

COUNTRY ASSESSMENT REPORT India

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1.1 Country Assessment Report Template

Country Name	India
Introduction	India is one of the world's largest economies, and is home to a rapidly growing low-carbon energy sector, developing in parallel to commercial and industrial (C&I) load. C&I power buyers operate across a range of sectors and industries, and providing access to voluntary market renewable energy certificates (REC)s is therefore essential to supporting corporate decarbonization commitments at scale. Indian policy related to REC market development has focused on the compliance mechanisms through renewable portfolio obligation (RPOs), while the voluntary market has developed in parallel on the basis of I-REC(E) issuance for assets that are not captured in the domestic REC ecosystem. This enables both national objectives and compliance targets to be met by domestic tracking instruments, and for the private sector to conduct voluntary procurement through the I-REC(E). Safeguards are in place to address risks of double counting, which give precedence to the domestic scheme and enable issuance of I-REC(E) only for devices or generation not captured by existing registries or regulatory structures.

1.2 Electrical Generation and Demand

Complete based on the latest available data.

Generation	Technology	Capacity (MW)
	Wind	53599.92
	Hydro	55506.77
	Fossil/Thermal	254435.24
	Biomass	11612.93
	Solar	129923.82
	Total	505023.06
Demand	Sector	Demand (GWh)
	Residential	375000
	Commercial/Service/Public Sector	195000
	Transport	33000
	Industrial	645000
	Primary Activities	—
	Total	1543000
Source (CEA Installed Capacity Report as of Oct 2025)		
Source (Niti Ayog report for FY 2023-24)		

1.3 Electrical Interconnection and Import/Export

Complete for all interconnected countries based on the latest available data.

Connected country	Capacity (MW)	Annual import from country (GWh)	Annual export to country (GWh)
Nepal	1400	-	154.08
Bhutan	2185	3862.78	-
Bangladesh	1160	-	8413.52
Myanmar	3	-	8.47
Additional information	Source: Grid-India Monthly Reports, Powerline (MoP), CTUIL's ISTS rolling plan 2028-29 (interim report).		

1.4 Market Structure

The Indian electricity market is a complex, multi-layered system involving generation, transmission, distribution, and trading, all regulated by both central and state governments. The market operates under the framework established by the Electricity Act of 2003, with significant roles played by public and private players.

Key components of the market

1. Generation: Electricity is produced by a mix of thermal (coal-based), hydro, nuclear, and renewable energy sources.

1.a. Dominance of Thermal: Thermal power continues to be a major source, though the country is actively increasing its renewable energy capacity.

1.b. Public and Private Players: Generation is carried out by Central Public Sector Undertakings (PSUs) like NTPC and NHPC, state-owned generation companies, and private players such as Adani Group and Tata Power.

2. Transmission: High-voltage power is transmitted across states and regions.

2.a. Central Transmission Utility (CTU): Power Grid Corporation of India Limited (POWERGRID) is the CTU responsible for inter-state transmission.

2.b. State Transmission Utility (STU): Each state has an STU for intra-state transmission.

3. Distribution: Distribution companies (DISCOMS) are responsible for the final supply of electricity to consumers. Most DISCOMS are state-owned, though some private players are also involved.

4. Trading and Exchanges: A wholesale electricity market allows for transparent and competitive buying and selling of power.

4.a. Power Exchanges: These platforms enable flexible trading of electricity. Examples include the Indian Energy Exchange (IEX), Hindustan Power Exchange Limited (HPX) and Power Exchange India Limited (PXIL).

Trading Mechanisms: The market includes multiple products, including real-time market (RTM) for immediate delivery and day-ahead market (DAM) for delivery on the next day of trading.

1.5 Responsible Government Department

Government Framework:

India's power sector is primarily managed by two main Central Government ministries: the Ministry of Power (MoP) and the Ministry of New and Renewable Energy (MNRE). Other ministries are involved in specific, related aspects such as fuel supply.

