



Power Market Development and Power Trading

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MERCADOS
ENERGY MARKETS INTERNATIONAL
Finding new paths for the energy market



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Overall Objectives

● Power Market Development

- Serve the interest of Society
- Provide correct price signals, help raise capital and reduce supply deficit
- Optimize asset utilization through short term trading
- Promote competition, efficiency and economy
- Create level playing field for different entities

● Power Market Regulation

- Ensure fair, neutral, efficient and robust price discovery
- Provide extensive and quick price dissemination to reduce information asymmetry
- Design standardized contract and work towards increasing liquidity

Indian Power Markets Development

Pre-1991 : ISGS Single-part tariff

- ▶ Bilateral transactions in radial transfer mode
- ▶ Very few one-to-one transactions (3-month / year)
- ▶ Single-part tariff

1991-2002 : ISGS two-part tariff

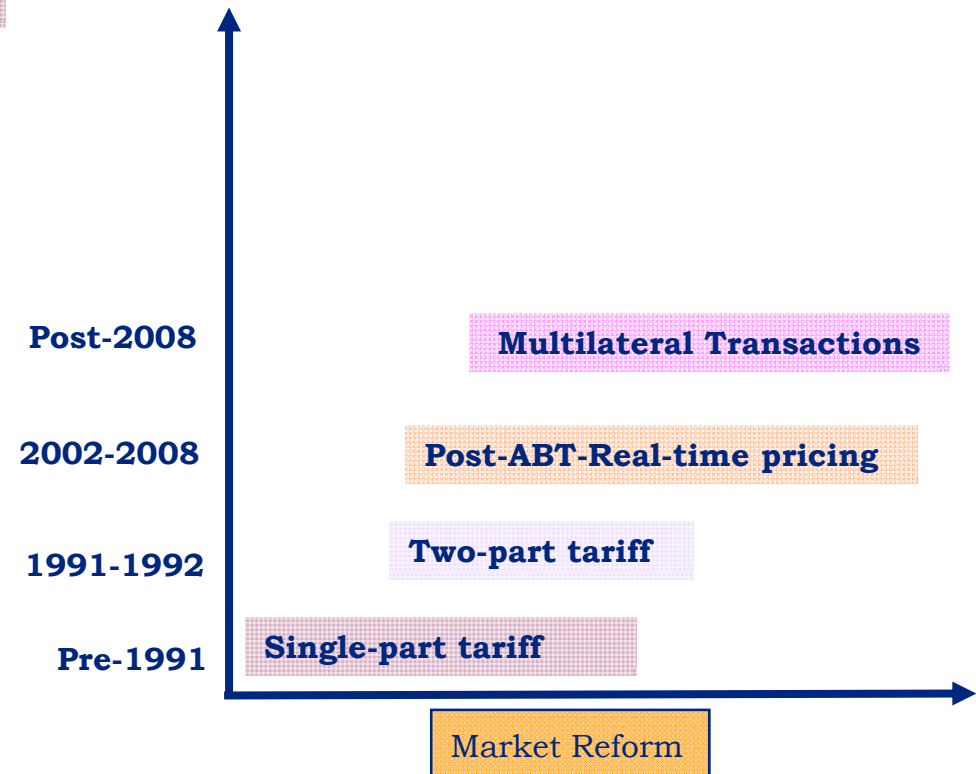
- ▶ Bilateral market in intra-region parallel mode
- ▶ Few transactions (month-wise)
- ▶ Two-part tariff
- ▶ CGS Share trades in form of overdrawal/underdrawal

2002-2008 : ISGS Three-part tariff (ABT)

- ▶ Electricity Act: Emphasis market Development
- ▶ Real-time market
- ▶ Multiple regions in parallel
- ▶ Large transactions – UI market Vs Bilateral market
- ▶ Trading on Day and ToD basis

