

Electricity Exchanges in South Asia – The Indian Energy Exchange Model

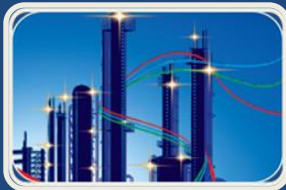
18 Mar'14



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In this presentation



Overview - Indian Market



Short Term Trading through Exchange



Proposed mechanism for regional electricity market

Market related legislations

Electricity Act, 2003

- De-licensing of generation
- Development of a multi-buyer multi-seller market in power
- Trading – licensed activity.

National Electricity Policy , 2005

- Measures to promote competition aimed at consumer benefits
- Promote competition through developing markets

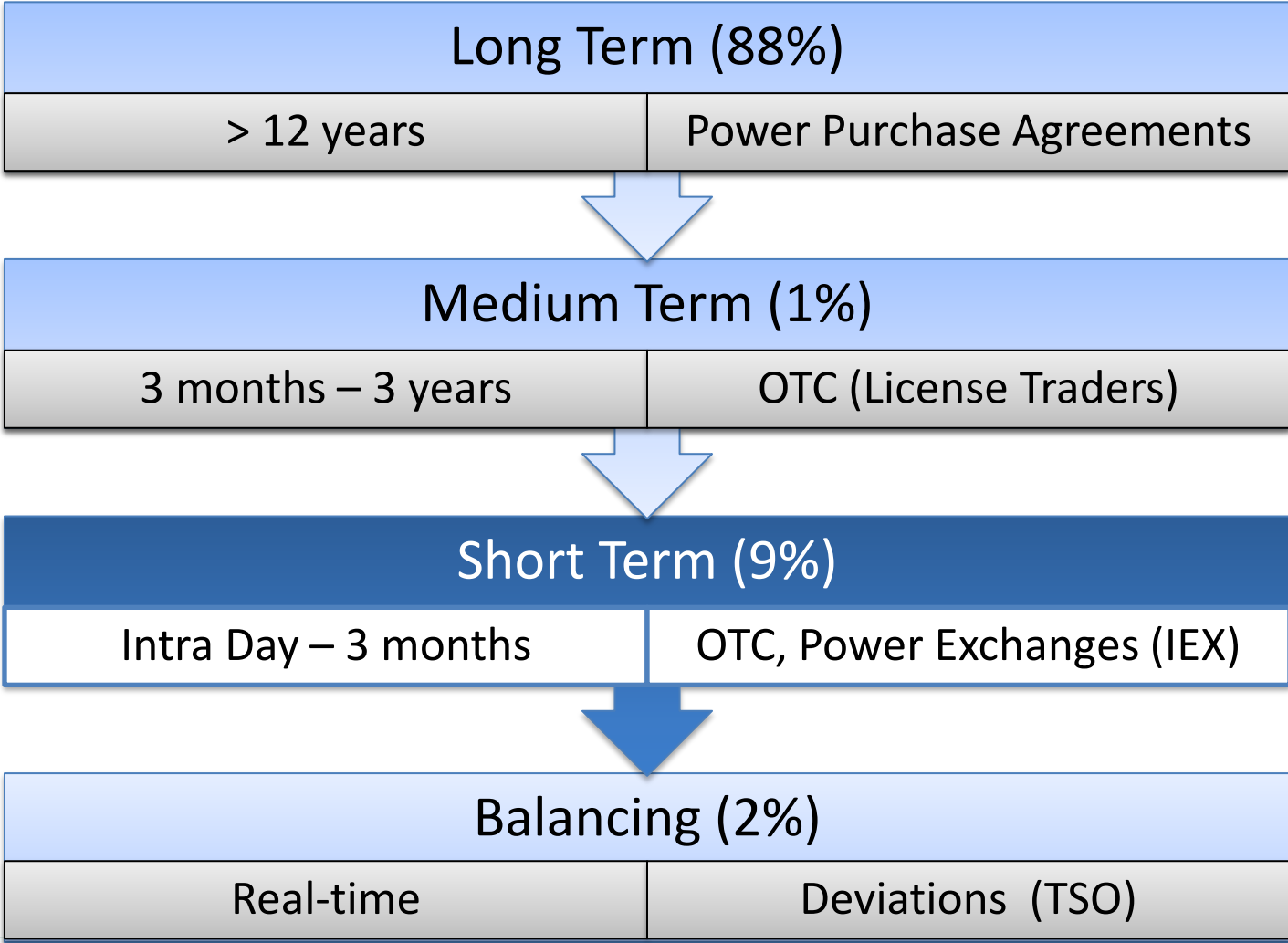
Open Access Regulations , 2004 & 2008

- Universal Open Access to transmission networks
- Procedures for 'Day-Ahead Market' and OTC transactions

