into equity shares.

FDI is permitted under the “automatic route” (ie, the investment does not require the prior approval of the RBI or the GoI) or the “government route” (ie, the investment requires prior government approval in certain specified sectors). 100% FDI in Indian entities engaged in the generation, transmission, distribution or trading of electricity (other than atomic energy) is permitted under the automatic route. However, if the investing entity is from a country that shares a land border with India, or if the beneficial owner of the investment resides in, or is a citizen of, such a country, the investment is only permitted under the government route.

Further, any investment or repatriation of investments by a PROI in an Indian entity is subject to RBI’s pricing guidelines. A PROI is only permitted to purchase or subscribe to equity instruments in an Indian company at a price not less than the valuation of the equity instrument on an arm’s length basis per any internationally accepted pricing methodology.

India recognises international commercial arbitration and the parties’ right to submit to a foreign institution for arbitration. A foreign award is enforceable in India if the party receives a binding arbitral award from a country which is a signatory to the Convention on the Recognition and Enforcement of Foreign Arbitral Awards, 1958, and/or the Geneva Convention on the Execution of Foreign Arbitral Awards, 1927, and the award is made in a territory notified as a convention country by India.

In India, bidding guidelines are also issued under the Act to ensure transparency, competitiveness and fairness in power procurement by state-owned utilities (such as Discoms and intermediary procurers like SECI, etc) and to ensure PPAs signed with such entities – ie, “utility PPAs” are standardised to include protections and relief for events such as force majeure, change in law, grid unavailability, and off-take constraints, etc.

The previous bidding guidelines for the procurement of power from solar projects (which have now been superseded by the Bidding Guidelines, as discussed in **1.6 Recent Changes in Law or Regulation**) specifically included the expropriation of project assets, or the compulsory acquisition of projects assets by the GoI, as a “non-natural force majeure event”, for which solar generators were entitled to termination compensation. However, the force majeure provisions under the revised solar Bidding Guidelines are open-ended as the solar Bidding Guidelines only require the force majeure provisions to be as per “industry standards” and do not specifically categorise expropriation or compulsory acquisition as force majeure events.

Utility PPAs typically also prescribe a split dispute resolution procedure to be followed after a failure to resolve disputes amicably, under which parties approach the SERC or CERC (each, an ERC, as relevant) for disputes in relation to the tariff or any other matter agreed to be referred to the relevant commission, which can then be further appealed before the Appellate Tribunal for Electricity (APTEL). Where the parties are required to approach the CERC, all other disputes are resolved by the Dispute Resolution Committee set up by the GoI, failing which disputes are resolved through domestic arbitration under the Arbitration and Conciliation Act, 1996. Where the parties are required to approach the

SERC in the first instance, the SERC adjudicates all disputes, and may refer the disputes for arbitration. PPAs signed by generating companies directly with C&I customers also typically provide for dispute resolution through domestic (and, in some cases, even foreign-seated) arbitration.

1.4 Law Governing the Sale of Power Industry Assets

There is no standalone legislation in India to govern mergers and acquisitions, which are governed by the Companies Act 2013, the FEMA, and any sector specific requirements.

The Act prescribes certain restrictions on sale, amalgamation or merger of transmission licensees, distribution licensees, and electricity traders – no similar restrictions apply to generation or storage. Without the ERC's prior approval, a licensee is not permitted to undertake:

- an acquisition of a utility (ie, electric lines and/or electrical plants including all lands, buildings, works and materials) of any other licensee;
- a transfer (by way of sale, lease or exchange) of its own utility; and
- a merger of its own utility with another licensee's utility.

Further, restrictions on sale or transfer of power assets are also set out in:

- the project documents (such as PPAs) – renewable energy (RE) utility PPAs typically contain shareholding restrictions that require the selected bidder to maintain a minimum quantum of shareholding in the project developer for a specified time; and
- certain permits obtained for a project, such as the grant of connectivity issued pursuant to the CERC (Connectivity and General Net-

work Access to the Inter-State Transmission System (ISTS)) Regulations, 2022 (the "GNA Regulations") for an RE-generating station can only be transferred after commissioning.

1.5 Central Planning Authorities

The Act established various independent regulatory agencies for regulation of the electricity sector, including:

- the ERCs for regulating and determining tariff for transmission, wheeling and retail sale of electricity, regulating the Discoms' power procurement, and adjudicating disputes;
- APTEL as an appellate tribunal for disputes;
- CEA, which sets the technical standards, grid standards, and safety requirements for the electricity industry and functions as the Gol's advisory body;
- the Central Transmission Utility of India Limited (CTU) and STUs, which are responsible for the national grid's day-to-day operations; and
- the state, regional, and national load dispatch centres to ensure optimum electricity scheduling and dispatch.

The CEA is also required to prepare a National Electricity Plan, where it sets developmental goals for the electricity sector on a five-year basis, including a short-term and long-term demand forecast for different regions and suggested areas/locations for generation and transmission capacity addition.

1.6 Recent Changes in Law or Regulation

Bidding Guidelines

Under Section 63 of the Act, the Gol is required to issue guidelines for power procurement by Discoms or intermediary procurers at tariffs discovered through a competitive bidding

process. In 2023, the Ministry of Power (MoP) issued guidelines for tariff-based competitive bidding processes for power procurement from grid-connected wind power projects, solar PV power projects, wind-solar hybrid projects, and RE projects with Energy Storage Systems (ESS), collectively referred to as “Bidding Guidelines”. These latest Bidding Guidelines have superseded previous iterations, and now also cover RE projects with ESS. The Bidding Guidelines aim to improve the bankability, through provisions pertaining to: (i) adequate payment security to the generators, failing which, the generators have the right to restrict energy supply; (ii) payment of generation compensation on account of reduced offtake/offtake constraints due to grid unavailability, temporary transmission availability, back-down instructions etc; and (iii) payment of termination compensation to the generators in case of termination due to the power procurer’s default.

The Bidding Guidelines for RE Projects with ESS (the “ESS Guidelines”) were issued with the objective of providing the Discoms with round-the-clock, demand-based, firm and dispatchable RE. The ESS Guidelines are applicable to the long-term power procurement from RE projects with ESS, which offer a minimum quantum of 50MW of power, and envisage standardising key project documents. While these standardised documents are yet to be issued, procurers are required to comply with the principles provided in the ESS Guidelines until these are notified.

General Network Access (GNA)

For projects where power is sold to entities located in a different state, projects are required to be physically interconnected with the ISTS. The grant of connectivity and non-discriminatory open access (OA – ie, the right of a generator to connect to and inject power into the grid oper-

ated by a transmission/distribution utility) to the ISTS is now governed by the GNA Regulations, which have replaced the previous CERC regulations and simplified the process of obtaining connectivity.

The GNA Regulations were amended in 2023 to, inter alia, introduce the concept of “GNA-renewable energy” (GNA-RE) – ie, OA to the ISTS for drawing power exclusively from renewable sources. While the Green Energy Open Access rules (discussed below) contemplate procuring RE through OA; this is facilitated through the amendment to the GNA Regulations, which will allow GNA-RE grantees to procure only RE. This is particularly useful in the context of green hydrogen/green ammonia production, which requires only RE to be used as feedstock.

