



Functioning of Power Exchanges: Development , Regulation and Products

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Electricity Market Design?

“Power Markets are actually ‘sequences of markets’ from the pre-commitment of plants at Day(s) Ahead to real-time balancing of actual injections and withdrawals; via the allocation of transmission capacity and the necessary management of unforeseen congestions.” Evolution of Global Electricity Markets by Sioshansi, 2013.

Vertical

or

Wholesale or Retail

Pool

or

Exchange

Single

or

Multiple

Auction

or

Continuous

Uniform

or

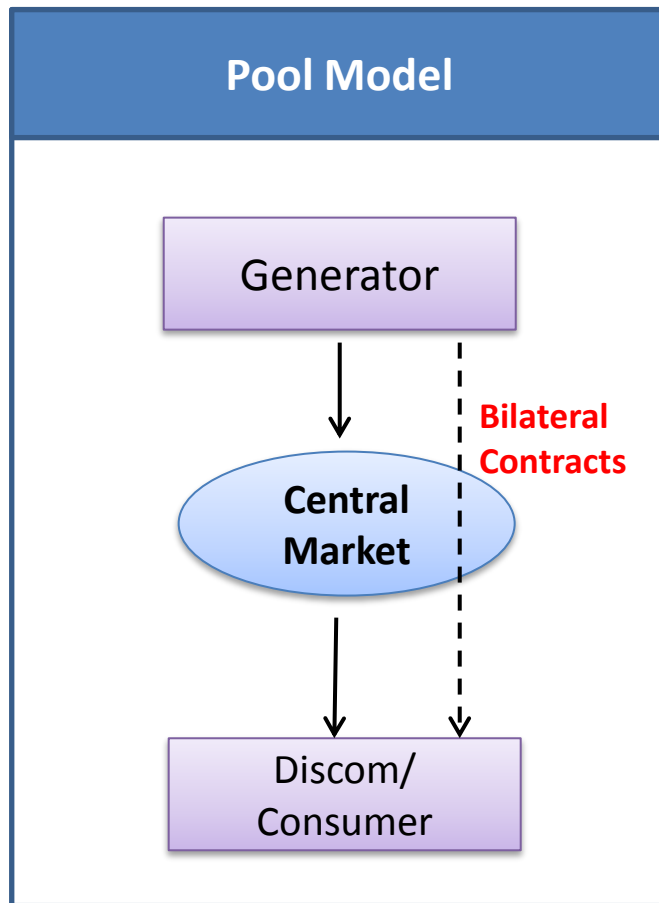
Pay-as-bid

Implicit

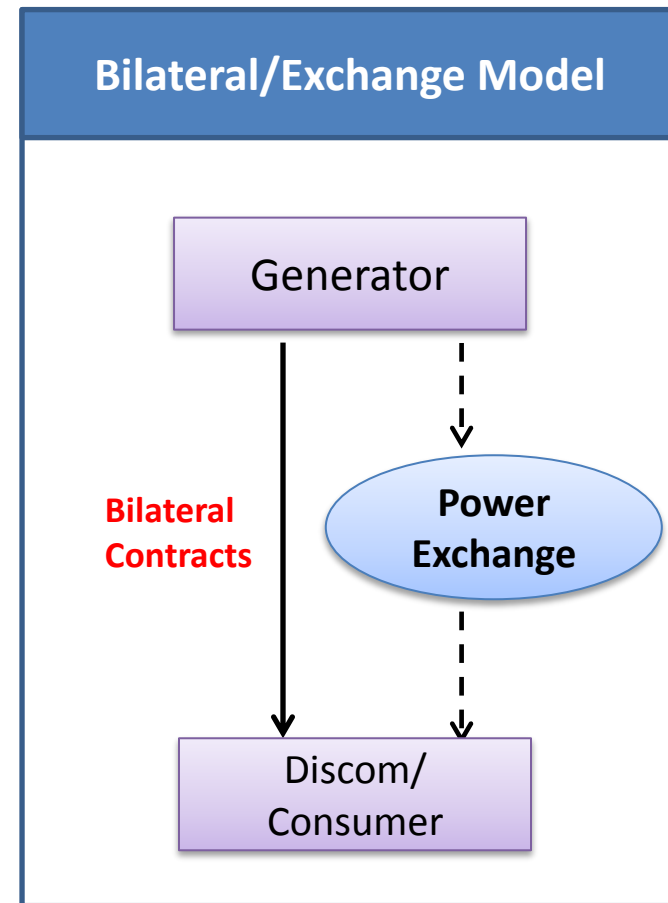
or

Explicit

Pool vs Exchange Model



Centralised Dispatch



Decentralised Dispatch

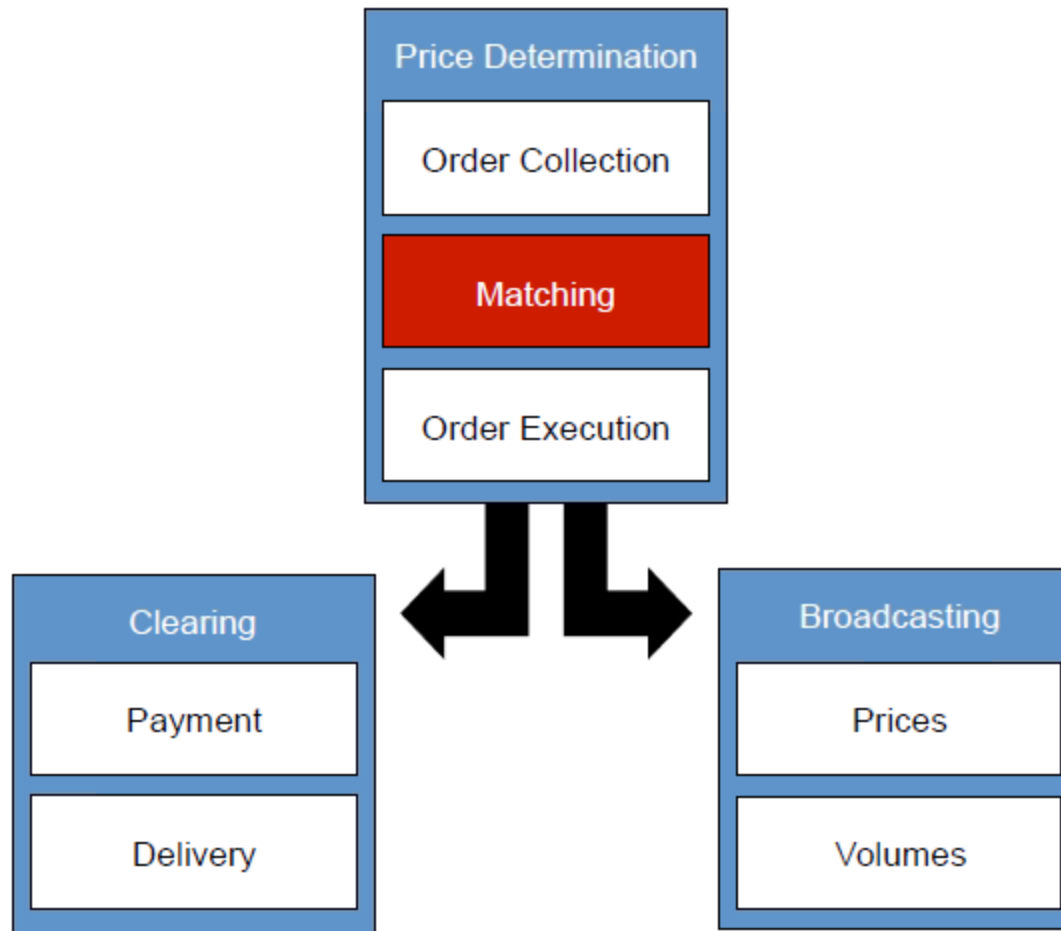
Pool vs Exchange Model

	Pool	Exchange
Characteristics	<ul style="list-style-type: none"> Largely emulates the originally vertically integrated and strictly regulated market architectures 	<ul style="list-style-type: none"> Suited where decentralised markets exist, with deregulated environment
Pros	<ul style="list-style-type: none"> Permits an excellent co-ordination of the various sub-sections of the electricity market Considered the only way in which electricity supply at minimum costs could be ensured Advantageous if competition is strong or regulation is effective, if the demand cannot play a big role in pricing 	<ul style="list-style-type: none"> Easier to achieve an active participation of the demand side in electricity trading market participants can usually avoid institutions which do not work well Errors in the design of the market cause less damage and can be identified and remedied faster Advantages if close co-ordination could be achieved by means of a suitable market architecture
Cons	<ul style="list-style-type: none"> Demand side has few incentives and possibilities to make a contribution in pool models or to respond to prices Mandatory trading at an electricity pool suppresses the competition among different market platforms Defective or deficient design of the procedures and rules at the pool results to grave imperfections as there wont be alternatives Focus of the optimisation algorithms on short-term cost minimisation, which leads to a situation in which investment incentives can be distorted Requirement of close monitoring of the market not only implies high costs but also that the regulator (with poorer information) has to take decisions which the market takes in an Exchange model 	<ul style="list-style-type: none"> Coordination problems

