

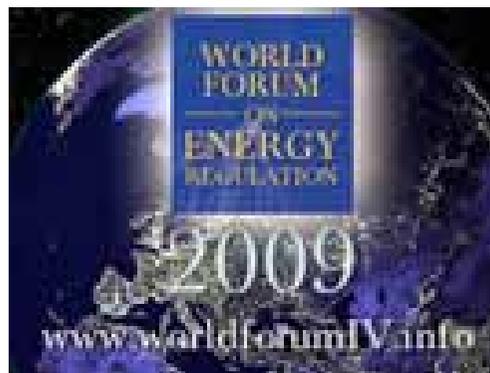
“The Role of Power Exchange in Developing a Competitive Power Market in India”

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MD & CEO, Power Exchange India Limited

World Forum on Energy Regulation IV

Athens, Greece, October 18-21, 2009



Agenda



☐ Indian Power Sector

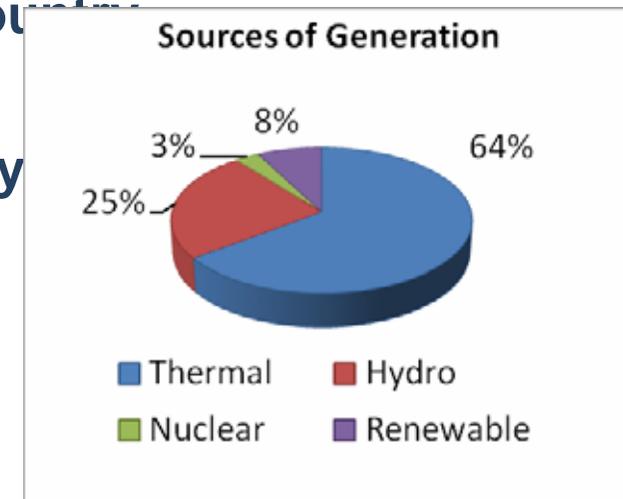
☐ In transition: to a Competitive Market

☐ Unique Experiences in India

☐ Power Exchange India Limited

Indian Power Sector

- ▣ 4th largest in Asia and 6th largest in the World
- ▣ Generation Capacity of 150,323 MW, as on June 2009
- ▣ However, energy availability of 689 BUs vs. requirement of 774 BUs
- ▣ Has consistently remained a power deficit country
- ▣ Pre-dominant focus on fossil fuels, especially