Green Energy Open Access

The Electricity (Promoting Renewable Energy through Green Energy Open Access) Rules were notified in 2022, and amended twice in 2023, to provide a simplified process for procuring RE through OA. These rules extend to all mechanisms that utilise green energy to replace fossil fuels, and, among others:

- require Discoms to provide exclusively RE to OA users (which benefits entities that need to exclusively procure RE for green hydrogen/ammonia production);
- permit the banking of energy, on at least a monthly basis; and
- require the Grid Controller of India Limited to operate a single window green energy OA system and approve the applications seeking green energy OA within 15 days.

Further, the minimum contracted demand or sanctioned load limit for OA has also been reduced from 1 MW to 100 kW for green energy

(with no minimum limit for captive consumers), to encourage smaller consumers to procure RE through OA.

In the context of implementation, the rules provide that, where necessary, SERCs may amend their respective OA and banking regulations for consistency with the Rules. Some states (such as Odisha, Andhra Pradesh, Karnataka, and Gujarat) have already implemented the rules, while other states are in the process of amending their respective OA and banking regulations.

Waiver of Transmission Losses and Charges

ISTS users are required to pay transmission charges, in accordance with the CERC (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2020. In this regard, the first amendment to these regulations, effective from 1 October 2023, provides that for wind and solar projects:

- transmission losses will be waived for projects awarded through competitive bidding for a period of 25 years from the commercial operation date (COD), where: (i) COD is achieved by 30 June 2023, or the date of operation of first amendment (ie, 1 October 2023), whichever is earlier; and (ii) PPAs have been executed for sale of such generation capacity to all entities, including the Discoms, for compliance of their renewable purchase obligations (RPOs); and
- transmission charges will be waived for a period of 25 years from the COD, where electricity is scheduled under GNA and the RE-generating station achieves COD by 30 June 2025.

For COD between 30 June 2025 and 1 July 2028, only a percentage of the transmission charges (ranging from 25% to 75%) will be payable, and

after 1 July 2028, 100% of the transmission charges will be payable.

Captive Requirements

A Captive Generating Plant (CGP) is a plant set up to generate electricity primarily for own use, and includes a plant set up by any co-operative society or association of persons (AoP). Under rule 3 of the Rules, a plant qualifies as a CGP only if captive user(s): (i) hold at least 26% of the ownership; and (ii) consume at least 51% of the aggregate electricity generated for captive use annually. If the plant is set up by an AoP, the captive user(s) are required to consume electricity in proportion to their ownership in the plant ($\pm 10\%$) (the “Proportionality Rule”).

Captive power is exempt from the cross-subsidy surcharge (CSS) and additional surcharge, which are compensatory charges paid to Discoms by a consumer falling within the Discoms’ area for not procuring power from the Discom. Levy of such charges can significantly increase the power procurement cost.

Owing to conflicting interpretations, in October 2023, the SC settled the interpretation of rule 3 and held that:

- minimum shareholding requirements (26%) and minimum consumption requirements (51%) are to be maintained continuously throughout the financial year (on a weighted average basis); and
- special purpose vehicles (SPVs) which own CGPs are AoPs and must comply with the Proportionality Rule.

The SC introduced a Unitary Qualifying Ratio, as a minimum consumption test to determine if captive generation conditions are met, which provides that for every 1% shareholding held

by the user, the user should have a minimum consumption of 1.96% ($\pm 10\%$) of the electricity generated.

1.7 Announcements Regarding New Policies

Electrolyser Manufacturing

The MNRE issued scheme guidelines for implementation of an Incentive Scheme for Electrolyser Manufacturing in June 2023 (Tranche-I) and March 2024 (Tranche-II) under the National Green Hydrogen Mission, for FY 2025-26 to FY 2029-30, with a total outlay of ~USD532 million to promote domestic manufacturing of electrolyzers and production of green hydrogen. Bidders are required to fulfil specified “Local Value Addition” (ie, the local value component of the electrolyser as a percentage of the sale value) parameters to avail the incentives.

ESS

In August 2023, the MoP issued the National Framework for Promoting ESS (the “ESS Framework”) to support ESS development, achieve 24x7 dispatchable RE, and promote energy independence by deploying ESS in remote communities.

Pursuant to the ESS Framework, the MoP introduced a Viability Gap Funding (VGF) scheme to support development of 4000 MWh of battery ESS capacity.

Pump Storage Projects (PSPs)

In April 2023, the MoP issued Guidelines to Promote Development of PSPs to enhance India’s energy storage capacity by measures such as no upfront premium on project allocation, relaxation of construction timelines where delay is due to pending environmental clearances, and potential tax reliefs.

Carbon Credits

In June 2023, the MoP notified the domestic carbon credit trading scheme (CCTS) to develop the Indian carbon market by 2026. The CCTS recognises the GoI or its authorised agency’s ability to issue carbon credit certificates to entities registered under the CCTS, which comply with the standards to be issued by the Bureau of Energy Efficiency as the administrator.

Time of Day (ToD) Tariff

MoP has amended the Electricity (Rights of Consumers) Rules, 2020, to provide that the ToD tariff shall be effective no later than: (i) 1 April 2024 for C&I consumers having maximum demand of more than 10 kW; and (ii) 1 April 2025 for other consumers (except agricultural consumers), in each case after installation of smart meters. The ToD tariffs are separate for peak hours, solar hours, and normal hours, and are determined by SERC.

Offshore Wind Energy Lease Rules

In December 2023, the Offshore Wind (OSW) Energy Lease Rules, 2023, (the “OSW Rules”) were issued to regulate seabed leasing for OSW projects to private entities. Under the OSW Rules, GoI is entitled to lease offshore areas (within 200 nautical miles from India’s coast) for development of OSW projects.

In June 2024, the Union Cabinet approved a VGF scheme for the installation and commissioning of 1 GW of OSW projects and the upgrading of ports off the coast of Gujarat and Tamil Nadu.

Renewable Generation Obligation

The MoP issued a notification on 27 February 2023 requiring new coal or lignite-based thermal plants, commissioned on or after 1 April 2023, to establish RE-generating capacity of a minimum of 40% of the capacity of the coal or lignite-

based thermal plant, or to procure and supply RE equivalent to such capacity. Such plants were required to comply with these obligations by: (i) 1 April 2025, if the plant COD is between 1 April 2023 and 31 March 2025; or (ii) the COD, if the plant COD is after 1 April 2025.

1.8 Unique Aspects of the Power Industry

One Nation One Grid

Initially, India's grid was demarcated into five regions, namely Northern, Eastern, Western, North-Eastern, and Southern. By August 2006, the Northern, Eastern, Western and North-Eastern grids were connected, forming a central grid operating at one frequency, and in December 2013, the Southern Region was also connected to this central grid, forming the National Grid – one of the largest operating synchronised grids in the world at that time.