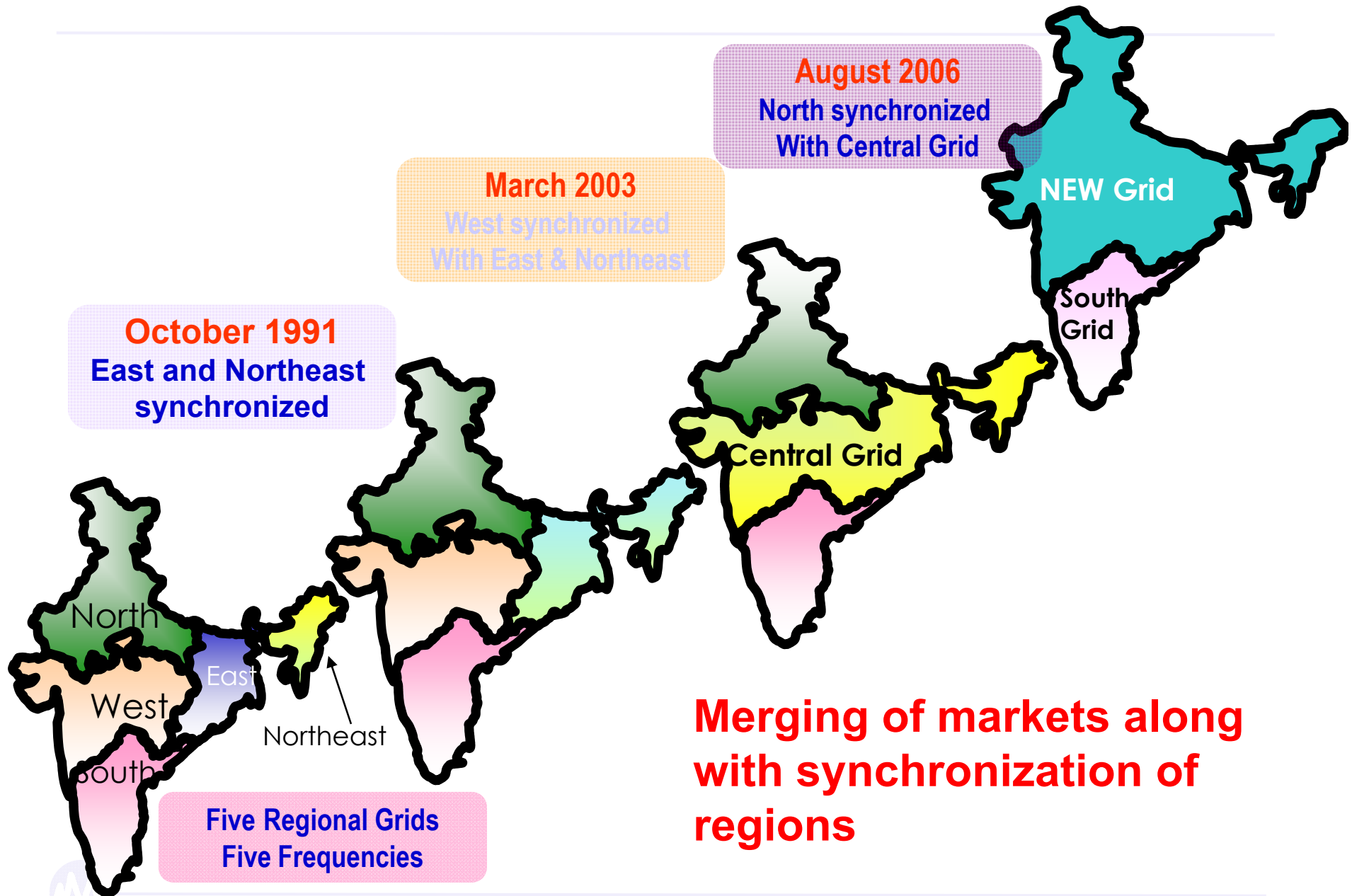
Post 2008 : Multilateral Transactions

- ▶ Era of true competitive markets
- ▶ UI, Bilateral and Collective transactions
- ▶ Very large transactions
- ▶ Trading on hourly basis