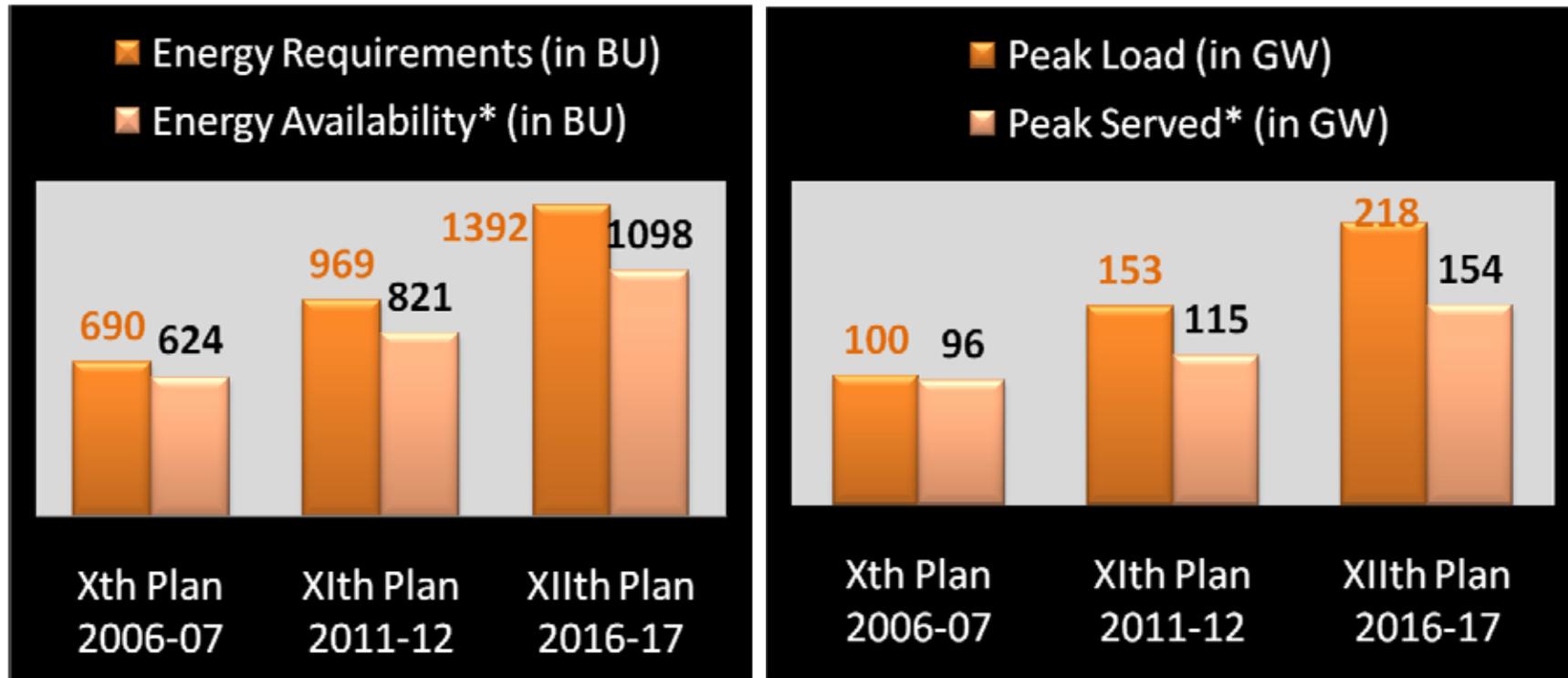


Source: CEA

Indian Power Sector



▣ Demand – Supply Summary Forecasts



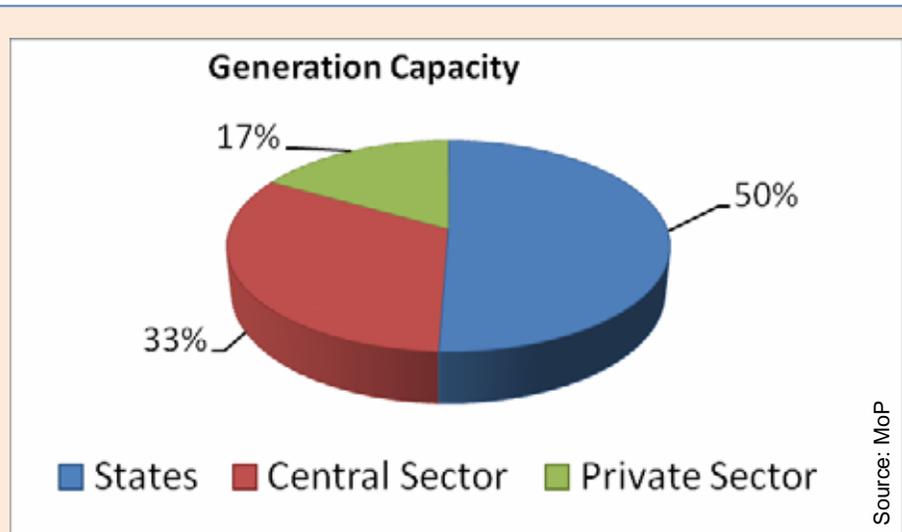
Source: CEA

*Extrapolated by

PXIL

Even with higher rates (6% y-o-y) of capacity addition and energy generation, India would continue to remain a power deficit country