Key Ministries Involved

1. Ministry of Power (MoP): This is the primary ministry responsible for the overall development of electrical energy in the country. Its work covers:

General policy formulation and coordination in the power sector.

- Matters relating to thermal and most hydro power generation (above 25 MW capacity), transmission, and distribution.

- Administration of key legislation like the Electricity Act, 2003, and the Energy Conservation Act, 2001.

- Oversight of central public sector undertakings (PSUs) such as NTPC Limited, Power Grid Corporation of India, and the Bureau of Energy Efficiency (BEE).

2. Ministry of New and Renewable Energy (MNRE): This ministry is the nodal agency at the central level for the promotion of new and renewable energy sources. Its functions include:

- Research, development, and deployment of solar energy, wind power, biomass, and small hydro

projects (below 25 MW capacity).

- Implementing schemes and developing renewable energy projects through PSUs like the Solar Energy Corporation of India (SECI) and the Indian Renewable Energy Development Agency (IREDA).
- Managing initiatives like the Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) and the Solar Park Scheme.

3. Other Related Ministries/Entities

- Ministry of Coal: This ministry manages the policies for coal production and supply, which is the primary fuel source for a significant portion of India's thermal power generation.
- Ministry of Environment, Forest and Climate Change (MoEFCC): Involved in environmental clearances and climate change policies that affect power projects.
- Ministry of Heavy Industries: Involved in the ecosystem for electric vehicles and associated charging infrastructure.
- Department of Atomic Energy (DAE): This department manages matters related to nuclear power, which is kept separate from other energy sectors due to national security implications.

Institutional Framework:

Policy determination in the Indian electricity market is a shared responsibility between central and state governments, involving both governmental ministries that formulate policy and statutory regulatory bodies that implement and oversee those policies.

The market is overseen by several regulatory and governmental bodies.

1. Central Electricity Regulatory Commission (CERC): An independent, quasi-judicial body that regulates tariffs for generation and inter-state transmission of electricity, issues inter-state licenses, and promotes competition and market development. It also advises the Central Government on the formulation of the National Electricity Policy and Tariff Policy.
2. State Electricity Regulatory Commissions (SERCs): Each state has a SERC that determines tariffs for intra-state generation, transmission, and distribution, issues licenses within the state, and generally regulates the local power sector to protect consumer interests.
3. Central Electricity Authority (CEA): This body is responsible for technical coordination and supervision. It prepares the National Electricity Plan every five years in accordance with the National Electricity Policy and advises the government on technical matters, safety regulations, and standards.
4. Bureau of Energy Efficiency (BEE): Established under the Energy Conservation Act, 2001, BEE is an agency under the MoP that develops policies and strategies for promoting energy efficiency and conservation across various sectors.
5. NITI Aayog: The government's policy think tank, which helps connect energy planning with India's broader development goals.

1.6 Existing/Planned Legislation

India's renewable energy compliance framework is a multi-pronged approach involving Renewable Purchase Obligations (RPO), Renewable Consumption Obligations (RCO), and a market-based instrument called Renewable Energy Certificates (REC). The issuance of I-REC(E) in India is proactively calibrated to avoid risks of double issuance or double counting against the domestic compliance and certificate systems.

1. Renewable Purchase Obligation (RPO): The RPO is a regulatory mechanism under the Electricity Act, 2003. It requires obligated entities, including electricity distribution licenses (DISCOMs), certain open-access consumers and captive power plant users, to purchase a specified minimum percentage of their total electricity consumption from renewable energy sources. Targets are set by SERCs and vary by state, although the Ministry of Power provides a long-term national trajectory which are adopted by SERC based regional conditions. Entities can meet their RPO by directly purchasing renewable power through long-term

power purchase agreements (PPAs), procuring renewable power from power exchanges (e.g., IEX, PXIL) or by purchasing Renewable Energy Certificates (RECs). Any claims under RPO are treated as consumption of green attributes and therefore, not eligible for I-REC(E)s.