Renewable Purchase Obligation

Under the Act, the SERCs are required to specify a percentage of the total electricity consumed in an area that is to be purchased from RE sources – ie, specifying RPOs. For this purpose, the SERCs have issued regulations prescribing RPO targets, and the MoP prescribes the long-term growth trajectory of RPOs. The MoP has categorised RPO targets into a percentage of electricity that is to be purchased from wind energy, hydro-power, and other renewable sources, and from 1 April 2024, a new “distributed RE” category has been introduced, which stipulates RPO targets from less than 10 MW RE projects.

2. Market Structure, Supply and Pricing

2.1 The Wholesale Electricity Market

India has a wholesale electricity market in the form of power exchanges, and power generators and traders are permitted to sell power on the power exchanges in accordance with the CERC (Power Market) Regulations, 2021. RE can be purchased on the power exchanges through the Green Day Ahead Market (GDAM) or the Green Term Ahead Market (GTAM). The GDAM is the RE trading market for delivery on the following day and the GTAM allows participants to transact for delivery of RE for durations of up to one week. We understand that the average RE price in the wholesale market in recent years has been higher than tariffs that have been discovered through competitively bid out projects.

In addition to the wholesale market, generators may sell power to:

- the Discoms, or intermediary procurers on a tariff discovered through the competitive bidding process and adopted by the ERC;
- third-party consumers (captive or non-captive) on mutually agreed tariffs; if power is supplied to captive users, then the CGP will need to comply with the requirements discussed in **1.6 Recent Changes in Law or Regulation**; and
- traders on mutually agreed tariffs and thereafter, the trader may resell such power directly to a third party, or on a power exchange. If the trader resells such power to a Discom, then the tariff of sale to the trader would be regulated by the ERC.

2.2 Electricity Imports and Exports

Cross-border trade of electricity between India and neighbouring countries is permitted through

mutual agreement under the CERC (Cross Border Trade of Electricity) Regulations, 2019, and the guidelines issued by the MoP in December 2018 (together, the “Trade Regulations”). The Trade Regulations permit electricity trade under an overall framework agreement signed between India and the neighbouring country. Export or import of electricity is subject to the CEA’s prior approval. Any Indian trader, after obtaining approval, can trade in Indian power exchanges on behalf of any entity from the neighbouring country.

The tariff for:

- import of electricity is determined through competitive bidding per the tariff policy of India or mutual agreement, provided that, for hydro projects, the CERC may determine the tariff if requested by the generator through the neighbouring country’s government and agreed by the Indian entities; and
- export of electricity is determined through agreements based on competitive bidding, subject to payment of charges for transmission and wheeling of electricity through the Indian grid, provided that, both for import and export of electricity, any tariff determined through mutual agreement between governments is final.

Up to 2022-2023, CEA has noted that India is a net exporter of electricity to Nepal, Bangladesh, and Myanmar, and a net importer of electricity from Bhutan. India and these neighbouring countries are interconnected at various places, such as: (i) a Dhalkebar (Nepal) – Muzaffarpur (India) 400kV D/C transmission line; (ii) Baharampur (India) – Bheramara (Bangladesh) 400kV D/C transmission line; and (iii) various 400kV, 220kV and 132kV lines, mainly for import of about 2 GW from Tala HEP (~1GW), Chukha HEP (336MW),

Kurichu HEP (60MW), and Mangdechhu HEP (720 MW) in Bhutan to India.

2.3 Supply Mix of Electricity

As of 30 April 2024, the total installed capacity of power stations in India is ~443 GW, comprising: (i) ~243 GW of thermal power plants (comprising coal, lignite, gas, and diesel based plants); (ii) ~8 GW of nuclear power plants; (iii) ~47 GW of large hydro power plants; and (iv) ~145 GW of RE source-based power plants (comprising small hydro, wind, solar, and bio fuel based power). Despite the significant increase in RE capacity, India has a large dependency on non-RE sources and more than 50% of the total installed capacity is from thermal power plants.

2.4 Law Governing Market Concentration Limits

There are no concentration limits regarding the percentage of electricity supply that is controlled by any one entity in the market. While there are no such limits, the principal laws that promote competition in this sector are: (i) Section 60 of the Act, which empowers the ERC to issue directions if it considers that any licensee or generating company has entered into any agreement or combination, or abused its domination position in a manner that is likely to adversely affect competition; and (ii) the (Indian) Competition Act, 2002 (the “Competition Act”).

2.5 Surveillance to Detect Anti-competitive Behaviour

The Competition Act is the primary legislation governing anti-competitive behaviour in India and aims to prohibit anti-competitive agreements and abuse of dominant position. The Competition Commission of India (CCI) is the independent agency that adjudicates on Competition Act violations, and it can either on its own, or on receipt of information, make an enquiry, and if

there is a prima facie case, refer it for a detailed investigation. CCI has the power to order:

- dominant enterprises to be divided or a combination to be discontinued;
- any anti-competitive agreements or abuse of dominant position to be discontinued; and
- imposition of penalties and fines depending on the violation.

There is an overlap between the Competition Act and Section 60 of the Act, as well as the powers accorded to CCI and the ERCs. In a 2018 order pertaining to alleged bid-rigging between bid participants, on the question of CCI's jurisdiction, CCI harmoniously constructed the provisions of the Competition Act and the Act while deciding that the CCI had the jurisdiction to adjudicate the matter.

3. Generation Facilities

3.1 The Construction and Operation of Generation Facilities

The principal law that governs the construction and operation of generation facilities is the Act and the Rules set thereunder. While generation is a de-licensed activity and the generator does not require a licence under the Act, power plants must obtain several other permits and consents, and comply with various central and state-specific regulatory requirements depending on the category of power plants as discussed in **3.2 Obtaining Approvals to Construct and Operate Generation Facilities** and **3.3 Approvals to Construct and Operate Generation Facilities**.

Nuclear power plants must also comply with: (i) the Atomic Energy Act, 1962, and the guidelines issued thereunder; and (ii) the Radiation Protection Rules, 1962.

In addition to the above, power projects are required to comply with environmental standards prescribed under Indian environmental laws, including the Environment (Protection) Act, 1986, and the laws regulating air pollution, water pollution, hazardous waste disposal and fly ash disposal.

3.2 Obtaining Approvals to Construct and Operate Generation Facilities

The regulatory framework for obtaining approvals is split at the central and state levels, and there is no one single window/agency available to developers. There is also variance across states in relation to the timelines and procedures for procurement of approvals. That said, several state governments like Gujarat, Madhya Pradesh, and Andhra Pradesh have made efforts to establish a single application window for obtaining permits for RE projects.

Project developers must ensure that the land being selected for the project can be legally used for the relevant purpose, and that all regulations regarding land use/land conversion are complied with; for instance, if land acquired for a power project is categorised as forest land, then a separate approval from the Ministry of Environment, Forest and Climate Change (MoEFCC) for diversion of the forest land for non-forest purposes is required.

Thermal power plants, nuclear power plants, and hydroelectric power plants with a capacity of more than 25 MW, must comply with a higher standard of: (i) environmental norms under Indian law; and (ii) emission standards issued by the MoEFCC. The following key environmental approvals must be obtained for such projects:

- an environmental clearance (EC) from the MoEFCC, obtained prior to construction,

following an environmental and social impact assessment;

- a consent to establish (CTE) from the State Pollution Control Board (SPCB) prior to construction;
- a consent to operate (CTO) from the SPCB prior to operation; and
- an approval for disposal of hazardous waste.