Power Market Regulations, 2010

- Formal framework for Competitive markets
- Norms for setting up and operating power exchanges

Power Market: Present status



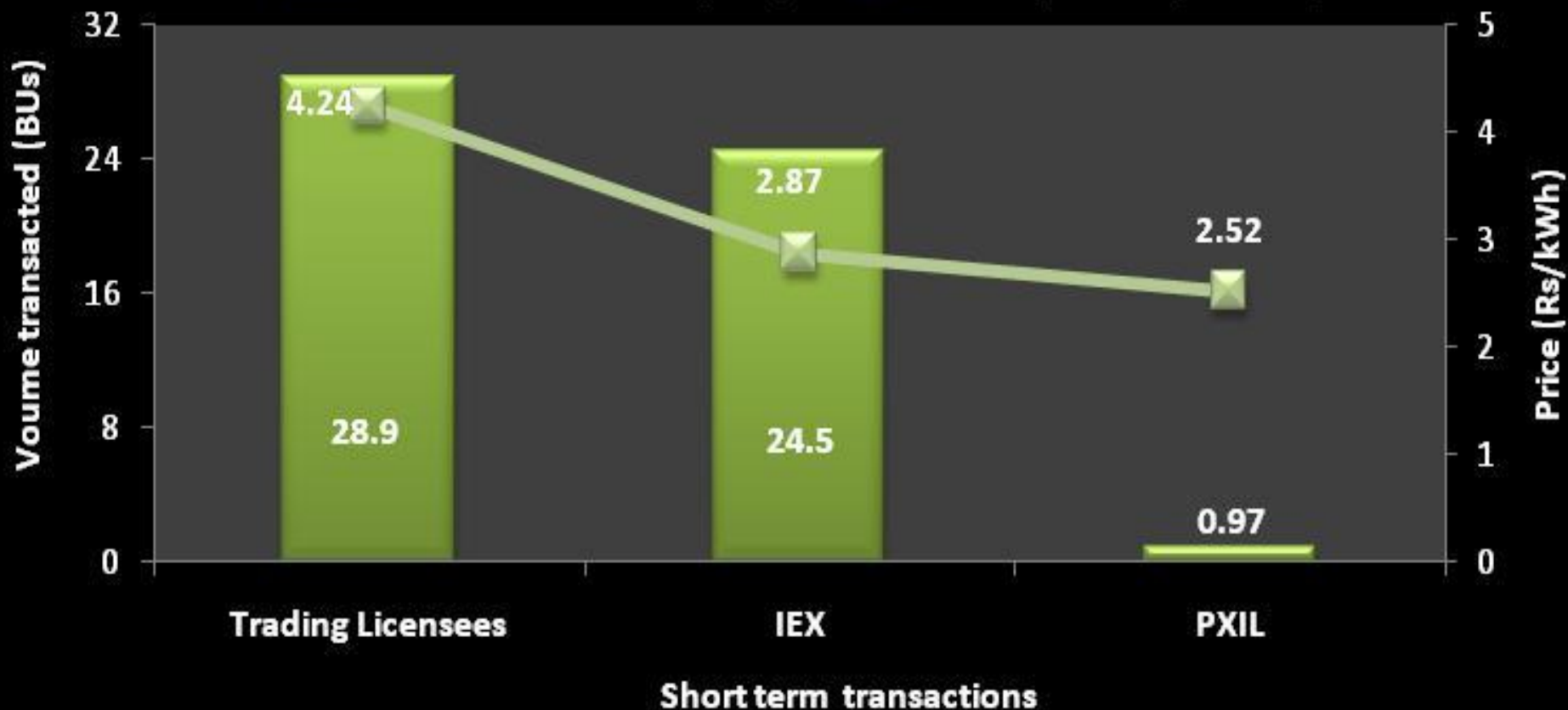
Composition of Short-term Market

CERC MMC Report for FY 2013-14



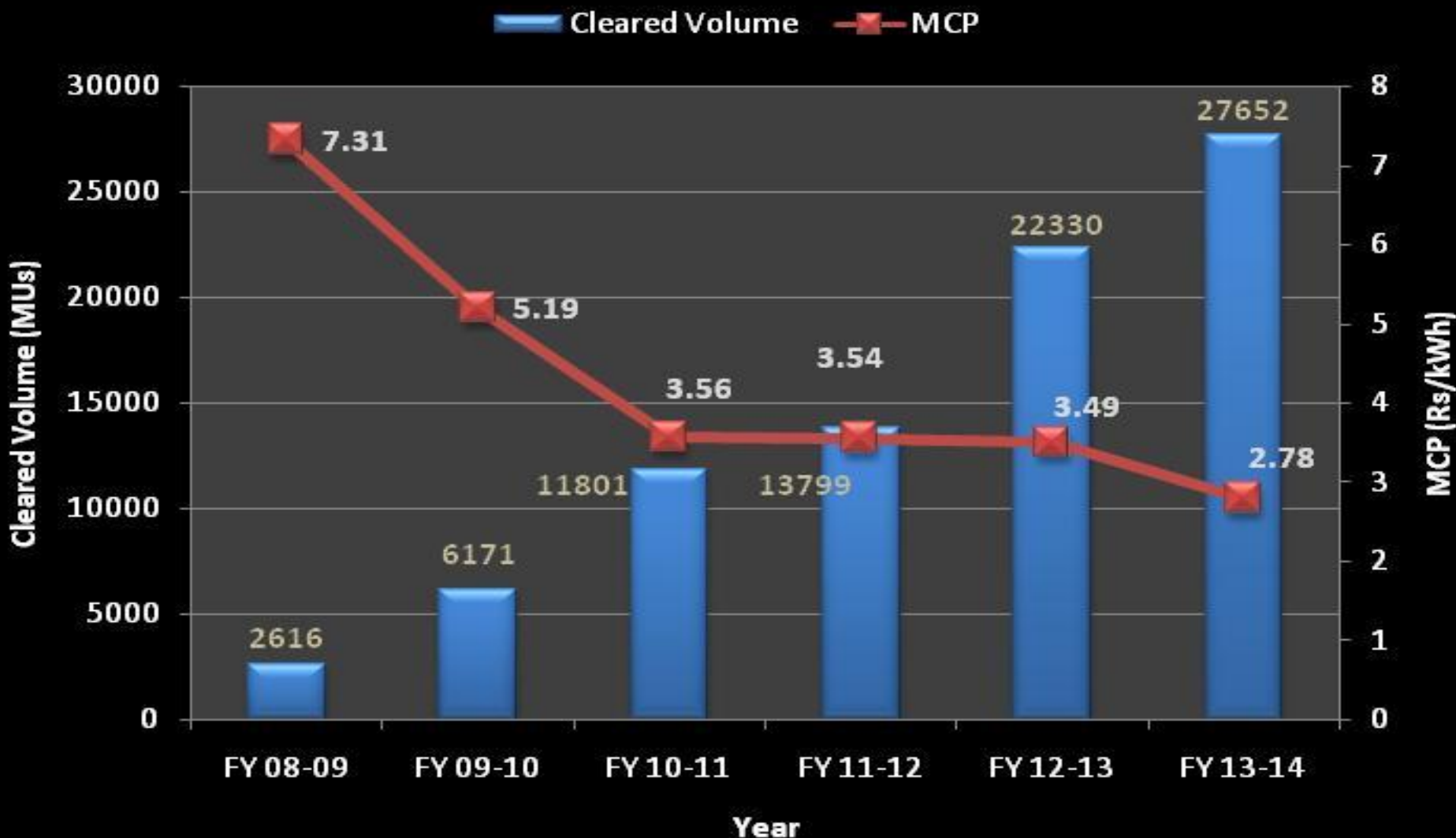
Price & Volume Comparison (FY13-14)

Volume Transacted (BUs) Average Price (Rs/kWh)



PX Transactions Vs Prices

Last 5 years





Trading Through Indian Energy Exchange

Features of Indian Short term Power Market

Federal Structure

- States has autonomy over distribution and Open access
- Regulator at National & State levels

Multiple Exchange allowed

- Competition among exchange to benefit market

Distinct Market and System Operators

- 2 Market Operators and hierarchy of System Operators
- National , Regional (5) & State TSO (33)
- MO interaction with SO for transmission capacity and scheduling

Only Physical delivery based market

- Limited forward contracts on exchange (up to 1 weeks)

Absence of Retailers







- Content/Carriage separation yet to be achieved
- Consumer direct access to market
- Over 2300 direct consumer and total 3000 participants