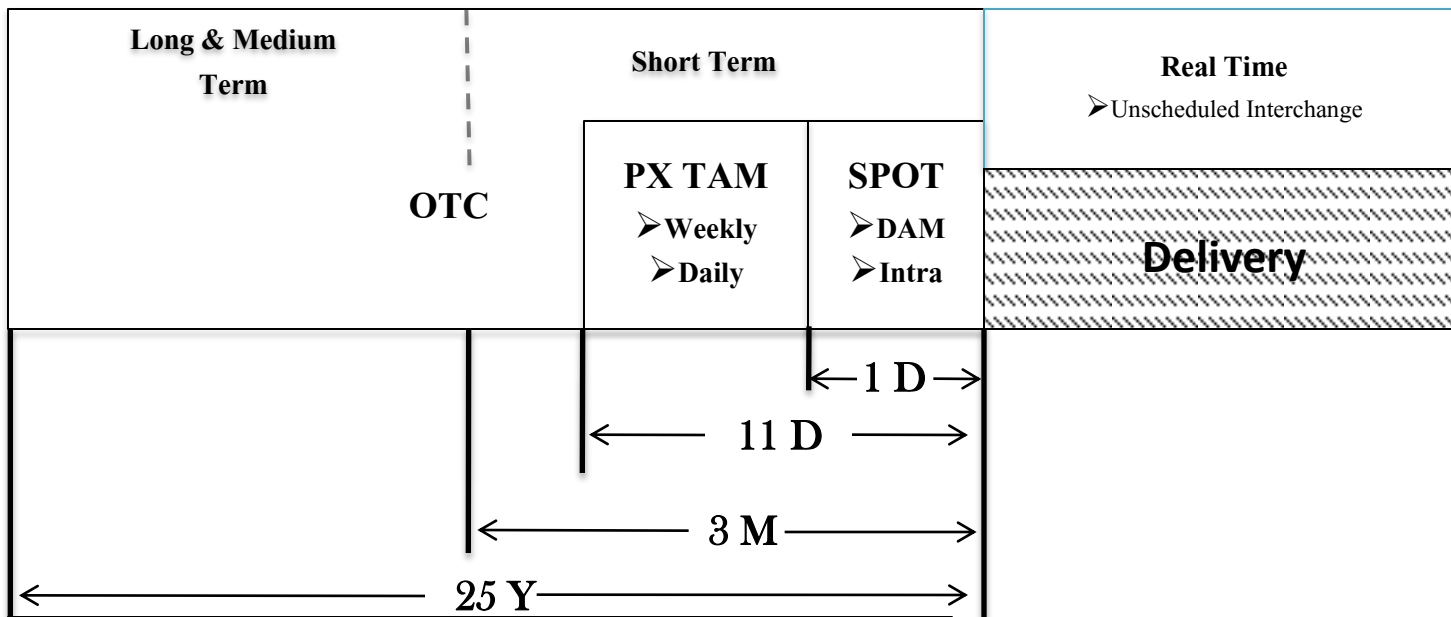
Power Exchange: functions



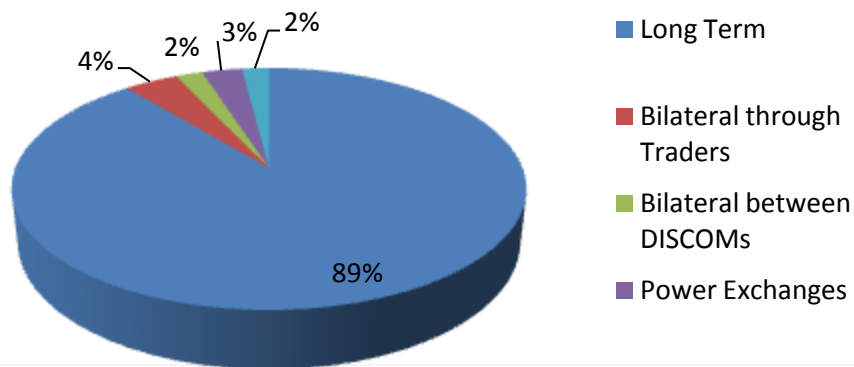
Power Exchange: functions