On the other hand, RE plants such as solar, wind, and mini hydroelectric plants (with capacity less than 25 MW) are “white category” projects and do not require any environmental and social impact assessment, EC, CTE, CTO, or approval for disposal of hazardous waste; instead, only a notification to the SPCB is required.

Other key approvals that could be required for power plants (irrespective of their category) established in India include:

- Pre-construction approvals:
 - (a) for utility projects, the tariff discovered from competitive bidding needs to be adopted by the ERC and the Discoms need to obtain approval for procurement of power;
 - (b) a connectivity approval/GNA to connect the plant to ISTS or the intra-state transmission system (InSTS);
 - (c) OA approval;
 - (d) approvals for laying overhead transmission lines;
 - (e) authorisation from the state government or CEA under Section 164 of the Act to enter, place, and maintain transmission towers and lines on land owned by third parties without executing specific agreements; as an alternative, developers can also enter into right of way (ROW) agreements with individual landowners (in practice, power producers obtain both, to

avoid disputes);

- (f) permission for non-agricultural use of agricultural land; and
- (g) approval from gram panchayat – ie, the village council, to set up a power project within its territorial limits.
- During construction:
 - (a) labour approvals, such as registration under the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, and payment of cess under the Building and Other Construction Workers Welfare Cess Act, 1996, where ten or more building workers are employed;
 - (b) fire safety NOC; and
 - (c) other approvals as required, such as approval for groundwater extraction, permission where a transmission line crosses a national highway, and approval for where overhead electrical lines or underground cables cross railway tracks, etc.
- Post construction:
 - (a) approval for energisation of the plant to ensure it meets the specifications under the Act;
 - (b) commissioning certificate issued by the Discom; and
 - (c) Chief Electrical Inspector’s periodical inspection of electrical installations.

Public participation is required for land acquisition for power projects in India. For instance, if an approval is obtained under Section 164 of the Act for using land owned by third parties for setting up transmission towers or lines, the developer is required to publish the transmission scheme in the official gazette and at least two local daily newspapers, and any interested party can make a representation within two months after the date of the publication. Public hearings are also conducted as part of the environmental

and social impact assessment and are a prerequisite for obtaining an EC (where required).

3.3 Approvals to Construct and Operate Generation Facilities

While terms of approvals for a generation facility vary depending on the type of generation facility, some typical terms imposed under approvals include:

- the EC requires compliance with various conditions in relation to the air quality, water use and conservation, waste management, emission control, wildlife, biodiversity, and forest conservation (as applicable) and submission of compliance reports;
- compliance with labour legislations and payment of welfare cess to protect the labourers employed for the construction of the project;
- all electrical installations above a prescribed voltage must comply with the safety regulations prescribed under the Act and the CEA's technical standards; and
- complying with the CERC (Indian Electricity Grid Code) Regulations, 2023 (the "Grid Code"), and the state grid code as relevant, and adhering to all grid safety requirements.

Typically, no specific process is provided under law to seek an amendment or relaxation of a term/condition of approval, and such exemptions may be sought on a case-by-case basis through applications.

3.4 Eminent Domain, Condemnation or Expropriation Rights

Land used to develop power projects in India falls into two broad categories: (i) privately owned land acquired through contractual arrangements such as sale/title deeds, partition deeds, and lease deeds; and (ii) government revenue land

which is owned by the state governments, allotted through lease or licence agreements.

In India, the right to property has been identified as a constitutional right, and Article 300A of the Constitution of India provides that no person shall be deprived of his/her property, except by the authority of law. Indian courts have held that for any valid acquisition of property by the GoI, there should be a procedure laid down under law and the GoI must comply with the procedure. In this respect, the GoI has the right to acquire private land for its own use or private companies', for a public purpose, on payment of appropriate compensation in accordance with the provisions of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (the "LARR Act"). Any acquisition of land must follow the process under the LARR Act.

3.5 Decommissioning a Generation Facility

There are no specific legal requirements for the decommissioning of a power plant and a generator is only required to notify the CEA of the decommissioning. Decommissioning of thermal and nuclear power plants must comply with all applicable environmental standards.

4. Transmission Lines & Associated Facilities

4.1 Regulation of Construction and Operation of Transmission Lines and Associated Facilities

Electricity transmission is a licensed activity, and can only be undertaken by an entity that has a transmission licence (TL). The CERC issues TLs where transmission activities are undertaken

across more than one state, and SERC issues TLs in the case of transmission within one state.

The mechanism for the granting of an inter-state TL is provided in the CERC (Procedure, Terms and Conditions for grant of Transmission License and other related matters) Regulations, 2024 (the “CERC TL Regulations”). Licensees must also comply with the CERC (Standards of Performance of Inter-State Transmission Licensees) Regulations, 2012, which contain the performance standards for licensees (such as minimum availability requirements and restoration time limits).

In relation to an intra-state TL, separate regulations have been issued by SERCs (such as the Gujarat Electricity Regulatory Commission (GERC) (Licensing of Transmission) Regulations, 2005, and the Maharashtra Electricity Regulatory Commission (MERC) (Transmission License Conditions) Regulations, 2004), which cover similar aspects as the CERC TL Regulations.

While no environmental review is required prior to the granting of a TL, licensees are required to obtain various other approvals, which may include environment-related approvals depending on the area of the proposed transmission lines.

4.2 Obtaining Approvals for the Construction and Operation of Transmission Lines and Associated Facilities

As discussed in 4.1 Regulation of Construction and Operation of Transmission Lines and Associated Facilities, TLs are granted by the ERCs. The procedure for the granting of a TL is provided in the CERC TL Regulations and similar state regulations (collectively, the “TL Regulations”). The TL Regulations contain the eligibility

requirements, which include showcasing technical and financial ability.

After obtaining a TL, a licensee must obtain various other approvals for undertaking the proposed transmission activities, which include approvals to lay transmission lines, route approvals for transmission lines, energisation approvals, and highway/railway crossing approvals. Certain environmental approvals may be required depending on the area of transmission, for instance:

- additional environmental scrutiny is required if the transmission infrastructure crosses the habitat of the Great Indian Bustard (Rajasthan, Gujarat, Maharashtra, Andhra Pradesh, Karnataka, and Madhya Pradesh), which is a critically endangered species;
- NOC for the felling of trees;
- the Standing Committee of the National Board for Wildlife’s approval for transmission lines passing through wildlife sanctuaries; and
- MoEFCC’s approval for using forest land.

The granting of a TL involves a high degree of public participation. The TL Regulations require applicants to publish notice of their application in at least two newspapers in circulation in the relevant state and on their website. The CTU or STU also sends recommendations. The ERC may approve or reject the application after considering the public’s and CTU/STU’s suggestions. Before granting the TL, the ERC will publish a notice of approval on its website and in two newspapers. The ERC, after considering any further comments received, may grant the TL. The ERC is also required to provide a hearing to the persons who have filed suggestions or objections prior to the granting of the TL.