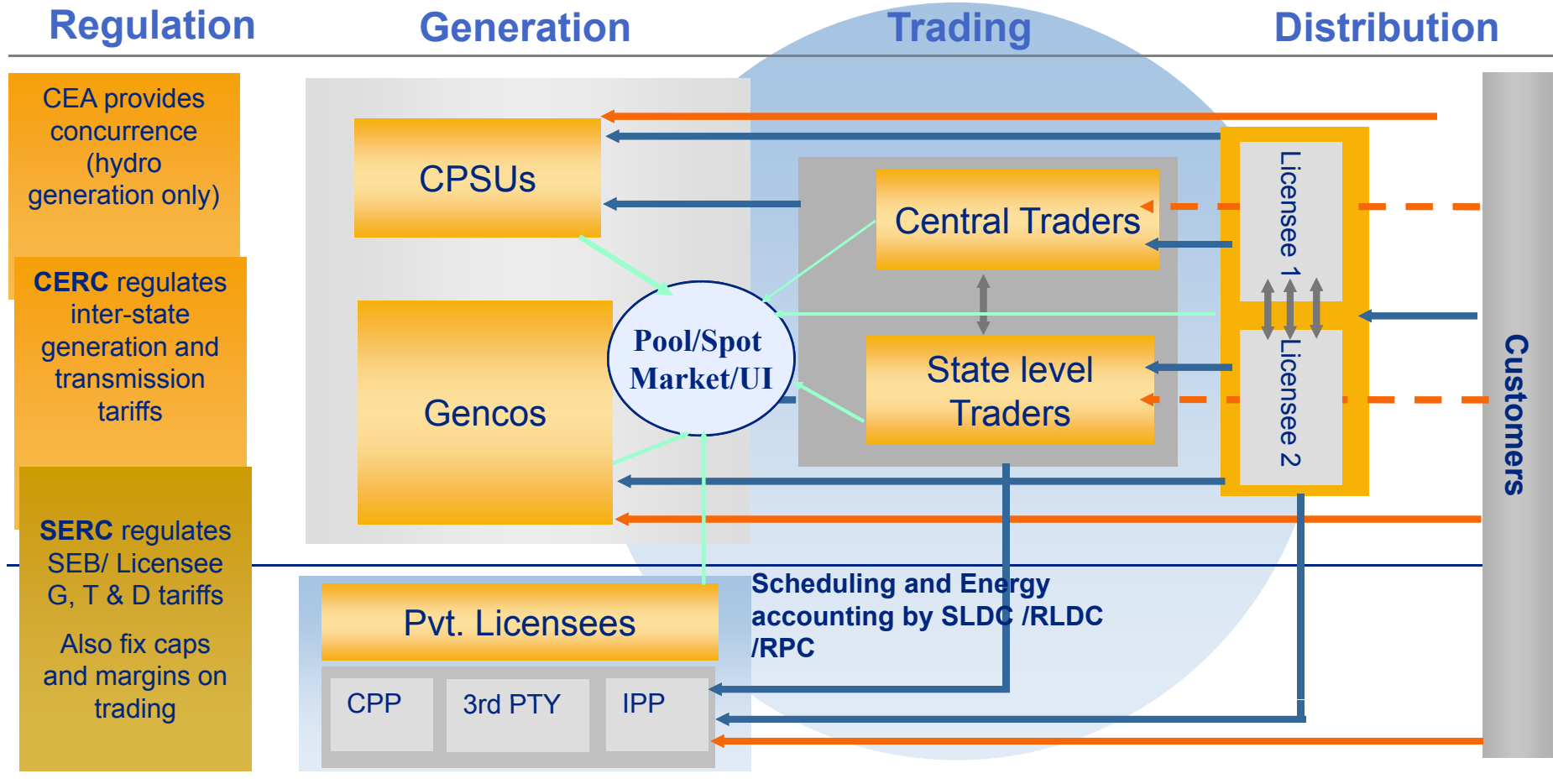


Source : Paper by IIT Kanpur at INDICON 2008

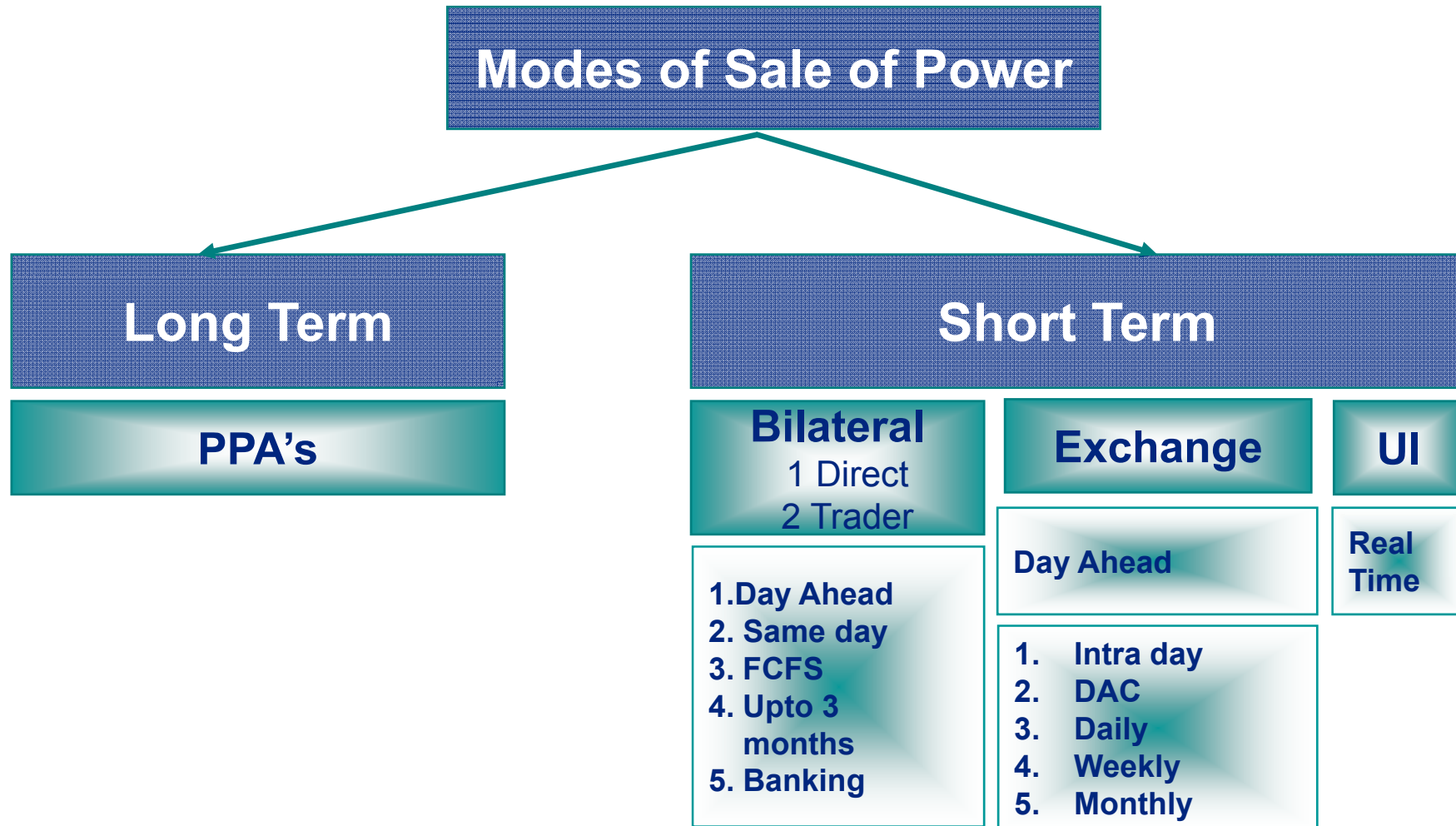
Evolution of Synchronous Grids



Market structures now permit a wide range of purchase and sale options



Various Modes of Sale of Power



Components of Power Markets

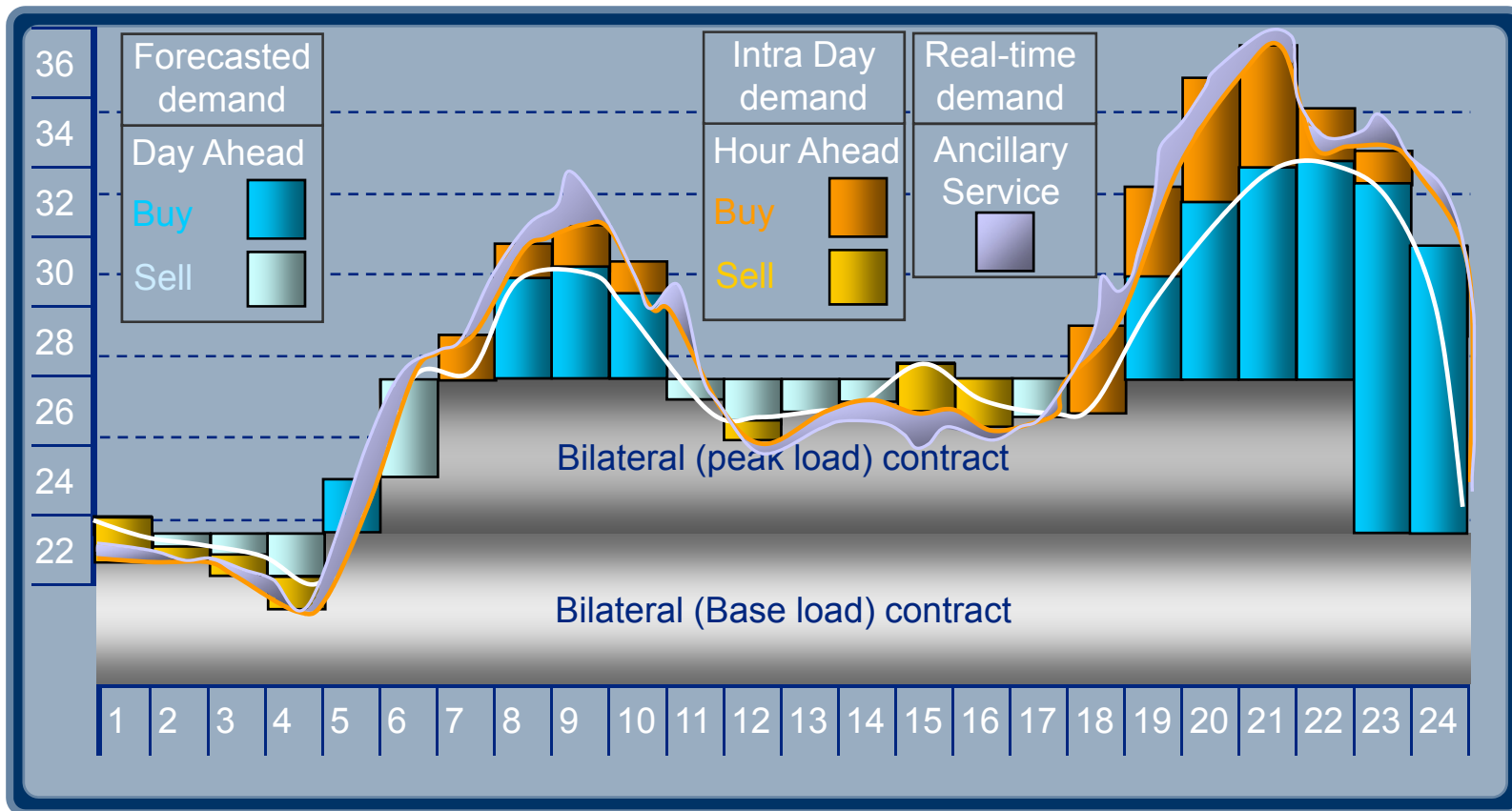


Overview of Indian Market Situation

- Chronic deficits. There is no market risk practically, although there could be price risks
- Discoms in practice have no *obligation to supply*. This influences their decision making processes
 - The focus is on securing deliveries when needed to overcome basic shortages
- For sellers, it is devising an optimal strategy that they can execute considering:
 - Maximisation of returns *while*,
 - Simultaneously ensuring financeability of projects
 - Late stage or operational projects often have different portfolio strategies than early development stage projects
- Trader and intermediary positions slightly distinct. Risk management is a more serious issue when positions are taken
 - However as of now, few if any traders take exposed positions

