Power Market Development

Key issues and solutions

Prabhajit Kumar Sarkar, AVP, Strategy and Product Development, Power Exchange India Limited

In accordance with Entry 38, List III (Concurrent List) and Seventh Schedule of the Constitution of India, electricity is governed at both the central and state levels. Both policy-making and regulation are handled at the central and state levels.

Historically, India was divided into five electrical regions for the development of the electricity market. Generation, transmission and distribution were first planned for the state level and then for the regional level. Each state's electrical utility was responsible for managing demand and supply within its periphery.

The union government started assisting the states by setting up central sector generating stations (CSGSs) in the five regions. Each CSGS would supply to the states constituting the region. All the capacity from such generating stations was completely allocated to the states within the region through long-term contracts of 25 years or more. To add to the pool of available power, private sector participation in generation was also encouraged. However, all these plants were also developed within the framework of long-term commitments to the state utilities, which continued to remain their sole buyers.

As can be seen from Tables 1 and 2, most of the transactions in the Indian power market have been long-term contracts (of 15-25 years or more) with the entire electricity generated by the power plants being purchased. The ownership of this generation capacity, therefore, rested with distribution utilities and state utilities.

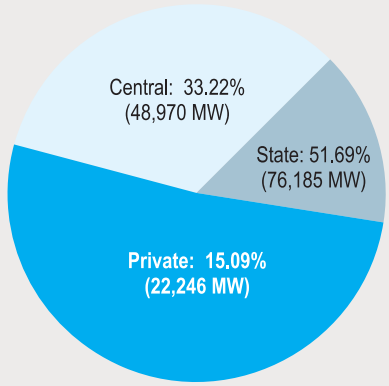
Until a few years ago, the tariffs for these contracts were determined on a cost-plus basis with the governments playing a significant role. With the emergence of the regulatory framework, the role of tariff determination was legitimately passed on to the regulators who created a framework for this. The end retail-level tariffs, however, continued to carry the legacy distortions related to below-cost supplies to certain user segments.

Development of trading – Precursor to the power market

Depending on seasonal or daily variations in demand, some utilities have had excess capacity, which has been utilised for short-term sales. In a few cases, this electricity has been sold on a bilateral basis between utilities. However, after trading was identified as a separate regulated activity vide the Electricity Act, 2003 and licensing norms for electricity traders were developed by the Central Electricity Regulatory Commission (CERC) by 2003-04, electricity traders started actively intermediating to help utilities find buyers and sellers for their surplus generation or deficits in requirement.

Tariff, in the case of such transactions, is determined either on a negotiated basis between the utilities and traders, or through competitive bidding. Apart from seasonal variations in load, utilities also experience some changes in their electricity needs on a daily basis. These requirements are catered to through day-ahead transactions. After the launch of the power exchanges, most day-ahead transactions now take place through the exchanges and reflect a common market clearing price for all 24 hours of the next day.

Table 1: Installed capacity as on December 31, 2008



Policy and regulation

Since 2003, the policy and regulatory environment within the country has become conducive to the development of power markets.

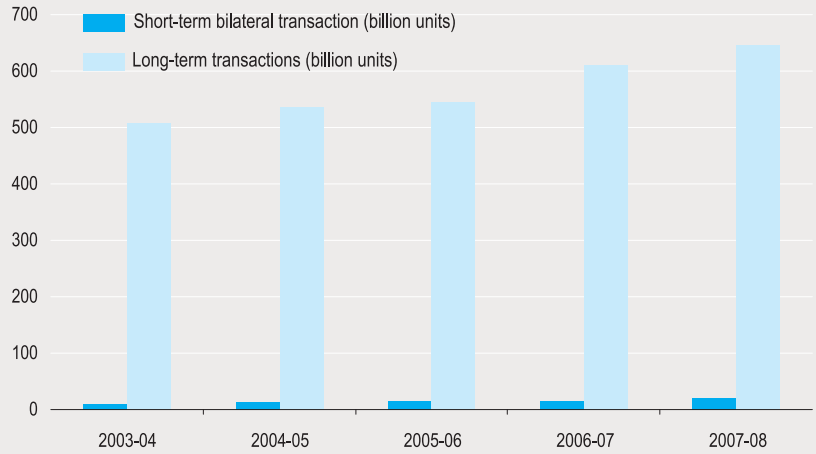
The Electricity Act, 2003, an astutely drafted legislation, has been the harbinger of widespread change in the sector. The act ushered in and formalised the concept of trading of electricity within the country and also suggested the development of power markets, governed by appropriate regulations.

