Power exchanges

The power to exchange

Electricity as a subject finds its place in the concurrent list, whereby both the central government and state government are allowed to make laws. The structure of the electricity market has evolved over time. Generation, transmission and distribution of electricity were initially planned at state levels. Each state's electricity utility, or State Electricity Board, was responsible for managing demand and supply within its periphery.

Few of these states had surpluses of electricity and some were in deficit. Given this situation, the inter-state transaction of electricity was inevitable. To co-ordinate the same it was thought appropriate to group these states into five regional entities, called Regional Load Despatch Centres. The RLDCs were made responsible for demand and supply management within their regional peripheries and also with other RLDCs for inter-RLDC transaction of electricity.

The central government started assisting states by setting up Central Sector Generating Stations (CSGS) within the regions for supply to the constituent states within the region. All the capacities from such generating stations were completely allocated to the states within the region through long-term contracts of 25 years or more. Private sector participation had also been encouraged for the development of generation capacity. However, all these generating plants were developed within a framework of long-term supply commitments to the state utilities. Most of the transactions in the Indian power market are therefore legacy long-term contracts.

The power market has a history of about 128 years. It has come a long way from the production and distribution of more than 660bn units in 2007/08 and to the establishment of power exchanges in 2008. By **Rupa Devi Singh**, MD and CEO, **Power Exchange India**.

Evolution of the power market

It was neither feasible nor economical to meet short-term, seasonal and peaking demands through long-term contracts. To take care of short-term peaking demand, historically, states used to trade power with each other through bilateral banking arrangements. These arrangements were very similar to a barter mechanism of trading, where electricity banked with other states in times of surplus generation was received back in times of deficit.

The absence of any commercial principle to this barter trade often produced complications when both states faced deficits and there was no excess electricity to return to the state that banked electricity in the first place. Commercial transactions for short-term trading of electricity in India are a recent phenomenon.

Enactment of the Electricity Act 2003 (EA 2003) has given structure to the short-term trade. However, by and large most provinces still operate on a single buyer model, where the government-owned utility acts as counterparty to all purchases of electricity within the province. Currently the power market in India comprises mainly long-term power purchase agreements, with a small proportion of short-term bilateral contracts also happening for periods of up to three months. A balancing market was introduced a few years ago in the form of the unscheduled interchange (UI) mechanism, which is administered by the system operators.

EA 2003 has promoted competition in the electricity sector by de-licensing the generation, recognising trading as a distinct licensed activity and by introducing open access for inter-state transaction of electricity. While EA 2003 committed the nation to the development of organised markets in electricity, the Electricity Policy issued in 2005 actively spoke about the need to set up power exchanges.

The Central Electricity Regulatory Commission started the process of setting up power exchanges in the country in July 2006 by releasing a staff paper on "Developing a common platform for trading electricity". This was followed in February 2007 by guidelines for setting up and operating power exchanges in India. As a result, the first such exchange started functioning in June 2008 followed by the second one in October 2008.

Currently the power market in India is structured as follows in Table 1.

Power exchanges

The market is currently partitioned into 10 separate bidding areas.

TABLE 1 - STRUCTURE OF THE POWER MARKET

Sl. No.	Structure of transactions	Energy (in MUs)	%-age of the market
1	Long Term Bilateral PPAs	57735 MUs	93.17%
2	Short term bilateral (through traders and direct between distribution companies)	2029 MUs	3.27%
3	Unscheduled Interchange (UI)	1826 MUs	2.95%
4	Power Exchanges (PXIL and IEX)	377 MUs	0.61%
	Total electricity generation (excluding generation from renewable and captive power plants in India)	**61967 MUs**	**100%**

Source: Monthly Report on Short-Term Transactions of Electricity, October 2008, CERC)

Power exchanges

Currently, regulator CERC permits the purchase and sale of electricity on a day ahead market (DAM) basis through power exchanges. Both the existing power exchanges, Power Exchange India Ltd (PXIL) and Indian Energy Exchange (IEX), run only a DAM-based spot market. This concept in India uses an auction trade mechanism, whereby bids for the purchase and sale of contracts of one-hour duration that cover all 24 hours for the next day are collected by the exchanges between 10am and 12am.

As soon as the 12am deadline for participants to submit bids passes, all buy and sell orders are compiled into two curves for each delivery hour (an aggregate demand curve and aggregate supply curve). The market clearing price (MCP) for each hour is determined by the intersection of the aggregate supply and demand curve. Buy trades are settled at or below the quoted price and sell trades are settled at or above the quoted price, thereby ensuring maximum benefits to both buyers and sellers of electricity.

The Indian power market is currently partitioned into 10 separate bidding areas that can have separate prices if the unconstrained solution flow between bidding areas exceeds the available transfer capability (ATC). If there is no such constraint, the MCP will be uniform across the country. However, in case of a transmission constraint, the congestion management is done by market splitting, ie by increasing prices in deficit area and reducing them in surplus areas so as to facilitate power flow from surplus to deficit area.

The model adopted by Indian power exchanges is very similar to the one employed at Nordpool, with the difference being that the longer tenure products are likely to be developed in a significantly different way, in line with the realities in the Indian market.

Power exchanges – Benefits and utility

In addition to providing an efficient, transparent and equitable platform for better market price discovery, power exchanges provide price signals for bilateral trades. They facilitate market participants' access to the physical market without any cost and also eliminate credit risk by becoming counterparty to all the trades. To take advantage of the open market price realisation, the electricity generating firms these days have reduced their long-term power sale commitments from the earlier 90%–100% to 75%–80%. Generating firms expect that 20%–25% of their power if sold in the open market would provide them with better financial returns in a market projected to remain in supply deficit over a large part of the next decade.

Power Exchange India Limited

PXIL started its operations on October 22 2008. PXIL draws its strength from institutional promoters, the National Stock Exchange and the National Commodity and Derivative Exchange. PXIL draws its sectoral expertise from the domain knowledge of its other equity partners, which include state-owned utilities and independent power producers, as well as Power Finance Corporation (the largest lender to the power sector). It is observed that market participants are looking for longer-tenure products, particularly in view of rising demand in the ensuing summer season, to take advantage of market prices of electricity and to hedge themselves against unforeseen fluctuations in demand and supply.

Assessing the requirements of market participants, PXIL has applied to regulator CERC for approval to introduce forward and intraday contracts that can be traded on three-month, two-month, month-ahead and week-ahead, and intraday (also known as contingency or hour-ahead market) bases. In addition, PXIL also proposes to introduce a day-ahead contingency contract for trading surplus power on a day-ahead basis that has not been successfully matched in the first session of DAM.

Presently, power exchanges are in a nascent stage and barely trade 0.61% of electricity produced in India. Due to the limited number of market participants, erratic fluctuations are being seen in day-to-day cleared volumes. In these circumstances, maintaining sustainable liquidity at power exchanges is difficult.

Understanding the situation and taking clue from power exchanges worldwide, PXIL is of the opinion that for growth of liquidity, the time and sequence of introduction of new products are important. It is expected that over the next two years the spot/physical markets will develop sufficiently in terms of full-scale participation by state utilities, independent/captive power producers and will also see the introduction of longer-tenure products. The markets would benefit if forward products as well as financial derivatives (if allowed) were introduced.