Power Exchanges help in maximizing efficiency

→ **Surpluses/Deficits** - Balance physical supply and demand



Trends in Volume of Short-term transactions of electricity

Type of Transactions	Volume of short-term transactions (MUs)					
	Jan 09	Feb 09	Mar 09	Apr 09	May 09	Jun 09
1. Bilateral Transactions	2121	2149	1942	2210	2317	2418
(i) Through Traders	1715	1678	1696	1795	2070	1844
(ii) Direct	406	471	246	415	247	574
2. Power Exchange transactions	316	218	429	406	342	529
3. Transactions through UI	1911	1569	1878	1816	1997	2119
Total Short-term transactions	4349	3936	4248	4432	4656	5066
Total Electricity Generation in India	61193	57121	64842	62486	63465	62646
% of short-term transactions to total electricity generation in India	7.11%	6.89%	6.55%	7.09%	7.34%	8.09%



Trends in Volume of Short-term transactions of electricity

Type of Transactions	Volume of short-term transactions (MUs)			
	Jul 09	Aug 09	Sep 09	Oct 09
1. Bilateral Transactions	3020	3369	2857	2771
(i) Through Traders	2402	2761	2518	2210
(ii) Direct	618	607	338	561
2. Power Exchange transactions	495	493	527	639
3. Transactions through UI	2204	1926	2210	2251
Total Short-term transactions	5720	5789	5595	5662
Total Electricity Generation in India	62935	65563	63188	64896
% of short-term transactions to total electricity generation in India	9.09%	8.83%	8.85%	8.72%

Volume of Short-term transactions of electricity to total electricity is varying between 6.5% to 9.1%. There is an increasing trend of share of volume of short-term transactions to total electricity generation



Price of Short-term transaction of Electricity (Rs/kWh)

Sr. No	Type of Transaction	Price of short-term transactions of electricity									
		Jan 09	Feb 09	Mar 09	Apr 09	May 09	Jun 09	Jul 09	Aug 09	Sep 09	Oct 09
1	Bilateral through traders	7.23	6.58	7.43	7.21	6.82	5.05	4.75	4.64	4.73	5.07
	RTC	7.43	6.89	7.35	6.83	6.60	5.04	4.72	4.46	4.60	4.86
	PEAK	8.55	8.16	8.08	9.05	8.18	6.44	5.92	6.32	6.02	6.48
	OFF PEAK	6.78	6.19	7.53	8.47	8.03	5.07	4.98	5.77	5.48	5.80
2	Power Exchange										
	PX (IEX)	6.16	6.85	8.33	10.10	6.84	7.39	4.81	7.40	4.00	4.73
	PX (PXIL)	6.86	7.42	8.54	10.18	8.74	9.60	4.85	6.15	4.32	5.18
3	UI										
	UI (NEW Grid)	4.99	4.89	4.85	5.36	4.17	4.94	4.12	6.29	5.02	5.83
	UI (SR Grid)	7.61	7.68	8.20	6.04	3.99	5.10	4.67	5.85	4.20	4.24

There is softening of short-term prices in the period July 09 to September 09 though in October 09 the price has risen again. Even prices at exchange have reduced and is in the range of Rs 4-5 per kWh except August 09. UI prices in September and October 09 in SR region is lower than NEW grid because of improved frequency conditions.