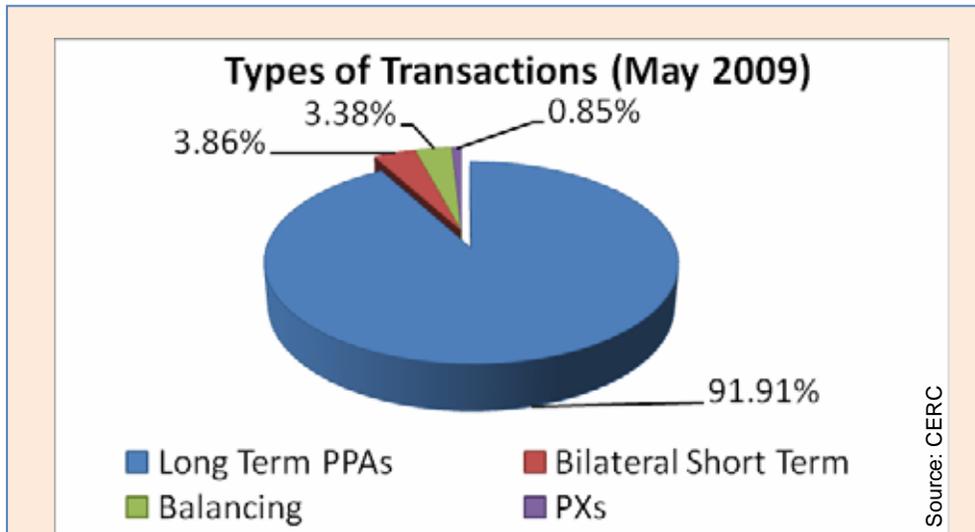
Issues in Indian Power Sector



Ownership structure

- Both Central Government and States have control
- Single-buyer model in most States
- Private Sector accounts for only 17% of generation capacity
- State Utilities not creditworthy
- Restrictive policies of State governments “Open Access”, “Cross

Subsidy” etc.