Wholesale Power Market in India



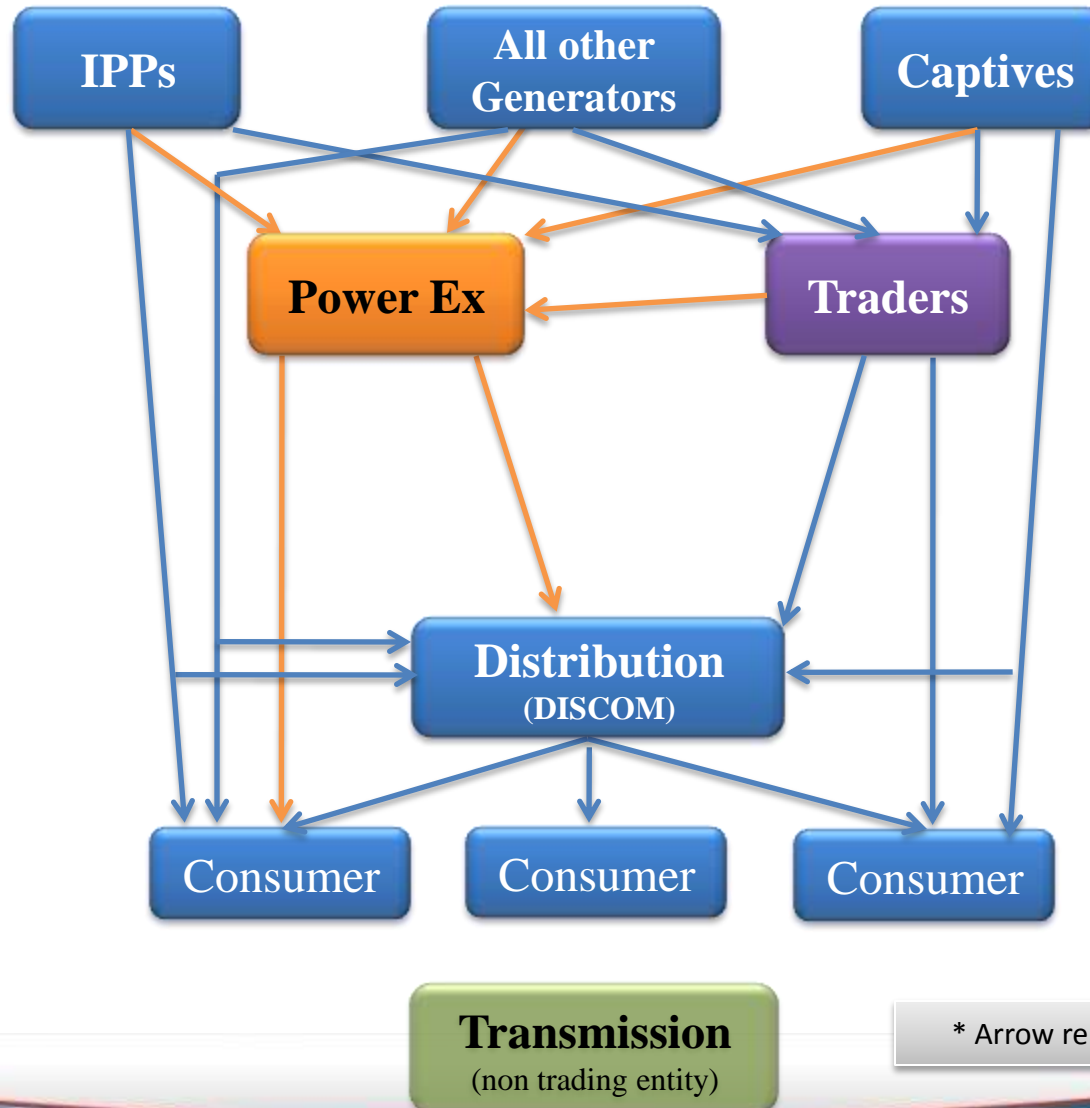
Wholesale Market Segments (FY 2014-15)