Key Buyers and Sellers States

Key Buyers in 2008 by the Volumes transacted through Bilateral Trading and on the Power Exchange

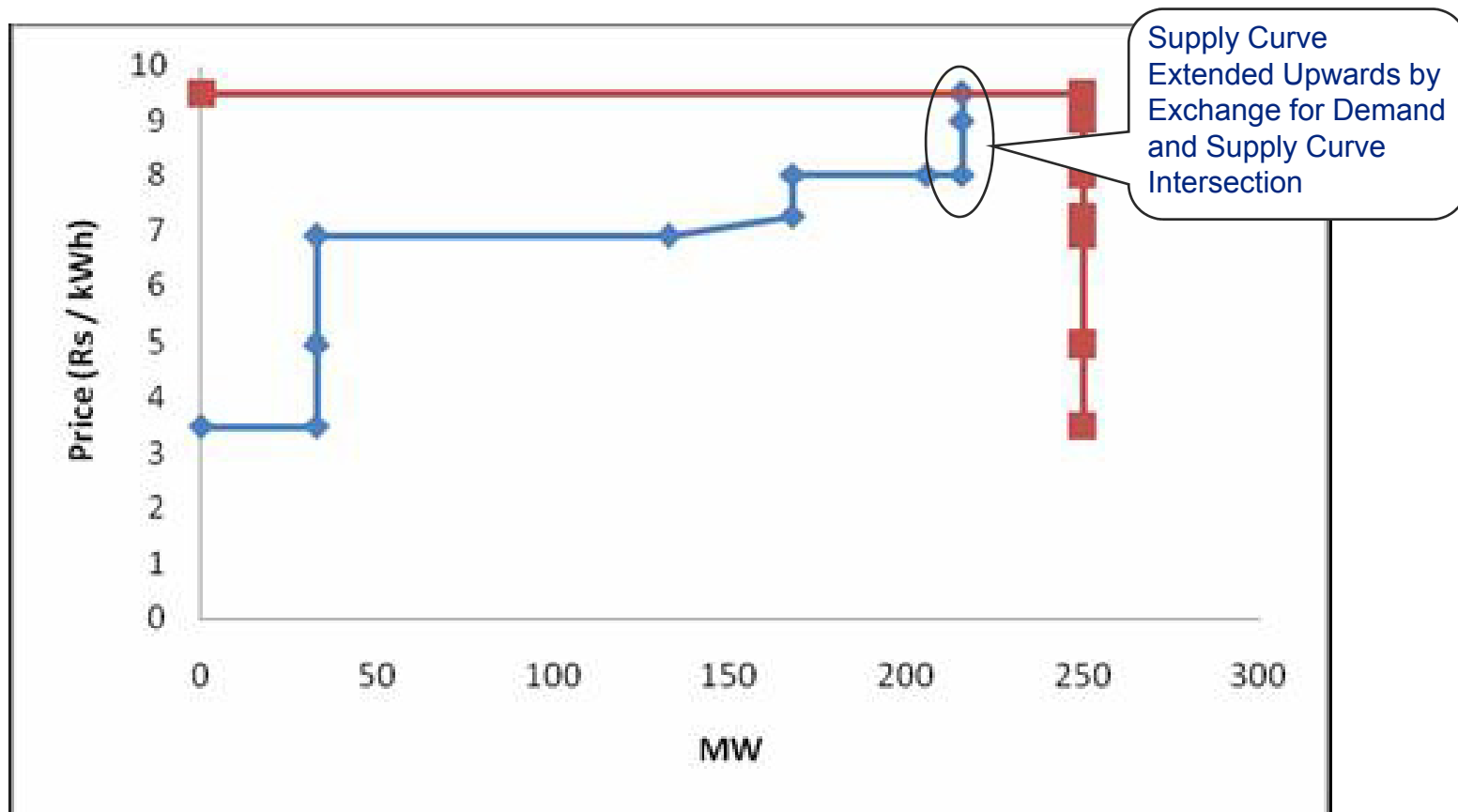
Rank	Bilateral	Power Exchange
1	Punjab	Maharashtra
2	Uttar Pradesh	Haryana
3	Maharashtra	Tamil Nadu
4	Gujarat	Kerala
5	Haryana	Andhra Pradesh

Key Sellers in 2008 by the Volumes transacted through Bilateral Trading and on the Power Exchange