2. *Renewable Consumption Obligation (RCO) is a more recent and stringent mechanism introduced under the Energy Conservation (Amendment) Act, 2022, and operationalized by the Ministry of Power (MoP) in consultation with the Bureau of Energy Efficiency (BEE). It obligates "designated consumers", including DISCOMs and energy-intensive industries (e.g., steel, cement, aluminum) that meet specific consumption thresholds, to meet a minimum share of their total energy consumption (not just electricity purchases) from non-fossil sources. This expands responsibility beyond just power utilities to the broader industrial sector, aiming for an economy-wide transition. Compliance is to be monitored by the BEE, and non-compliance attracts substantial penalties under the Energy Conservation Act, which are often stricter than the previous RPO penalties. The RCO framework is intended to supersede or integrate state-level RPOs to ensure uniform, national compliance targets, with year-wise trajectories specified up to FY 2029-30.*

3. *Renewable Energy Certificates (REC) mechanism is a market-based instrument designed to facilitate compliance with RPO/RCO requirements by addressing the geographical mismatch between renewable energy generation potential and consumption centers. A generator of renewable energy has two options i.e., either to sell both the electricity and its "green attributes" (environmental benefits) at a preferential tariff or sell the electricity component at the conventional power price and the environmental attributes separately as RECs. These certificates are traded on power exchanges like the Indian Energy Exchange (IEX) and Power Exchange India Limited (PXIL). Obligated entities (under RPO) or designated consumers (under RCO) that cannot generate or procure sufficient renewable energy directly can purchase RECs from the market to meet their regulatory targets. At the time of writing, targets met by RECs must use domestic RECs for compliance purposes as opposed to I-REC(E); and I-REC(E) issuance practices are calibrated so that only one REC (domestic or I-REC(E)) can be issued for any given MWh.*

1.7 Environmental and Renewable Electricity Legislation

Carbon Credit Trading Scheme (CCTS)

The CCTS is India's next-generation, national-level market that focuses directly on the reduction of greenhouse gas (GHG) emissions which is a shift from the energy efficiency focus of the PAT scheme.

Objective: To reduce the greenhouse gas emission intensity of India's economy in line with its Nationally Determined Contributions (NDCs) under the Paris Agreement (e.g., reducing emission intensity by 45% by 2030 from 2005 levels).

Mechanism: It establishes an Indian Carbon Market (ICM) with two mechanisms:

- i. Compliance Mechanism: Mandatory for nine energy-intensive sectors (e.g., cement, steel, aluminium, textiles, petrochemicals) where entities are given specific GHG emission intensity targets.*
- ii. Offset Mechanism: A voluntary program for entities outside the compliance mechanism (e.g., in agriculture, transport, waste management) to generate and sell carbon credits.*

Tradable Unit: One Carbon Credit Certificate (CCC) is equivalent to the reduction or avoidance of one tonne of CO₂ equivalent (tCO₂e).

Compliance: Obligated entities falling short of their targets must purchase CCCs, while overperformers earn them, creating a market-driven incentive for decarbonization.

Oversight: The scheme is administered by the BEE, with trading regulated by the Central Electricity Regulatory Commission (CERC) on power exchanges.

1.8 Existing/Planned Certificate or Support Systems

1. [Domestic] Renewable Energy Certificates (REC)

RECs unbundle the physical electricity from its environmental attributes. A power generator can sell electricity at the conventional market price and the environmental attributes as a separate, tradable REC. Each REC represents the generation of one megawatt-hour (MWh) of electricity from a renewable source. The program is regulated by the Central Electricity Regulatory Commission (CERC), and the Central Agency (National Load Dispatch Centre) is responsible for issuance and registry. I-REC(E) is different from this domestic RECs instrument, with measures in place by the Local Issuer to avoid risks of double issuance.