4.3 Terms and Conditions Imposed on Approvals to Construct and Operate a Transmission Line and Associated Facilities

The key terms and conditions that are provided in TLs are:

- timeline for commissioning the transmission infrastructure;.
- payment of licence fee to the ERC in accordance with the timelines under the TL;
- licensees are responsible for obtaining all approvals from the relevant authorities and the necessary land parcels for construction, and operating and maintaining the transmission infrastructure;
- non-exclusive nature of the licensee (as described in **4.5 Monopoly Rights to Provide Transmission Services**); and
- restricting licensees from executing any contracts or otherwise engaging in the business of electricity trading, during the term of the transmission licence.

The ERC may amend the TL in public interest, by its own motion or on the licensee's application. Any amendments to a TL can be undertaken after publishing these for public comments.

Other approvals obtained for construction of the transmission infrastructure may also provide additional conditions; for instance, if any line is passing through forest land, then the approval may require the transmission licensee to undertake compulsory afforestation.

4.4 Eminent Domain, Condemnation and Expropriation Rights

Please refer to the response in **3.4 Eminent Domain, Condemnation or Expropriation Rights** on eminent domain, condemnation, or expropriation rights in India. As noted in **3.2 Obtaining**

Approvals to Construct and Operate Generation Facilities, for construction of transmission towers and lines on land owned by third parties, approval can be obtained under Section 164 of the Act or as an alternative, ROW agreements are entered into with the landowners.

4.5 Monopoly Rights to Provide Transmission Services

Transmission entities do not have monopoly rights to provide transmission services in India; however, due to the cost involved in development of transmission infrastructure, the CTU and the STUs own the majority of the transmission network. TLs typically provide that the rights granted to licensees are non-exclusive in nature, by either: (i) specifying such non-exclusivity; or (ii) requiring the licensee to provide non-discriminatory OA to its transmission system for use by any other licensee under the Act, an electricity trader, a generating company, or any other person, in accordance with the Act. This enables other entities to use the transmission system upon payment of transmission charges.

4.6 Transmission Charges and Terms of Service

Transmission Charges

Transmission charges may either be determined by the ERC (the CERC in the case of ISTS charges and the relevant SERC in the case of InSTS charges) or discovered through a competitive bidding process.

For the tariff determined by the ERC, the ERCs issue tariff regulations (such as the CERC (Terms and Conditions of Tariff) Regulations, 2024, the TNERC (Terms and Conditions for Determination of Tariff) Regulations, 2005, and the MERC (Multi Year Tariff) Regulations, 2019, etc), which provide the components and manner of determining transmission charges.

Where the development of transmission systems is competitively bid out, the transmission charges are determined through the competitive bidding process in accordance with the “Tariff Based Competitive Bidding Guidelines for Transmission Service” and “Guidelines for Encouraging Competition in Development of Transmission Projects”, where transmission projects are awarded based on the lowest quoted transmission charges. Transmission charges that have been discovered pursuant to a bid process must be adopted by the ERC under Section 63 of the Act.

Terms of Service

Transmission licensees are required to execute transmission service agreements (TSAs) with: (i) their long-term customers or the CTU, in case of inter-state transmission; and (ii) their long-term customers, in case of intra-state transmission, which provide the terms of the services to be provided by the licensee (in addition to the terms provided in the TL). Key provisions of such TSAs typically include:

- conditions subsequent to be fulfilled by the transmission service providers within a specified duration, such as obtaining a TL, obtaining an order from the ERC adopting the transmission charges under the TSA, and achieving financial closure;
- “change in control” restrictions, to ensure the selected bidder maintains a minimum shareholding in the SPV developing the transmission system during the construction phase, and for one year beyond COD;
- target availability of the transmission system to be maintained by the licensee, and a penalty for failure; and
- lender’s substitution rights, upon the licensee defaulting under the provisions of the TSA.

4.7 Open-Access and Non-discriminatory Transmission

CTU, STUs, and licensees must provide OA to the transmission systems on a non-discriminatory basis on the payment of:

- transmission charges, where the OA is being provided to other licensees or generating companies; and
- transmission charges, CSS, and additional surcharge, where the OA is being provided to any consumer.

The ERCs have issued specific regulations to regulate the granting of OA to the transmission systems. OA to the ISTS is regulated by the GNA Regulations, and OA to InSTS is regulated by state level regulations. These regulations provide the modalities for the granting of OA, and the timelines within which non-discriminatory OA is to be granted.

Upon obtaining connectivity/GNA to the ISTS or an OA approval (or execution of an OA agreement) to the InSTS, users are entitled to inject power into the relevant transmission system, in accordance with the terms of service. Users are also entitled to relinquish their connectivity/OA (typically on payment of compensation towards the stranded capacity).

5. Distribution

5.1 Law Governing the Construction and Operation of Electricity Distribution Facilities

The distribution of electricity is governed by the Act and the Rules. As distribution is a licensed activity, a distribution licence (DL) must be obtained from the SERC of the state in which the distribution activity is to be undertaken. For the

granting of DL, the SERCs issue state-specific regulations (the State DL Regulations, which set out the process for granting DL and terms of the DL). Approvals for laying overhead lines, granting OA, energisation approvals, etc, will also be required for setting up distribution facilities.

Through an amendment in 2022 to the Rules, ESS were recognised as a part of the larger power system. To promote the development of energy storage, the policy framework (described in **1.6 Recent Changes in Law or Regulation** and **1.7 Announcements Regarding New Policies**) has been introduced in India.

Separately, while specific central-level regulations are yet to be issued, some states, such as Uttar Pradesh and Assam, have issued state-level regulations to govern the implementation and operation of mini-grids and microgrids.

5.2 Regulatory Process for Obtaining Approvals for the Construction and Operation of Electricity Distribution Facilities

To procure a DL, the SERC DL Regulations typically require the applicant to submit an application to the SERC and pay the licensing fee. The SERC then scrutinises the application and, if eligible, grants the DL after complying with public participation requirements under the SERC DL Regulations.

The SERC DL Regulations typically require an applicant to publish a notice of its application in newspapers in circulation in the proposed area of supply. After such notice, any person can raise objections within a stipulated time, and these must be considered by SERC. SERC may also require a local inquiry and hearing to be conducted. The decision to grant the DL is usually also required to be published in newspapers.

The other approvals required for undertaking the proposed distribution activities are similar to the approvals required by transmission licensees (see **4.2 Obtaining Approvals for the Construction and Operation of Transmission Lines and Associated Facilities**).

5.3 Terms and Conditions Imposed in Approvals to Construct and Operate Electric Distribution Facilities

The following key terms and conditions are typically included in DLs:

- The DL sets out the authorised areas to distribute electricity.
- The licensee is required to pay the licence fee to the SERC and any non-payment/delay in payment attracts default interest, and could also lead to revocation of the license.
- The licensee must comply with the relevant regulations, grid code, and the orders or directions of the SERC, the relevant load despatch centre, the CEA and other statutory authorities.
- DLs impose restrictions on the licensee, such as no preferential treatment to any person in the provision of services, and restriction on transferring or relinquishing operational control of assets whose value is above a prescribed threshold.