OTC- Over The Counter
 DAM- Day Ahead Market
 Intra- Intraday Market
 UI- Unscheduled Interchange

Competitive Wholesale Market

(Post EA 2003)



- **Independent System Operator (ISO – RLDC/SLDC)**
- **Market Operator**
 - Power Exchanges
- **Monitoring**
 - CERC
- **Mechanisms for Scheduling, Metering, Balancing, Accounting, Settling**
 - CTU, STU
 - RPCs

Products on IEX

Delivery-based Contracts



Day-Ahead Market
since June,08

Closed , Double-sided Auction

10-12 am bidding

Each 15-min block , 0.1 MW min NOC required



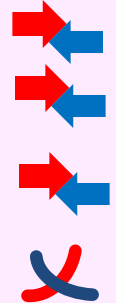
Term-Ahead Market
since Sep,09

Day-Ahead Contingency – Another window 3-5pm

Intra-Day - for the same day starting 2 pm

Daily- for rolling seven days (delivery starting after 4 days)

Weekly- for 1 week (Monday-Sunday)



Renewable Energy Certificates
since Feb,11

Green Attributes as Certificates

Sellers : RE generators not under feed in tariffs

Buyers: Obligated entities

1MWh equivalent to 1 REC



Next... Energy Saving Certificates



Auction



Continuous

Regulatory Environment for PXs

Level 1

- Regulatory oversight of CERC
- CERC Power Market Regulations, 2010

- Approval / Suspension Contracts
- Principles of Market Design
- Registration
- Prudential Norms for PX
- Clearing Corporation
- Market Oversight