2. Energy Saving Certificates (EScerts)

The ESCerts program is a market-based mechanism focused on improving energy efficiency in energy-intensive industries. Implemented under the Perform, Achieve, and Trade (PAT) scheme, it sets specific energy consumption (SEC) reduction targets for designated consumers (DCs) in sectors like cement, steel, and textiles. One ESCert is equivalent to 1 metric tonne of oil equivalent to (toe) of energy saved beyond the mandated target. Over-performing entities earn ESCerts, which can be sold to under-performing entities to help them meet their energy saving targets. The ESCerts program is being gradually integrated into the broader Carbon Credit Trading Scheme (CCTS).

3. Carbon Credit Trading Scheme (CCTS)

The CCTS is the new, national-level framework for a domestic carbon market to reduce economy-wide greenhouse gas emissions. It establishes a compliance mechanism for designated large emitters to achieve specific GHG emission intensity reduction targets. It also includes an offset mechanism for voluntary projects to generate credits. One Carbon Credit Certificate (CCC) is equivalent to the reduction or removal or avoidance of one tonne of CO₂ equivalent (tCO₂e) of emissions. Obligated entities must purchase CCCs if they miss their targets. This program aims to help India meet its climate action goals under the Paris Agreement.

1.9 Extent of Engagement with Government

The government has not provided a formal opinion endorsing or objecting to the operation of the I-REC(E) market in India. As noted above, India operates certificate programs which are administered by domestic authorities—such as the domestic REC mechanism, with demand driven by RPO obligations imposed by regulatory authorities. While I-REC(E) does not currently operate as a compliance mechanism in India, it functions in parallel as a voluntary instrument for RE developers, corporate power buyers, and other organizations to track and transact renewables on a voluntary basis. I-REC(E) receives extensive participation from captive power plants and other IPPs who do not participate in domestic REC or RPO mechanisms in India. In order to remain calibrated with domestic systems, the local issuer maintains a high degree of regulatory understanding and awareness of domestic instruments, to support high integrity issuance in alignment with the domestic market and to help ensure that each MWh of generation is only captured by one instrument.

1.10 Expected Response from Government

No explicit government objection or endorsement are anticipated, provided that the I-REC(E) issuance process remains used for voluntary purposes, and with issuance practices structured to mitigate risks or double counting against domestic regulated instruments. The Indian electricity market already includes

the concept and necessary infrastructure for operating its domestic REC mechanism to address RPO compliance. Hence, implementation of the I-REC(E) mechanism as a voluntary tool in parallel to existing system is not likely to be addressed by the Government of India. In a complementary way, the I-REC(E) mechanism has been operating in India for voluntary participation from RE developers and organizations aspiring to use I-REC(E) mechanism for their sustainability goals. There is no restrictive regulation from Government of India which limits the establishment of I-REC(E) and no objection remains an appropriate basis for operation of the system.

1.11 Proposed Restrictions

Issuance procedures for I-REC(E) issuance are designed to avoid double counting against domestic instruments. Therefore, I-REC(E) issuance is not permitted for production that falls under the Renewable Purchase Obligation (RPO) or Renewable Consumption Obligation (RCO), Carbon Credits Trading Scheme (CCTS), or the domestic REC system.

1.12 Any Other Relevant Information

RE Market Potential:

India added a record 27.93 GW of renewable energy capacity (excluding large hydro) in the first seven months of FY 2025-26 (April-October 2025), reaching a cumulative total of about 200.3 GW.

Recent Additions

Solar power led with 24.28 GW added during this period, including 2.59 GW in October alone, while wind contributed 3.56 GW. This marks a 123% year-on-year increase from 9 GW in April-August FY25, driven by strong project pipelines, favorable module prices, and policy support like waived inter-state transmission charges.

Annual Projections

Capacity additions are projected to exceed 35 GW for full FY 2025-26, potentially the highest ever, with earlier estimates suggesting up to 43 GW for calendar year 2025. In FY 2024-25, India added around 30 GW, more than doubling from 13.75 GW in 2023.