A DL may be amended on a licensee's request or by the SERC in public interest after it has been published for public comments.

5.4 Eminent Domain, Condemnation or Expropriation Rights for the Construction and Operation of Electricity Distribution Facilities

Under the Act, a DL is allowed to carry out works such as opening and breaking up the soil, pavement, sewer, drain, tunnel of any street or rail-

way, and laying electric line for the distribution of electricity. If a DL seeks to acquire land to construct electric distribution facilities, such acquisition will be subject to the provisions of the LARR Act. Please refer to **3.4 Eminent Domain, Condemnation or Expropriation Rights** and **4.4 Eminent Domain, Condemnation and Expropriation Rights** for further details.

5.5 Monopoly Rights for Electricity Distribution Entities

Distribution licensees do not have monopoly rights to provide distribution services in their specific authorised area of distribution. The SERC is entitled to grant a DL to two or more persons within the same area. For the grant of DL to such parallel licensees, the applicants are required to comply with certain additional capital adequacy, creditworthiness, and conduct requirements. Where such requirements are complied with, the grant of the DL cannot be refused on the ground that there is another licensee in that area.

The SC has also clarified that a parallel DL can be sought, and granted, for any area, without any minimum criteria on the size of the area or the composition of the consumers in the area. However, in practice, typically one DL operates in a specific authorised area of distribution (though exceptions exist, such as in Gujarat, where the regulator approved two parallel DLs in the same area).

5.6 Electricity Distribution System Charges and Terms of Service

The SERC determines the charges applicable to the licensees undertaking distribution activities in the relevant state through tariff orders pursuant to the tariff regulations issued by the SERC. The tariff regulations are typically issued for a control period during which the tariff regulations

remain applicable. Under the tariff regulations, the licensee is required to submit: (i) a forecast for the “Aggregate Revenue Requirement or ARR” – ie, the annual revenue requirement comprising allowable expenses and return on capital, pertaining to the licensee for recovery through tariff for a control period; and (ii) a forecast of the expected revenue from its customer base in accordance with the estimated quantum of electricity to be supplied and the prevailing tariff on the date of the application. Based on the ARR and the expected revenue, the licensee proposes a tariff which would meet any gap in the ARR.

For distribution licensees, the tariff regulations typically categorise the activities undertaken as: (i) the “distribution wires” business – ie, the business of operating and maintaining a distribution system for the wheeling of electricity in the licensee’s authorised area of distribution; and (ii) the “retail supply” business – ie, the business of sale of electricity by a licensee to its consumers. Therefore, the licensee is required to file an application for determination of the wheeling charges for the distribution wires business and the tariff for the retail supply of electricity. The wheeling charges are based on the ARR determined for the distribution wires business and the tariff for retail supply is based on the ARR for the retail supply business. There are various components to each of these charges such as:

- wheeling charges include O&M expenses, non-tariff income, income from other businesses and depreciation; and
- tariff includes power generation or purchase cost, transmission charges, O&M expenses, return on equity capital, etc.

The licensee may file an appeal against the SERC’s order before APTEL.

Terms of Service

The Act provides the terms of service applicable to a licensee, which include the following key terms:

- maintaining an efficient and economical distribution system;
- establishing a grievance redressal forum;
- paying the licensing fee; and
- ensuring the SERC does not suspend the DL in public interest on the following grounds:
 - (a) persistent failure to maintain an uninterrupted supply of electricity to customers, conforming with the relevant quality standards;
 - (b) failure to efficiently discharge its functions and duties under the Act;
 - (c) persistent defaults in complying with the SERC's directions; or
 - (d) violation of the specific terms and conditions of the relevant DL.

Trends and Developments

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Trilegal is one of India's top-tier, full-service law firms, with offices in four of India's major cities – Mumbai, New Delhi, Gurgaon and Bangalore, with over 950 lawyers and 126 partners. Trilegal has represented domestic and foreign clients on a large number of complex and high-value transactions, in India as well as globally, leading to our key practices winning top industry awards and accolades. Trilegal has a market-leading energy and infrastructure practice, which advises all types of market participants, including

sponsors and project developers, governments, banks and financial institutions, contractors and engineering and other consultants on various aspects of developing, financing and investing in energy as well as infrastructure projects. Trilegal has developed one of the country's foremost practices in the area of renewable energy, with a cross-functional team of over 70 lawyers and nine partners, having advised on marquee deals in the sector for over a decade.

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Despite global instability and supply chain disruptions in 2023, India's economy performed remarkably well, with the GDP growing by 8.2% compared to the growth rate of 7% in the previous year, exceeding all projections. The energy and infrastructure sectors were one of the primary propellants for this impressive growth, with India positioning itself to be one of the most attractive markets in the world for energy transition-related investments.

With a sustained increase in renewable power generation, India is becoming a global powerhouse in the renewable energy sector and leading the way for the clean energy transition. This increase is largely attributable to the large-scale competitive tendering of approximately 69 GW of renewable energy held at the central level (by implementing agencies such as Solar Energy Corporation of India (SECI)), as well as at the state level (by state distribution companies (Discoms)). Other measures by the central government, such as the waiver of inter-state transmission (ISTS) charges for renewable energy projects commissioned by 30 June 2025 (with the waiver for green hydrogen and green ammonia projects being extended till 31 December 2030, and the waiver for offshore wind (OSW) projects being extended till 31 December 2032), and the coming into effect of the Central Electricity Regulatory Commission (CERC) (Connectivity and General Network Access (GNA) to the Inter-State Transmission System) Regulations, 2022, for improved connectivity of renewable projects to the ISTS network, coupled with technological advancements in the renewable energy sector, also paved the way for increased investment in the Indian renewable energy sector.

Renewable energy sources, which include solar, wind, wind-solar hybrid, hydro, biomass and waste to energy, have a combined installed

capacity of 143.64 GW in India as of March 2024. With a view to fulfil its pledge to become “net zero” by 2070, India is also diversifying its areas of focus within renewable energy to extend to electric mobility, energy storage, carbon credits, green hydrogen, and OSW.

New Forms of Procurement by the State

Aside from tenders for solar, wind and hybrid projects, the central government is increasingly looking at different forms of procurement of renewable power from other sources, and to meet peak hour requirements of the Discoms.

Due to the sporadic nature of renewable energy, stabilising and balancing the grid poses a key challenge to the clean energy transition. One way to address this challenge is through firm and dispatchable renewable energy (FDRE), where renewable sources are integrated with energy storage systems (ESS) (such as, battery energy storage systems (BESS) and pump storage plants (PSP)). FDRE projects have less power fluctuations and therefore, enhance grid stability. Further, Discoms can procure power based on their demand profile from FDRE projects (instead of on a contract capacity basis). To promote FDRE projects, in June 2023, the Ministry of Power issued 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, which lay down the regulatory framework for procurement of FDRE by central agencies and Discoms. In 2024, SECI and NHPC Limited have successfully tendered out FDRE capacity of 1880 MW, with tariffs ranging from INR4.45/kWh (~USD0.053/kWh) to INR5.6/kWh (~USD0.067/kWh).