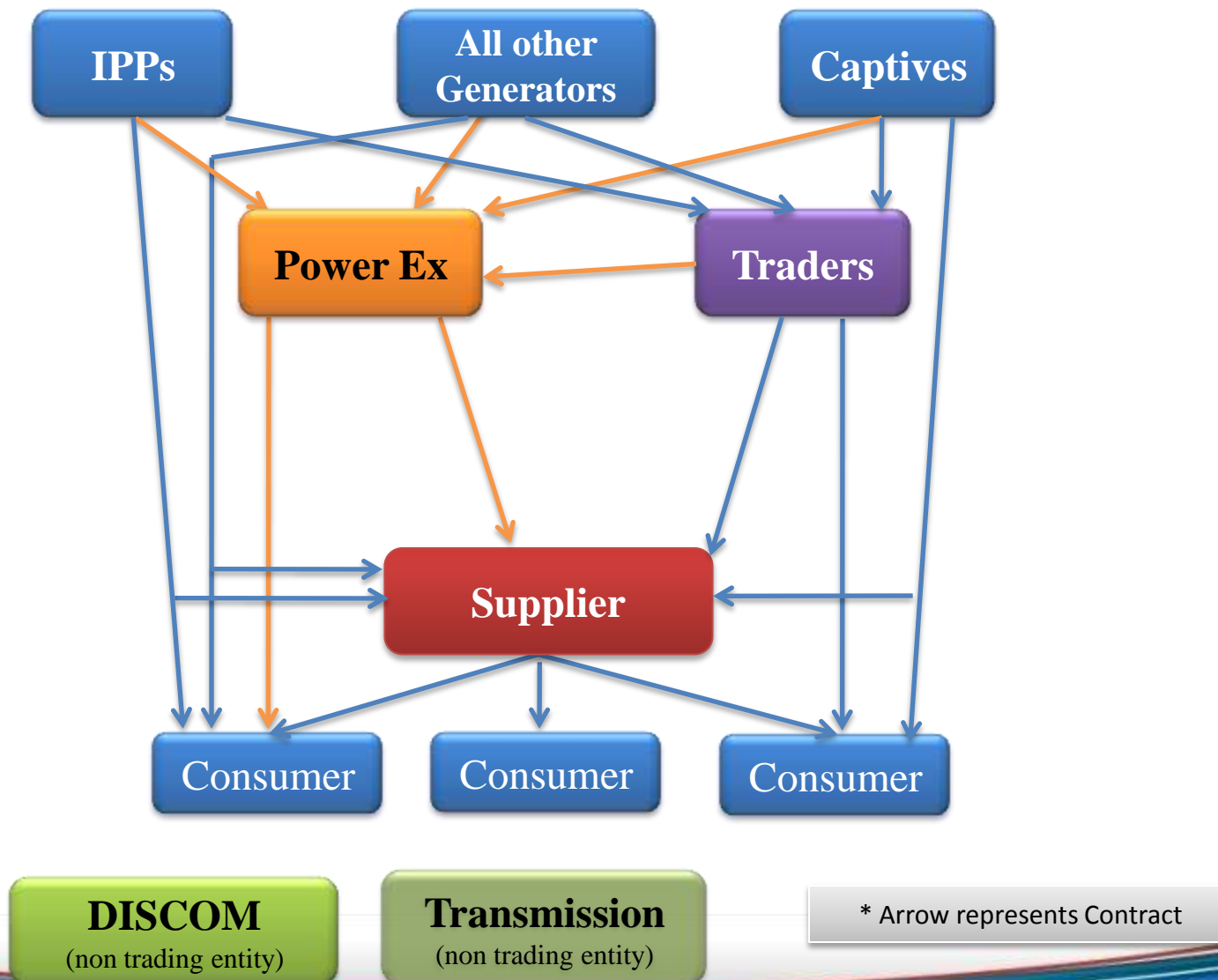
Level 2

- Self regulation by PXs
- Business Rules and Bye Laws of respective PXs, approved by CERC