Targets and Pipeline

India aims for 500 GW non-fossil capacity by 2030, with current non-fossil installed capacity at 259.4 GW (including large hydro and nuclear) as of October 31, 2025. Projects under implementation total 186 GW, with 67 GW tendered, positioning the country near its goal.

Historical support or development of renewables in the country/region:

The last decade has seen a rapid surge in capacity addition driven by ambitious targets and supportive policies. In 2014, the JNNSM target was significantly revised to 100 GW of solar power by 2022 and in 2015, India, along with France, launched the International Solar Alliance (ISA) at COP21 to promote solar energy globally and mobilize investment.

At COP26 in 2021, India committed to an enhanced target of achieving 500 GW of installed non-fossil fuel capacity by 2030 and a net-zero emissions goal by 2070. However, India achieved a historic milestone by surpassing 500 GW of total installed power capacity, with non-fossil fuel sources accounting for over 50% of the total capacity, achieving its COP26 goal five years early (i.e., 2025).

Further, the National Green Hydrogen Mission was launched in 2023 to position India as a global leader in green hydrogen production.

Demand-side market potential or strategic nature of market development:

As India targets 500 GW of non-fossil fuel capacity by 2030, the intermittency of solar and wind generation creates significant supply variations. Demand flexibility allows load to be shifted from peak, non-solar hours to periods of high renewable generation (e.g., sunny afternoons), helping to balance the grid in real-time and avoid blackouts.

For I-REC(E) specific demand, a growing number of companies in India are voluntarily purchasing I-REC(E)s to meet their internal environmental, social, and governance (ESG) commitments, achieve carbon neutrality, and align with global initiatives like RE100. The voluntary market is witnessing expansion, especially among IT and manufacturing sectors. Purchasing I-REC(E)s is often a flexible and cost-effective way for corporates to meet their sustainability goals without physically procuring renewable energy or installing on-site generation, which may not be feasible due to space or capital constraints.

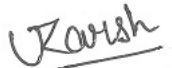
However, historically, supply has often outpaced demand, leading to a surplus of certificates and relatively low market prices. Hence, it is observed that more corporates are required to seriously pursue their sustainability goals, which is also supported by a few Government Initiatives for sustainability reporting mechanisms.

Analysis of political disruptions or market risks:

1. *Explicit disruption to the I-REC(E) market on political or regulatory grounds is not anticipated. However, it is critical that Local Working Instructions and issuance practices remain apace with development of the domestic REC and RPO ecosystems. Safeguards by the local issuer are in place to monitor regulatory developments to continue evaluating facility and generation eligibility for I-REC(E) issuance, such that voluntary markets to not risk double counting domestics ones.*
2. *Alignment between I-REC(E) and Domestic RECs: The voluntary and compliance markets in India have different use cases and commercial setups. The domestic REC market has a larger trade volume, however, the mandatory obligation for larger consumers to consume renewable energy (through domestic REC mechanism as well) often maintains a high price of the domestic REC as compared to I-REC(E)s. Hence, global buyers with sustainability goals are often attracted towards I-REC(E) mechanism rather than domestic REC (which is primarily used by RPO obligated entities).*

Limitations and commercial risks affecting I-REC(E) market in India. A few are listed below:

3. *Scope of I-REC(E) coverage: The I-REC market relies entirely on voluntary RE generator and corporate action. The major power plants are already under PPA with consumers who are RPO obligated. Hence, majority RE power is utilized by domestic consumers for their own RPO compliance. The power plants eligible for registration with I-REC(E)s are only those who are free to from RPO compliance and do not have authority to trade in REC market (Captive Power).*
4. *Price Volatility and Lack of Price Support: The I-REC(E) market has a market-driven pricing mechanism which leads to price volatility, affecting the revenue certainty for RE generators issuing I-REC(E)s.*
5. *Volatility in Demand: The demand is vulnerable to changes in corporate sustainability priorities or global reporting standards. Unlike the domestic market, it is not supported by the strict enforcement mechanisms (or lack thereof) that drive RPO compliance in India.*

1.13 Author			
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DATE	26	08	2026