Implicit Auction of Transmission Capacity in Day-Ahead Markets

- Trading with 12 price areas
- Open Access at State level- Every state with different open access feature

IEX Market Segments

Delivery-based Contracts

Day-Ahead Market since June,08	<i>Closed , Double-sided Auction</i> <i>10-12 am bidding</i> <i>Each 15-min block , 0.1 MW min NOC required</i>	
Term-Ahead Market since Sep,09	<i>Day-Ahead Contingency – Another window 3-5pm</i> <i>Intra-Day - for the same day starting 2 pm</i> <i>Daily- for rolling seven days (delivery starting after 4 days)</i> <i>Weekly- for 1 week (Monday-Sunday)</i>	   
Renewable Energy Certificates since Feb,11	<i>Green Attributes as Certificates</i> <i>Sellers : RE generators not under feed in tariffs</i> <i>Buyers: Obligated entities</i> <i>1MWh equivalent to 1 REC</i>	

Next... Energy Saving Certificates

 Auction

 Continuous

Company Snapshot



IEEX
INDIAN ENERGY EXCHANGE
India's **No.1** Power Exchange

95% Market share **80,000 MWh** daily average trade

3000+ participants

2100+ Industries

Transparency

Liquidity

Competition

Contract Characteristics

TERM AHEAD MARKET

Contract Characteristic
Delivery
Auction Type
Contracts
Trade Availability
Financial Settlement

Day Ahead Market
Next day
Closed Auction
15 min
All Days
Pay-In- D-1; Pay Out – D+1

Intraday Contracts
1400 -2400 Hrs same day
Continuous trading
Hourly
All days
Pay in: T+1 Pay out: T+1

Day Ahead Contingency
For next day
Continuous trading
Hourly
All Days; 1500-1700
Pay in: T+1 Pay out: T+2

Daily Contracts
From 4 th day to next 7 days
Continuous trading
Block of Hours (Fixed)
All Days; 1200-1500
Pay-In- D-1; Pay Out – D+1

Weekly Contracts
For next week
Open Auction
Block of Hours (Fixed)
Wed & Thurs; 1200-1600
Pay-In- D-1; Pay Out – D+1

Features of Day Ahead Market



Physical delivery based market | Min 100kW

A closed double-sided anonymous auction for **each 15-min time block** for the following day

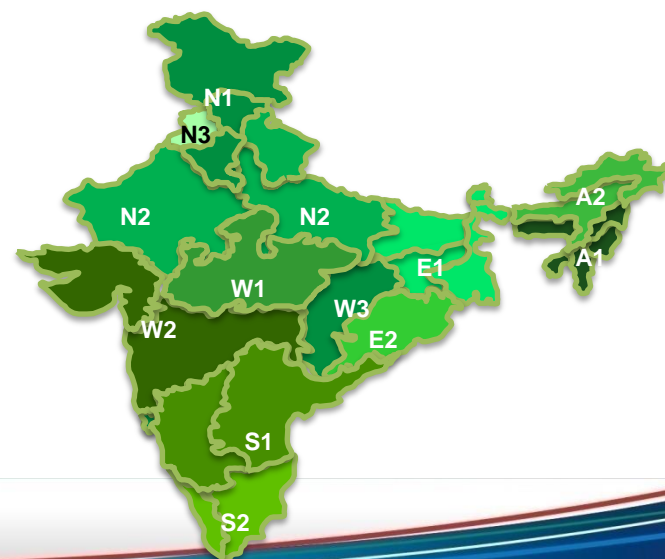
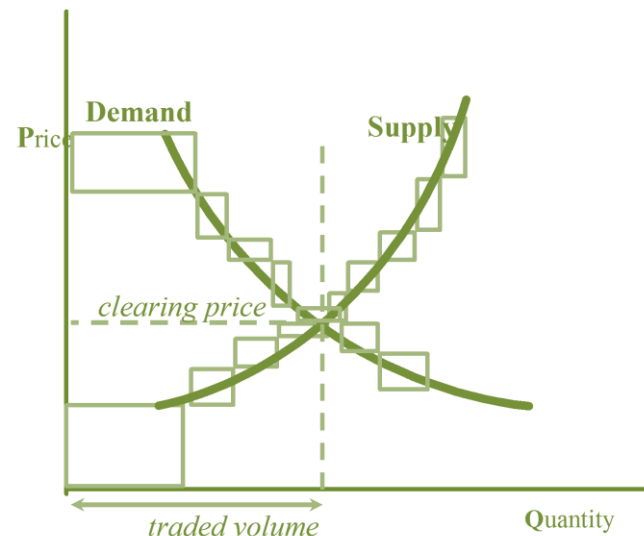
Bid types: Single Order or Block Orders