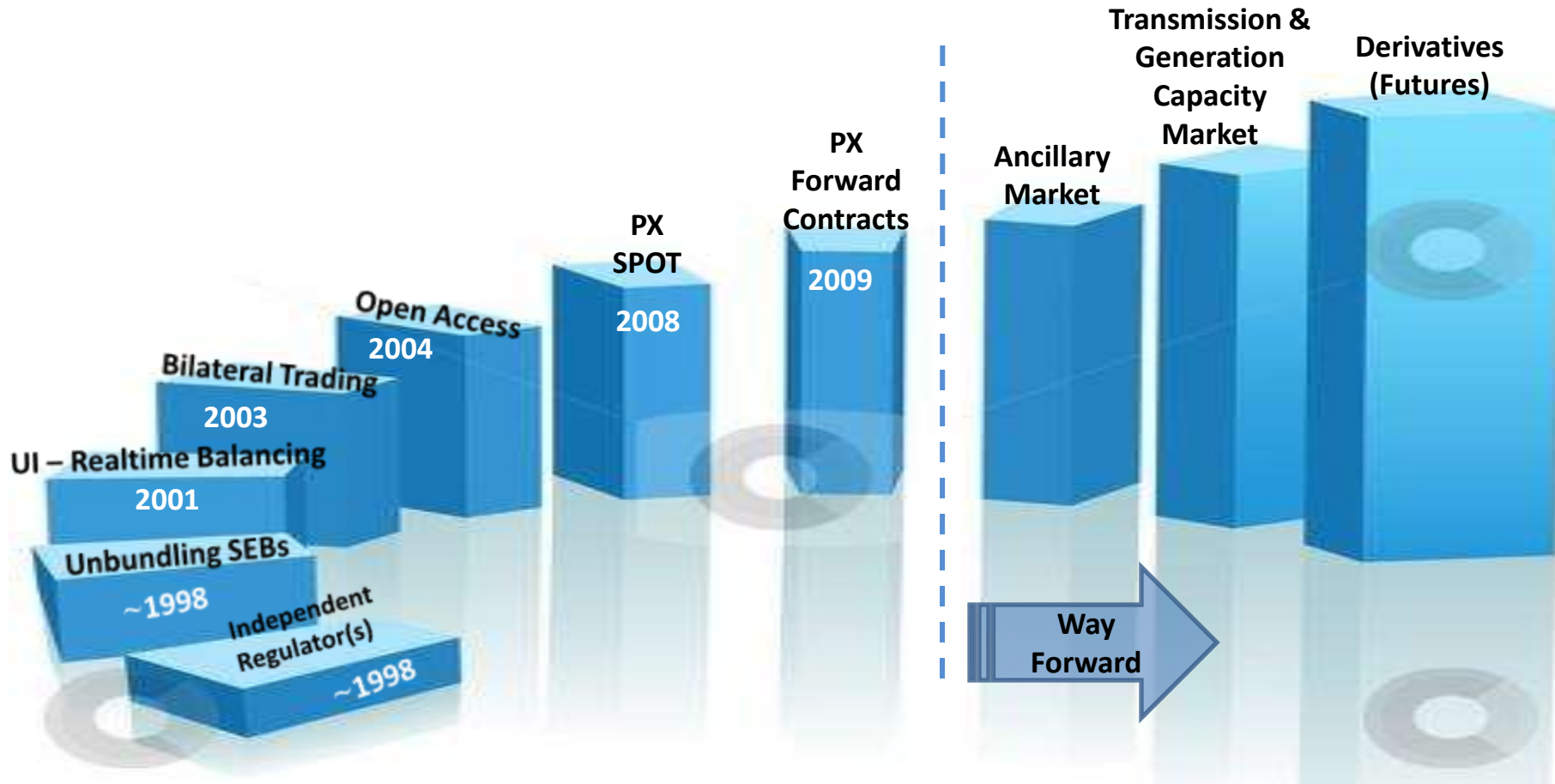
- Contract Specifications
- Clearing
- Matching mechanism
- Risk Management
- Settlement
- Membership
- Fee

Competitive Wholesale Market

(Proposed EA Amendment 2014)



Milestones & Way Forward



Extended Market Session on Power Exchanges

CERC order dated 8th April 2015



- PXs to offer round the clock Intraday market, including offering the DAC market till end of day
- To be operational within 3 months, i.e. by July 2015
- Delivery within 3 hours of conclusion of trade
- All other features to remain same as that of existing design
- Implementation of National Open Access Registry (NOAR) would be looked into
- 6 months pilot project

Thank You for your attention

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Best Power Exchange in India
– Enertia Awards '14, '13 & '12
– India Power Award 2014
– Power Business View 2014

**Inc India Innovative 100 Award for
'Innovation in Product and Technology'**

***Best Performing Power Exchange –
Power Line Awards '13 & '12***

***Best E-enabled consumer platform –
India Power Awards '09***