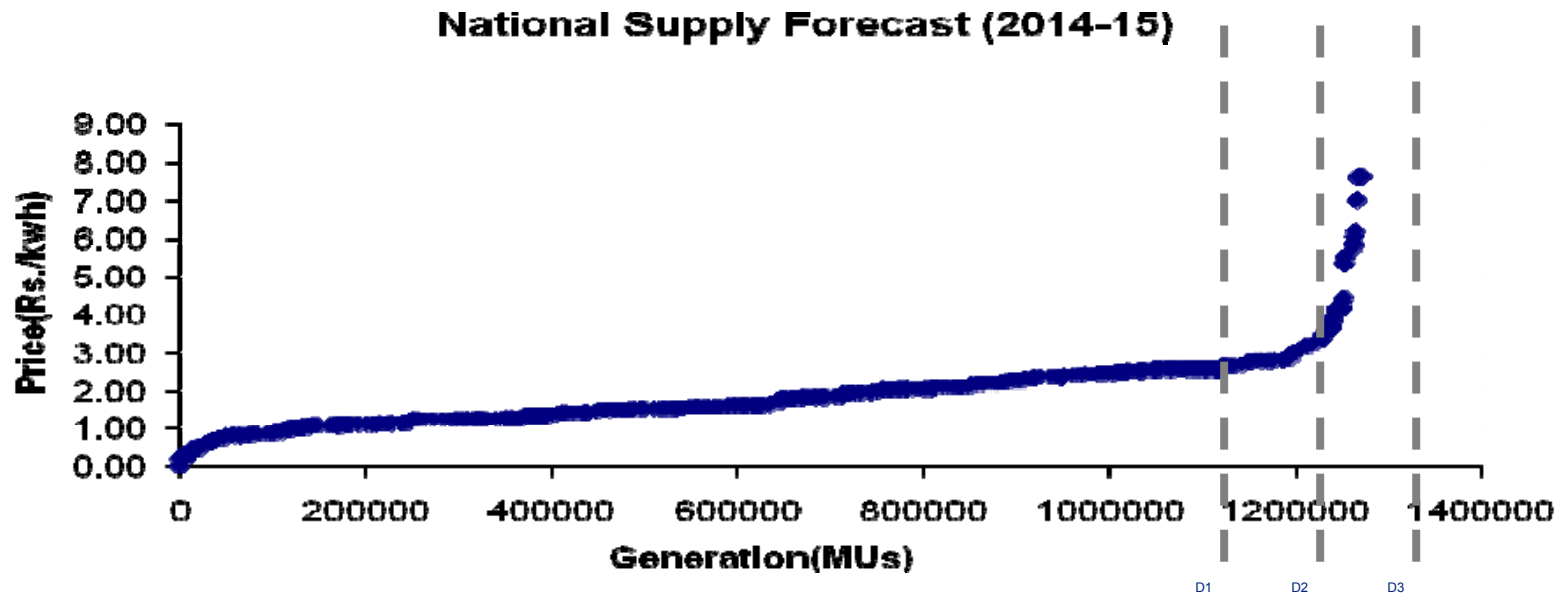
Rank	Bilateral	Power Exchange
1	Himachal Pradesh	Chhattisgarh
2	Madhya Pradesh	West Bengal
3	West Bengal	Madhya Pradesh
4	Chhattisgarh	Rajasthan
5	Sikkim	Himachal Pradesh

Southern States like Tamil Nadu & Andhra Pradesh and Western States like Maharashtra and Madhya Pradesh will remain key buyers till 2014-15 and Chhattisgarh, Gujarat and Orissa will be the key seller states

Price Formation in Capacity Constrained Markets Are Often Determined by Demand Alone



National Supply Curve in 2014-15



- Majority of capacity is at a variable cost ranging from 0.60- 3.4 Rs/kWh. This is primarily the hydro and the coal based thermal generation. Generation from diesel, naphtha will fetch a higher price and this is the capacity that will be backed down when the aggregate demand will be met.
- If the aggregate demand and aggregate supply curve intersect at a point where cumulative generation exceeds 1200000 then the price formed will be higher and this costly generation will have to be dispatched



Thank You