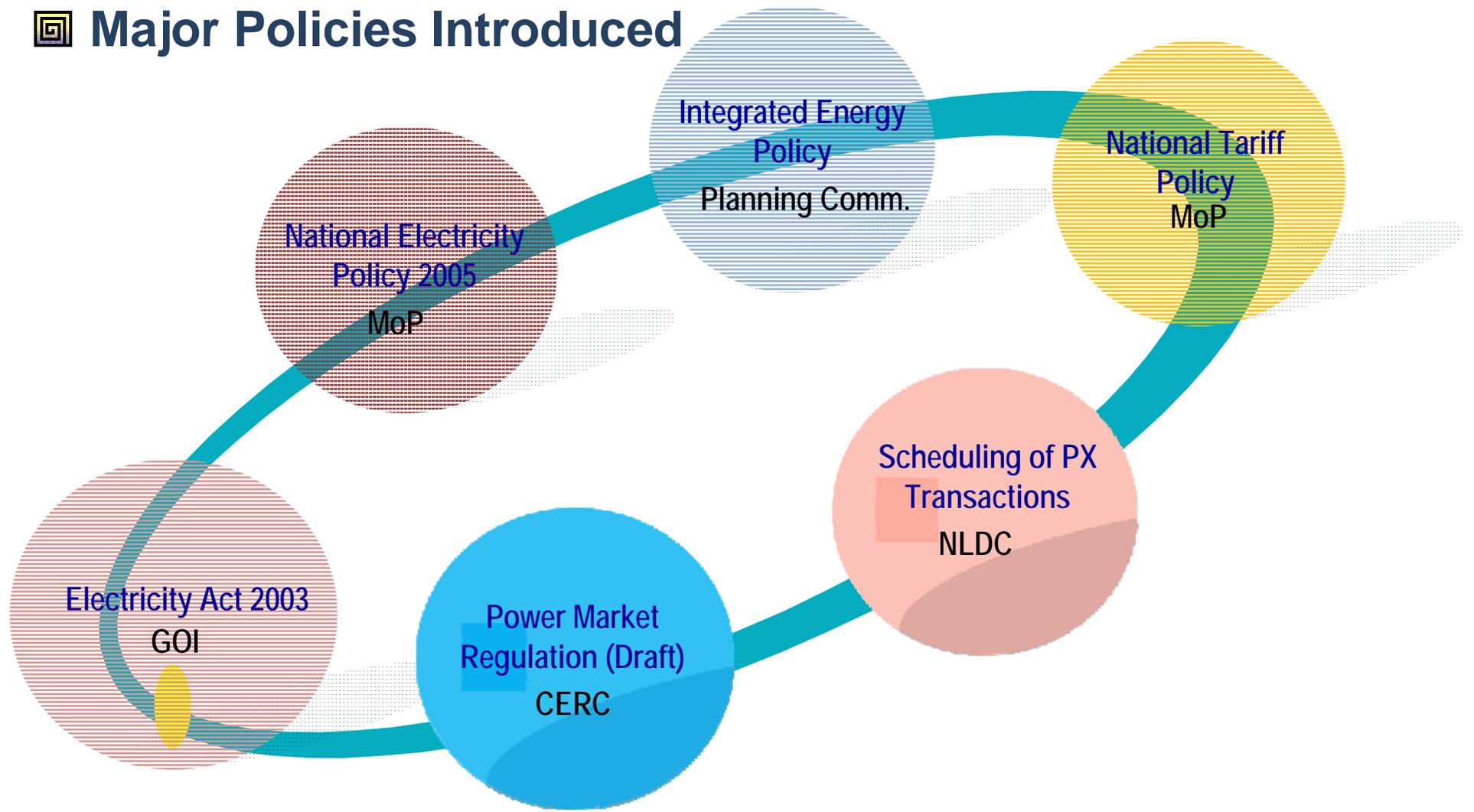
Transaction Structure

- Largely tied-up through PPAs
- Low liquidity in short term market due to
 - Insufficient power left for short term trade
 - Non-standardization of electricity trading products
- Merchant capacities are expected to increase

In transition: to a Competitive Market



Major Policies Introduced



Key precepts of the EA 2003

- ▣ **Compulsory Unbundling**
- ▣ **De-licensing of generation**
- ▣ **Separation of “transmission ownership” and “system operation”**
- ▣ **Universal Open Access to transmission networks**
- ▣ **Consumer level choice of supplier**
- ▣ **Development of a power market**

**Power Exchanges have emerged to provide
a competitive and efficient marketplace**

Power Exchanges in India

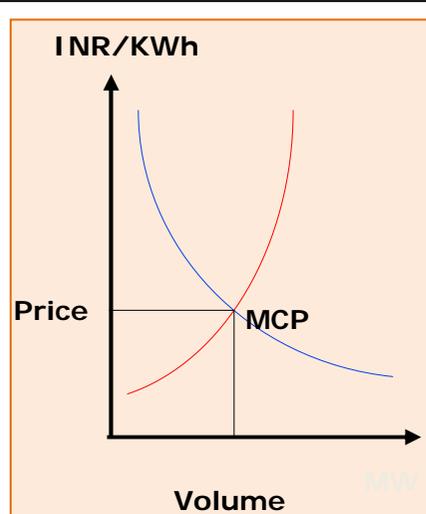
Day Ahead Contracts



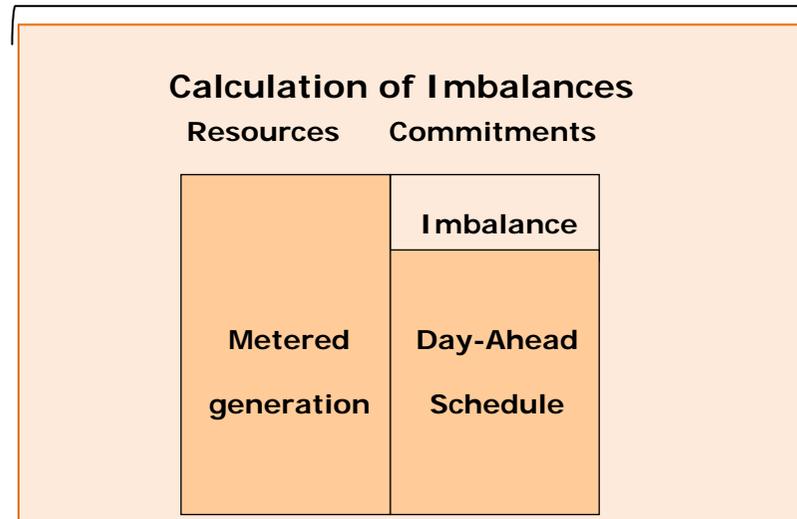
Day-ahead Spot Market

Buy Bids		Prices (INR / KWh)			
		1	5	7	10
Hours	00-08	200			
	08-16	500	400	250	
	16-24	400			