The National Electricity Policy (NEP), notified by the Government of India, is a seminal work that can give shape and policy direction to the development of the power sector, as well as the power market within the country. Under Section 5.7 of the NEP, the Ministry of Power underscored that the development of the power market would need to be undertaken by the appropriate commission in consultation with all concerned. The ministry further stipulated that regulations for inter- and intra-state trading and regulations on power exchanges would be notified by the appropriate commissions within six months of the publication of the NEP.

In view of this and pursuant to Section 66

of the Electricity Act, the CERC issued a discussion paper for setting up a common platform for trading of electricity on February 6, 2007. After much debate and discussion, the plan for setting up power exchanges within the country was formulated. Applications from two exchanges were submitted and approved by June and September 2008. Both these exchanges have active participation from various utilities, and both provide electronic platforms for trading electricity on a day-ahead basis.

Table 2: Volume of energy traded through various types of transactions



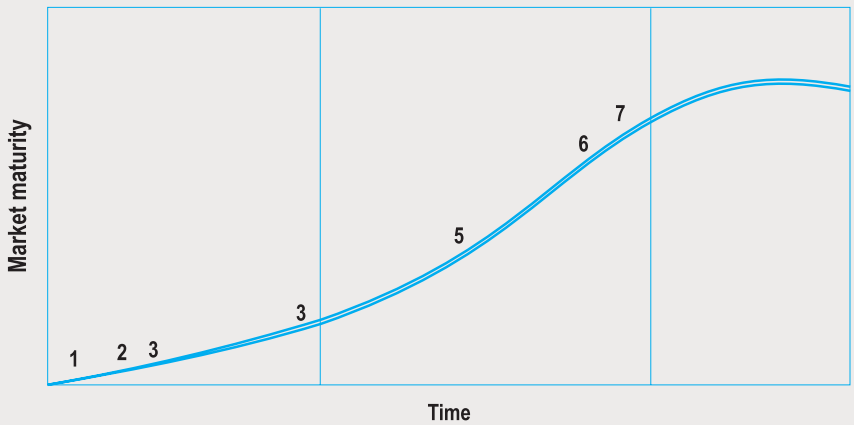
Defining power markets

Indian markets, especially those in the power sector, have unique complications and nuances; hence, a composite development of the power market to ensure competition and efficiency would require commonality in regulatory supervision.

Power markets should include both trade of power as a commodity and the trade of derivative instruments with power as an underlying commodity. In fact, as the market matures, ancillary and related products such as energy efficiency certificates, renewable energy certificates and transmission rights can also start getting traded in the power market. Needless to say, the appropriate regulatory as well as market-based interventions would need to be developed to ensure that power-related products and markets evolve in a smooth manner for the benefit of all stakeholders and provide them with multiple avenues to manage their commitments. The market would need to be defined to include all such entities, objects or activities in view of their impact on the electricity sector, primarily within the country.

The development of the power exchanges, under the regulatory guidance of the CERC, needs to be seen in this context. The exchanges are providers of market infrastructure, which is utilised by various participants to achieve their load generation balancing objectives in a free, fair and transparent manner. This market infrastructure has been developed for power market entities only with the view of providing a full range of services under the guidance of the appropriate regulatory body.

Power market life cycle



Points on the lifecycle	Type of products on the exchange
1, 2, 3	Spot market (day-ahead market, intra-day, contingency)
4	Forward market (week/month ahead)
5	Over-the-counter trades through exchanges
6	Futures and options
7	Efficiency certificates etc.

Power exchange life cycle

A general power market life cycle would be as depicted in the accompanying chart, with various products being introduced in the market at various points of time, depending on the maturity of the market. The time for such introductions has varied between three and eight years in various markets abroad.

The maturity of the market would depend on:

- The number of active trading entities in the market.
- Volume of trading in the market.
- Number of new entrants.
- Demand and supply transparency.
- Representative spot market prices (for the purpose of introducing derivative products).

- Influence of dominant market incumbents.

If all the parameters except "influence of dominant market participants" are strong, the market has a strong ability to trade forward, meaning that the market has the ability to successfully launch futures and other derivatives.

The influence of any dominant market player, whether in setting up the power exchange infrastructure or even with its presence as a participant within the sector, has the potential of skewing the market and should therefore, be keenly watched and managed.

Development of products in India

In India, the day-ahead market has been in operation for some time now with two exchanges providing the requisite infrastructure to participants within the sector to trade on the day-ahead spot market and help participants balance their load profiles.

