



Power Markets in India

For Prelims: [Indian Energy Exchange Procurement](#), [Electricity Act 2003](#), [Central Electricity Regulatory Commission](#)

For Mains: [Regulation of Discoms & Significance of Power Sector of India](#)

[Source: IE](#)

Why in News?

Recently, the government has allowed the **trading of surplus electricity** generated from “linkage coal” in the country's power markets amid increasing demand during the summer.

- Coal linkages are **government-allocated resources** to **thermal units** based on long-term [power purchase agreements \(PPAs\)](#) with distribution companies to ensure reliable and consistent [coal supply](#) for electricity generation.

What are Power Markets of India?

- **About:**
 - [Power markets](#) in India represent a system where electricity is traded through various mechanisms and platforms like **power exchanges**, allowing for **flexible and efficient** allocation of electrical power.
- **Power Exchange:**
 - **Power exchanges** are a key infrastructure within power markets that **enable the buying and selling of electricity through transparent** and competitive processes, thereby contributing to the overall efficiency and reliability of the electricity supply system.
 - **Structure and Evolution:**
 - Power exchanges were **first introduced in Europe** in 1990-91 and now operate in about 50 countries worldwide.
 - In India, the [Electricity Act of 2003](#) established the framework for exchange operations, and exchanges commenced in 2008.
 - The [spot market](#) was introduced in 2020 to enhance flexibility and responsiveness.
 - **Trading Mechanism:**
 - **Bidding Process:** Buyers make bids for purchasing electricity, and sellers make offers to sell.
 - **Market Clearing Price:** The equilibrium of demand bids and supply offers determines the **market clearing price** at which electricity is traded.
 - **Categories of Power Markets:**
 - **Spot Market:**
 - Real-time market (RTM) for near-immediate delivery.
 - The intraday market for same-day trades hours before delivery.
 - **Contract Markets:**

- **Day-ahead market (DAM) for closed auctions** in 15-minute time blocks for the following day.
- **Term-ahead market (TAM) for trades from 3 hours to 11 days** in advance.
- **Benefits of Power Markets:**
 - **Flexibility:** Generators can respond to short-term demand fluctuations and sell surplus power **independently of long-term power** purchase agreements (PPAs).
 - **Transparency and Reliability:** Price-based demand response involves multiple parties, **resulting in greater transparency** and reliability compared to bilateral contracts.
 - **Resource Optimisation:** Market-driven approaches enable generators to **optimise their output and revenue**, while utilities can meet variable power demands more efficiently.
- **Major Power Exchanges in India:**
 - **Indian Energy Exchange Ltd (IEX):** Dominates with over 90% market share.
 - Traded about 110 billion units (BU) of electricity in FY 2023-24, growing 14% year-on-year.
 - **Power Exchange India Limited (PXIL):** It is India's first institutionally promoted power exchange which has been providing innovative and credible solutions since 2008.
 - **Hindustan Power Exchange Ltd (HPX):** It provides a comprehensive market platform for different electricity products.
- **Regulation:** All exchanges are regulated by the [Central Electricity Regulatory Commission \(CERC\)](#).
 - CERC intends to **promote competition, efficiency and economy** in bulk power markets, improve the **quality of supply, promote investments** and advise the government on the removal of institutional barriers to bridge the demand-supply gap.
 - It is a **statutory body** functioning with quasi-judicial status under the Electricity Act 2003.
 - **Electricity Act 2003:** [The Electricity Act, 2003](#) provides for **Electricity Regulatory Commissions** at both the **central and state levels** (CERC and SERCs).

Instruments Related to Power Market

- **Renewable Energy Certificates (REC) Mechanism:**
 - It allows utilities to meet **renewable purchase obligations (RPOs)** by buying RECs, each representing 1 MWh of renewable electricity.
 - RPO was instituted in 2011, it is a mandate that **requires large power procurers to buy a predetermined** fraction of their electricity from renewable sources.
 - States with **insufficient renewable capacity** can purchase RECs to meet green energy targets.
- **Power Purchase Agreements (PPAs):**
 - These are **long-term agreements** (typically 25 years) between electricity generators and buyers (usually public utilities).
 - It involves **committing generators to supply power at fixed rates**, locking in significant generating capacity.
 - They are inflexible and **unable to adapt to dynamic market conditions**.

What are the Challenges Faced by Power Markets in India?

- **Transmission Bottlenecks:** Insufficient transmission infrastructure **creates congestion in the grid, hindering the efficient flow of electricity** from generation sources to consumers.
 - This is particularly **problematic for integrating renewable energy sources** located far from demand centres.
- **Financial Health of Discoms:** Distribution Companies (Discoms) have weak finances due to high losses from inefficiencies, theft, and unpaid bills, limiting their ability to invest in grids and pay generators promptly, impacting the market.
 - For example, **transmission and distribution losses (T&D) in India are more than 20% which is more than the world average**.
- **Coal Dependence and Price Volatility:** India's heavy reliance on coal for power generation **exposes the market to price fluctuations in the global coal market**. This

disrupts power pricing stability and can strain generator margins.

- **Market Design and Infrastructure:** Developing robust market designs, including **market coupling and capacity markets**, requires substantial investment in infrastructure and coordination.
- **Inconsistent Policy and Regulatory Framework:** A complex and evolving regulatory environment creates uncertainty for investors in the power sector.
- **Limited Market Products:** The current power market primarily focuses on short-term trading than developing a **wider range of market products**, such as **futures and derivatives contracts**.

Note

- **Market Coupling:** Market coupling is a mechanism used in electricity markets to **integrate and coordinate the trading of electricity across different regions** or countries.
 - It aims **to achieve a single market clearing price for electricity** by matching supply and demand bids from all participating power exchanges or market platforms.
- **Capacity Markets:** Capacity markets are mechanisms within the electricity sector where **generators are paid not only for the electricity they produce and sell but also for their capacity to generate electricity**.

What are the Steps Needed to Strengthen Power Markets in India?

- **Promote Market-Based Pricing:** The [Economic Survey 2022-23](#) highlights the need for a **market-driven approach** to power pricing. This could involve reforms like **phasing out subsidised electricity** for high-income consumers and allowing generators more flexibility in setting **prices based on demand and supply**.
- **Introduce Market Coupling:** Implementing market coupling to unify power prices and develop **capacity markets** with incentives and **support for grid reliability**.
- **Address Discoms' Financial Issues:** Measures like improving **billing and collection systems**, reducing power theft, and exploring [public-private partnerships](#) can improve their financial health.
- **Encourage Renewable Energy Integration:** Promote renewable energy and [smart grid technologies](#) to improve **grid management**, efficiency, and reliability through better forecasting, storage, metering, data analytics, and automation.
- **Harmonize Regulatory Framework:** Develop uniform regulations across states to reduce **inconsistencies and create a cohesive market environment**.
- **Strengthen Transmission Infrastructure:** Using [drones](#) for **line inspection** and maintenance in tough terrains and **exploring advanced materials for lighter, stronger, and more efficient transmission towers** can help in strengthening the transmission infrastructure.

Drishti Mains Question:

Q. Examine the challenges faced by power markets in India and discuss the steps needed to overcome these challenges.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. Which one of the following is a purpose of 'UDAY', a scheme of the Government? (2016)

- (a) Providing technical and financial assistance to start-up entrepreneurs in the field of renewable sources of energy
- (b) Providing electricity to every household in the country by 2018
- (c) Replacing the coal-based power plants with natural gas, nuclear, solar, wind and tidal power plants over a period of time

(d) Providing for financial turnaround and revival of power distribution companies

Ans: (d)

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