There have also been bids launched for standalone BESS projects, where storage is provid-

ed as a service by developers to Discoms – for example, in 2024, Gujarat Urja Vikas Nigam Ltd awarded two separate tenders of 250 MW/500 MWh standalone BESS at a tariff of INR4,49,000 (~USD5380)/MW/month and INR3,72,000 (~USD4,457)/MW/month, respectively. In another positive development, in September 2023, the Union Cabinet approved a viability gap funding (VGF) scheme for BESS projects with an initial outlay of INR94 billion (~USD1 billion). This scheme aims to achieve a levelised cost of storage, ranging from INR5.50 – INR6.60 per kWh (~USD0.066 – USD0.079 per kWh), making stored renewable energy a more viable option to manage peak power demand than previously. Separately, in April 2023, the Ministry of Power notified the guidelines to promote the development of PSPs in India, by introducing measures aimed at reducing the administrative hurdles in land allocation and approvals to develop PSP projects. Further, the Ministry of Power has also waived all ISTS charges for PSP and BESS up to 30 June 2025, provided that at least 51% of the annual electricity requirement for pumping/charging is met through renewable energy sources.

Diversification of the Indian Solar Sector

In FY 2023-24, India witnessed a record year with respect to renewable energy installations across the country, with 18.48 GW capacity addition. Out of this 18.48 GW capacity, more than 6.2 GW alone is attributable to solar power. Aside from ground-mounted solar projects, other developments in the sector have buttressed its growth, as discussed below.

Solar rooftop

One of the biggest impediments to large-scale solar deployment is land acquisition, particularly in a densely populated country like India. Given this, solar rooftop projects can play a major

role in helping India meet its renewable energy targets, without increasing pressure on its land resources. Solar rooftop projects currently comprise 14.5% of India's total installed solar capacity. To incentivise solar rooftop installation, the central government has introduced several schemes, with the PM Surya Ghar Muft Bijli Yojana Scheme being the most notable of these schemes. This scheme aims to provide 300 units of free electricity every month to households with at least 3 kW of installed solar rooftop capacity, for up to 10 million households by March 2027.

Floating solar

Another route for renewable power deployment with minimal land footprint is through floating solar projects, where solar panels are installed on floating structures over water bodies such as lakes, ponds and reservoirs. While India has the capability to house around 280 GW – 300 GW capacity through floating solar power, only a small percentage of this has been installed in the country so far (with a total capacity of around 500 MW), primarily due to the high cost of installation. Nonetheless, several companies have recently announced floating solar projects, with Tata Power Solar announcing a 101.6 MWp floating solar project in Kerala, and Narmada Hydro-electric Development Corporation commencing construction of the world's largest floating solar project of 600 MW, on Narmada's Omkareshwar Dam in Madhya Pradesh.

Solar module and cell production

In keeping with the goal of reducing dependence on import of foreign modules, along with the continued imposition of basic customs duty on solar cells and modules to curb imports, the central government approved the production linked incentive scheme (the "PLI Scheme") for the "National programme on High Efficiency Solar PV Modules". Under the PLI scheme, 39,600 MW

capacity of domestic solar PV module manufacturing has been allocated to 11 companies, with a total outlay of INR140 billion (~USD1.68 billion); by October 2024, manufacturing capacity of 7,400 MW is expected to become operational. Further, the implementation of the Approved List of Models and Manufacturers (ALMM) order from 1 April 2024, which mandates utilisation of solar modules listed in the ALMM, is also expected to boost the domestic solar module manufacturing sector since the ALMM currently only lists domestic manufacturers.

Adoption of New-age Technologies

Electric mobility

To fulfil the target of achieving decarbonisation by 2030 declared at COP 26, India joined the global EV 30@30 campaign, which aims for 30% of all vehicle sales in India to be electric vehicles (EVs) by 2030. Aside from the environmental benefits, while EVs have a higher initial investment by consumers, the long-term costs are significantly lower than other petrol/diesel/CNG-fuelled cars. The size of the EV Market in India is estimated at USD34.8 billion in 2024, and is expected to reach 120billion USD by 2030.

In this regard, the Ministry of Heavy Industries launched two tranches of the faster adoption and manufacturing of electric vehicles scheme (the “FAME Scheme”), with the objective of promoting the manufacturing of EVs. The tranches combined have had an outlay of over INR200 billion (~USD2.4 billion), with the second tranche ending in March 2024. The interim budget of FY 2024-25 allocated INR26.713 billion (~USD320 million) to a third tranche of this scheme – the details of FAME III are likely to be announced along with the main budget in July 2024. The Ministry of Heavy Industries has also recently introduced the Electric Mobility Promotion Scheme, with an outlay of INR5 billion (~USD59.9 million)

for a period from 1 April 2024 to 31 July 2024, to further accelerate the adoption of two-wheeler and three-wheeler EVs in India.

Green molecules

Green ammonia and green hydrogen hold immense potential in India’s energy transition journey. Green hydrogen, as a clean and sustainable fuel, can replace conventional hydrocarbon-based fuels in various sectors, including transportation, industry, and power generation. The production of green hydrogen using renewable energy sources can significantly contribute to reducing greenhouse gas emissions and combating climate change. In this regard, the National Green Hydrogen Mission, introduced in January 2023, aims to replace fossil fuels and fossil fuel-based feedstocks with green hydrogen and its derivatives in the transport sector. Under this Mission, the central government has granted a full waiver of ISTS charges for a period of 25 years from the date of commissioning, to green hydrogen and green ammonia projects commissioned by 31 December 2030, where such projects utilise renewable energy (from renewable plants commissioned after 8 March 2019) or ESS.

The Ministry of New and Renewable Energy (MNRE) has also introduced the Strategic Interventions for Green Hydrogen Transition (SIGHT) Programme, which outlines a comprehensive framework to incentivise the production and supply of green hydrogen, with a total outlay of INR175 billion (~USD2.09 billion). On 28 June 2023, MNRE introduced the SIGHT Programme – Component I, providing incentives for electrolyser manufacturing (of INR44.4 billion (~USD532 million)) and SIGHT Programme – Component II for green hydrogen production (of INR130 billion (~USD1.55 billion)).

In February 2024, the MNRE also issued sector-focussed scheme guidelines for pilot projects on use of green hydrogen for the transport (with a budget of INR4.96 billion (~USD59.4 million) till FY 2025-26), steel (with a budget of INR4.55 billion (~USD54.5 million) till FY 2025-26), and shipping (with a budget of INR1.15 billion (~USD13.7 million) till FY 2025-26) sectors, and in March 2024, the MNRE issued scheme guidelines for setting up hydrogen hubs in India (with an outlay of INR2 billion (~USD23.9 million) till 2025-26), under the National Green Hydrogen Mission.

A few green hydrogen projects are already in the pipeline, such as the green hydrogen plant being developed by GAIL in Madhya Pradesh, which is on track to be commissioned later in 2024. Further, SECI has also recently issued a tender under the SIGHT Programme – Component II, for the selection of ammonia producers for the supply of 5,39,000 metric tonnes of green ammonia annually.