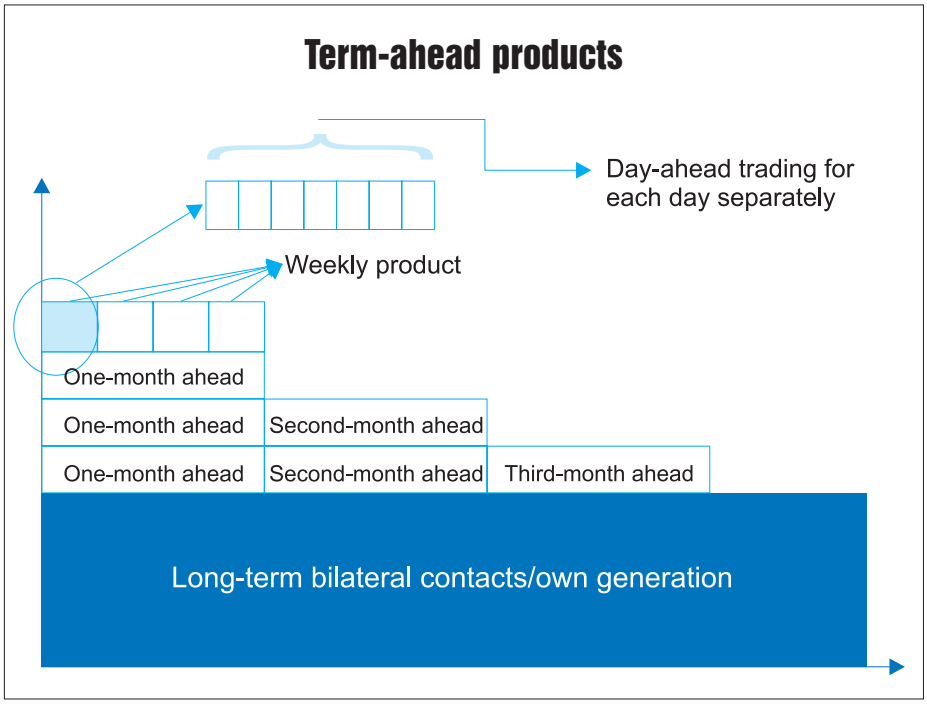
However, there are various transactions taking place in the power sector, especially in the short term, either through power traders or directly between utilities, which have the potential of being brought onto a transparent and neutral platform like the power exchange.

Short-term trades with terms not longer than three months, which utilise short-term bilateral open access regulations, can be brought onto the power exchanges such that there is a common platform for entities to participate, and such that the platform removes asymmetry of pricing information from the market.

Furthermore, with the exchange acting as a central counter-party for all trades, the credit risk management on such trades minimises drastically. In addition, it is only an exchange that can bring in the best market practices to ensure transparency, efficiency and fairness.

Currently, Power Exchange India Limited (PXIL) has applied to the CERC for approval of its term-ahead products. These products include third-month ahead, second-month ahead and one-month ahead products as well as weekly and day-ahead contingency products. The products would help entities to manage their demand and supply situations over longer time periods.

With time, as participation on the exchanges improves and participating entities develop active risk management models, derivative products like electricity futures can also be brought onto the exchange. However, the underlying philosophy for all such development has to be the support and growth of entities in the power sector, without which the sector does not exist.



Market matching mechanisms

The current day-ahead market is based on the systems expounded in the CERC discussion paper on power exchanges.

The matching system currently in use is a uniform price auction mechanism which has closed double-sided bidding. In other words, both buyers and sellers put in their buy and sell trades during a window of time. After this window closes, all the buy bids and sell offers are stacked such that there is an intersection of the demand and supply curves. The price at the intersection of the curves is uniformly applied to all buy bids at or more than such price, and to all sell offers at or lower than such price.

Products of longer terms present unique issues, including those of pricing and market behaviour, and therefore, the matching mechanism being used now in the day-ahead market, may need to be suitably evolved for products of longer terms. Other existing models need to be studied, discussed and debated before a final model is prescribed.

There are various matching mechanisms which can be utilised for the power market. These include uniform auctions, pay-as-bid auctions or Vickrey auctions, to name a few. By and large, most power markets around the world use the auction methodology as a market trading mechanism. The continuous matching system has been used only in a few stray cases since it is usually not considered as an appropriate tool for load balancing.

The complexities of the Indian power market and its unique attributes may be reason enough to try and develop a unique matching system for India. ■