Sell Bids		Prices (INR / KWh)			
		1	5	7	10
Hours	00-08	150			
	08-16	400	500	600	
	16-24	350			



Real Time Market



One Day before Day of Delivery (D – 1)

- ▶ Double-sided closed bid Auction
- ▶ Price / Volume Bids
- ▶ Binding Contracts
- ▶ Financial settlement based on Cleared Volume and Price

Day of Delivery (D)

- ▶ Final Day-Ahead Schedule includes PX transactions.
- ▶ Deviations, linked to frequency of the Grid;
 - Balanced on a real-time basis
 - Penalties for over-drawal or under-supply
 - Benefits for under-drawal or over-supply

The Day-Ahead-Market for Indian PXs has been fashioned on the NordPool Market

Transmission Infrastructure in India



☐ Infrastructure

- 5 Electrical Regions, More than 25 Control areas
- Transmission constraints across regions

☐ Transmission pricing based on tenure of transactions

- Long Term – More than 25 years
 - Transmission access given for specific seller and buyer
 - Transmission pricing based on cost of asset and socialized over all beneficiaries in the Region
- Short Term – Upto 3 months
 - Transmission access given for each transaction separately for a specific seller and buyer pair
 - Transmission pricing arrived at as a percentage of long term transmission pricing
 - Earnings used to reduce the cost of asset for long term transmission consumers
- Day-Ahead Spot Market – For the next day only
 - Transmission access for trades through Power Exchanges - Collective transactions
 - Point of connection tariff – equal price for connection from anywhere in India
- Balancing – Real time
 - Power system frequency based pricing
 - Penalty or reward based on deviation from schedule in any 15 min time block

Power Market Development



▣ Issues addressed through Power Exchange (PX)

- National market provided by PX suits the Federal Structure of power market
- To start with, Day-Ahead Spot Market was designed in-line with NordPool model
- Term Ahead Market
 - A physical delivery based market, different from products offered by PXs worldwide
 - Products designed specifically for Indian market to manage both Quantity & Price risk
 - Standardization of Contracts are expected to boost liquidity
 - Exchanges need to discover known pairs of buyers and sellers for each term-ahead transactions
- Introduction of “Collective Transaction” that made complex process of Transmission pricing easier
- Power Exchange obviated credit default risk
- Professional Clearing Member (PCM) concept was pioneered and introduced by PXIL to Facilitate credit arrangements to members

New Product Developments

- ▣ **Making Markets function in a deficit / single buyer model**
- ▣ **Regional Bids – in all 5 Electricity Regions of the country**
- ▣ **Match buyers and sellers**
 - Sellers come in and declare their quantity and price
 - Buyers can bid at their preferred price
 - Buyers can procure from any Electrical Region
 - Pairs of buyer and seller for each contract are identified and sent to System Operators
- ▣ **Weekly contracts of upto one month in advance**
- ▣ **Newer contracts to be**
 - Longer term physical delivery contracts
 - RECs, EECs
 - Financial derivatives expected in the medium term

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☐ Promoters and Equity Partners

PROMOTERS

National Stock Exchange (NSE)	National Commodity and Derivatives Exchange (NCDEX)
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EQUITY PARTNERS

Central Government Entities	State Government Entities	Private Sector Entities
PFC Limited	GUVNL	JSW Energy Limited
	MPPTCL	Tata Power
	WBSEDCL	GMR Energy Limited

PXIL leverages on:

- experience of Promoters in running exchanges
- experience of State government entities and
- the most active private players in the country

Power Exchange India Limited



Product Development at PXIL

Sl. No.	Products	Term / Duration
1	Day Ahead (10 AM-12 Noon)	For 24 Hrs the next day
2	Day-ahead-contingency contracts 3 PM to 4:30 PM (after closure of Day ahead)	For 24 Hrs the next day
3	Weekly contracts	For pre-defined calendar weeks upto a month ahead
4	Month-ahead-contracts	1 st , 2 nd and 3 rd calendar months
5	Intra-day products	Trade within the day
6	Intra-State products	National products implemented within State's geographical boundaries



Product Development at PXIL is a consultative process involving stakeholders of power sector

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THANK YOU

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