Offshore Wind

The MNRE and National Institute of Wind Energy (NIWE), which is the nodal agency for the OSW sector in India, estimate that approximately 70 GW of OSW energy potential exists across 16 OSW sites along the Indian coastline. The central government has prepared an indicative auction trajectory to bid out 37 GW of OSW projects by 2030, across eight zones off the coast of Gujarat and Tamil Nadu.

Over the years, the Indian government has developed the regulatory framework governing the OSW sector, which includes: (i) the National Offshore Wind Energy Policy, 2015; and (ii) the Guidelines for Offshore Wind Power Assessment Studies and Surveys, 2018. In 2023, the government issued the Offshore Wind Strategy Paper, which provides a roadmap for OSW develop-

ment in India and sets out various models for OSW development. Further, to regulate the leasing of seabeds for the development of OSW projects by private entities, the MNRE has issued the OSW Lease Rules, 2023.

Since high wind potential sites are limited in India for the development of onshore renewable projects, OSW development is likely to provide the necessary diversification in India's renewable energy mix. To boost private sector participation and enhance competitiveness in the OSW sector development, the Indian government has announced various incentives for OSW developers, such as waiver of ISTS charges for OSW projects commissioned till 31 December 2032 and reduced transmission charges thereafter for projects commissioned till 31 December 2036, fiscal incentives such as accelerated depreciation, concessional custom duties, and tax holidays, and a VGF scheme with a total outlay of INR74.53 billion (~USD892 million) for 1 GW of OSW deployment. SECI has also recently launched the first 4 GW OSW tender off the coast of Tamil Nadu.

Rise of Corporate PPAs

Corporate PPAs involve an entity, typically a company, entering into a PPA to procure renewable energy with a generating company, to meet their energy requirements and also fulfil their internal environmental, social, and governance (ESG) obligations.

India has seen an upward trajectory in corporate PPAs over the years, with companies increasingly focused on going green, coupled with attractive tariffs offered by renewable energy projects as compared to Discom tariffs. Companies are also looking to procure energy attribute certificates (EACs) to meet their internal ESG targets, where 1 EAC is equivalent to 1 MWh of

renewable energy. There is also interest amongst corporates to explore alternative power procurement structures prevalent in other jurisdictions, such as virtual PPAs/contracts for differences (CfD). These contracts are effectively financial instruments that settle the difference between a fixed price set out under the contract (the “strike price”), and the market price of electricity discovered on the power exchange. When the market price of electricity is lower than the strike price, the buyer pays the difference to the generator. On the other hand, if the market price exceeds the strike price, the generator pays the excess back to the buyer, or the parties agree to a upside sharing ratio. While the concept of virtual PPAs is relatively new in the Indian market, it presents itself with immense potential to propel the country towards its goal of a clean energy transition. However, at present, there is regulatory uncertainty regarding the treatment of such contracts, and whether these contracts should be regulated by the financial sector regulator or the electricity sector regulator. Clarity on these issues is needed for this form of contracting to take off in India.

Domestic Carbon Trading Market

One of the major policy initiatives by India in 2023 was the enactment of the 2023 Carbon Credit Trading Scheme (CCTS), which seeks to develop the Indian carbon market (ICM). The CCTS recognises the ability of the Indian government to issue carbon credit certificates to entities registered under the CCTS, which comply with the standards issued by the Bureau of Energy Efficiency (Bureau) – the Bureau is yet to issue any such standards. The CCTS establishes a National Steering Committee to govern and oversee ICM, with the Bureau acting as its administrator. To ensure the integrity of the carbon market, the CERC serves as the regulatory body for carbon credit trading. Further, the Grid

Controller of India is designated as the agency to maintain the ICM registry, to further enhance transparency and accountability in the ICM.

Pursuant to the CCTS, the Bureau issued the draft “Detailed Procedure for Compliance Mechanism” (the “Compliance Mechanism”) in October 2023 which defines “obligated” and “non-obligated” entities in the context of this scheme. Obligated entities are required to meet annual targets set by the Ministry of Environment, Forest and Climate Change for the reduction of greenhouse gas emissions – carbon credits are issued in favour of obligated entities who meet their emission reduction target, failing which they must purchase carbon credits from the ICM to bridge the shortfall in meeting their target. Obligated entities (and sectors) will be notified by the Ministry of Power, in consultation with the Bureau. Non-obligated entities do not have any emission reduction targets set by the government, but can purchase carbon credits on the ICM on a voluntary basis. Non-obligated entities are also allowed to register decarbonisation projects on the ICM, the Compliance Mechanism, or the CCTS. It has also been reported that the Bureau is evaluating whether to allow high-integrity carbon credits (such as from Verra and Gold Standard) in addition to promoting new home-grown standards.

Additionally, on 12 October 2023, the Ministry of Environment, Forest and Climate Change introduced the Green Credit Rules 2023, which propose to establish the Green Credit Programme to incentivise environmentally positive activities, such as afforestation, water management, sustainable agriculture, waste management, air pollution reduction, etc. Entities engaging in qualifying activities can earn green credits through this programme, which can be traded on a trading platform. While the Green Credit Programme is

yet to be operationalised, the Indian Council of Forestry Research and Education is tasked with formulating the guidelines for its implementation with the central government's approval. These guidelines will regulate the registration and issue of green credits and the setting up of a carbon registry and trading platform.

While the compliance-based trading market is scheduled to be commenced from 2026, there is no clear deadline for the launch of the voluntary trading market. Further, the establishment of the CCTS Committee (which is entrusted with the development of a detailed procedure to operationalise the ICM) is pending, and details of the scope, design and procedure of the scheme and its alignment with global standards and registries are expected to be released.

The Way Ahead

Despite the impressive growth of the Indian renewable energy sector, challenges exist in sustaining this growth. First, there is a need for low-cost financing, not only to invest in new renewable projects, but also to improve the existing transmission infrastructure in the country, to keep up with the pace of renewable capacity addition.

Second, large-scale ground-mounted renewable power projects require procurement of large tracts of land, which is particularly challenging in India due to landowner resistance, displacement of communities and difficulties in assessing clear and marketable land title.

Third, in the context of the solar sector, while India has seen a rise in the production of solar modules domestically (mainly on account of implementation of the PLI Scheme), local production of modules is still comparatively low compared to global competitors such as China, which holds 80% of the global market share in this space; domestic solar module manufacturing capacity needs to be ramped up significantly to meet India's ambitious renewable energy targets. Another vulnerability here is that the module manufacturing machinery deployed during the production stage also relies entirely on imports from China.

Lastly, the improvement of the grid infrastructure, and expansion of the transmission network, have not kept up with the pace of renewable power deployment in India, resulting in delays in commissioning of renewable projects. As India forges its path to net zero, these bottlenecks would need to be resolved to meet the renewable energy capacity of 500 MW by 2030. Given India's successful growth story so far in the energy space, backed with an enabling regulatory framework, the clean energy sector is expected to continue on its upward trajectory, with earlier technologies becoming more efficient and adoption of newer technology becoming more economically viable.

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