Intersection of aggregated sale and purchase curves defines Market Clearing Price (MCP)

12 Bid area defined for congestion
ATC across bid areas determined by NLDC /RLDCs

Market splitting determines Area Clearing Price (ACP) specific to an area
(available at www.iexindia.com)

Delivery/ Settlement /All OA Charges thru IEX



DAM trading process



Bidding

10:00 am to
12:00 pm

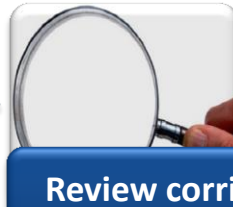
Bids for
15- min
each or
block bids
can be
placed



Matching

12:00 pm to
1:00 pm

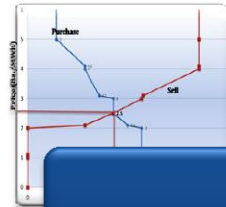
MCP
& MCV
calculated



**Review corridor
and funds
availability**

1:00 pm to
2:00 pm

Corridor
availability
and funds
verified



Result

3:00 pm

Final ACV
and ACP
calculated.
Market
splitting if
congestion



Confirmation

5:30 pm

Collective
transaction
confirmation
by NLDC



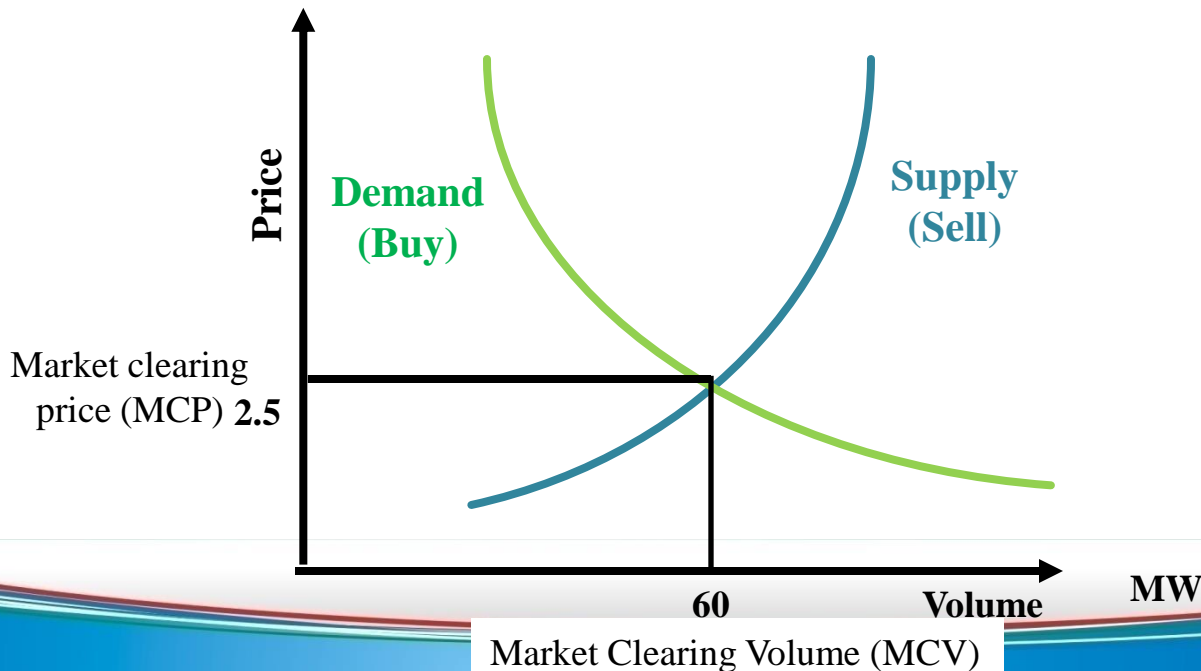
Scheduling

6:00 pm

Final
Schedule sent
to RLDC for
incorporation

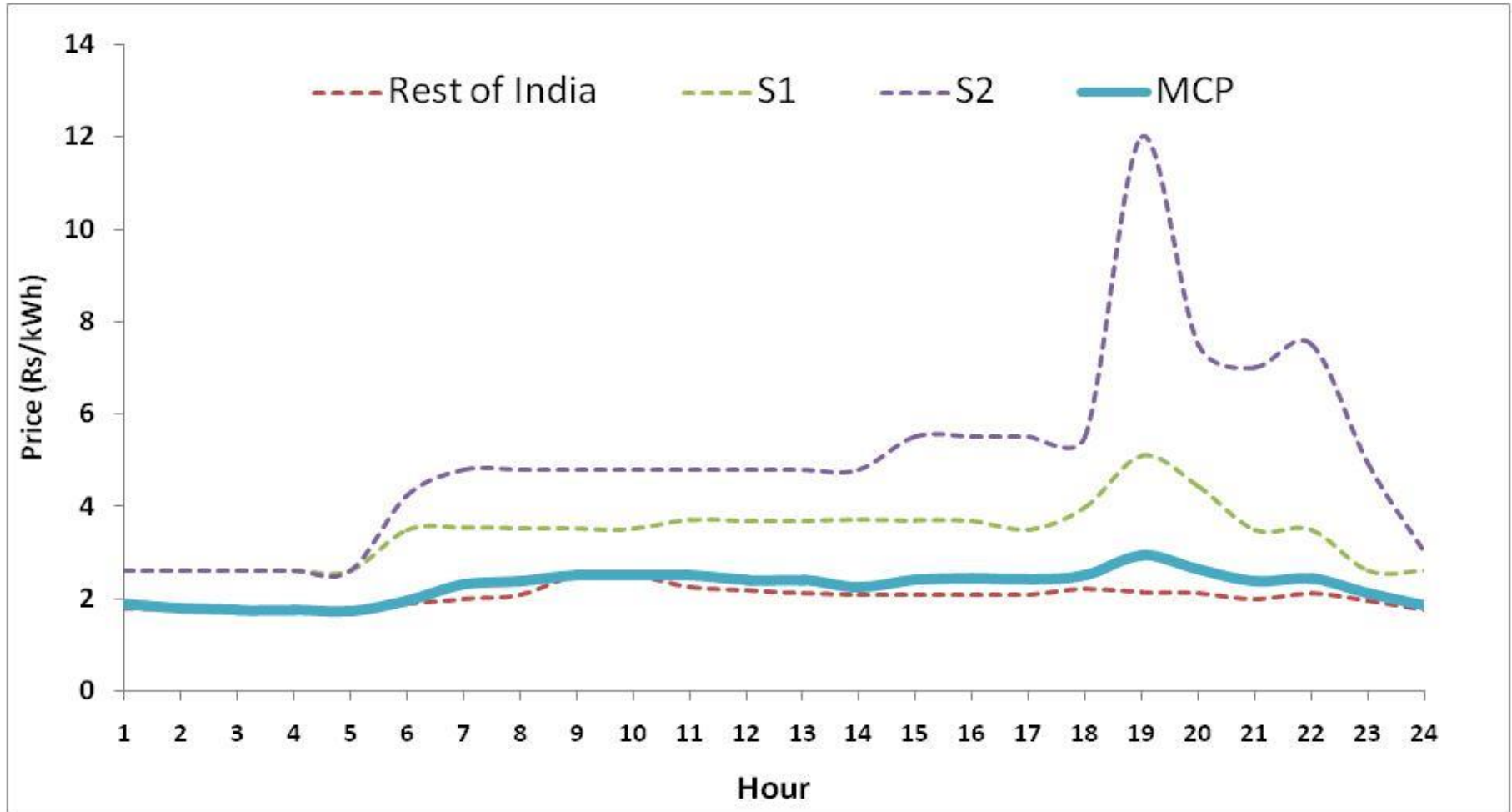
Model Price Calculation algorithm

Price Tick (Rs.)		0	1	1.1	2	2.1	2.5	3	3.1	4	4.1	5	---	---	----	20
Bid Quantum by different portfolios	Portfolio A, MW	20	20	20	20	20	20	20	10	0	0	0	0	0	0	0
	Portfolio B, MW	60	60	60	60	50	40	40	40	40	40	20	20	20	20	20
	Portfolio C, MW	40	20	0	0	-40	-60	-80	-81	-120	-120	-120	-120	-120	-120	-120
Total Buy Quantum received, MW		120	100	80	80	70	60	60	50	40	40	20	20	20	20	20
Total Sell Quantum received, MW		0	0	0	0	-40	-60	-80	-81	-120	-120	-120	-120	-120	-120	-120
Net Transaction, MW		120	100	80	80	20	0	-20	-21	-80	-100	-100	-100	-100	-100	-100



Typical price trend in DAM

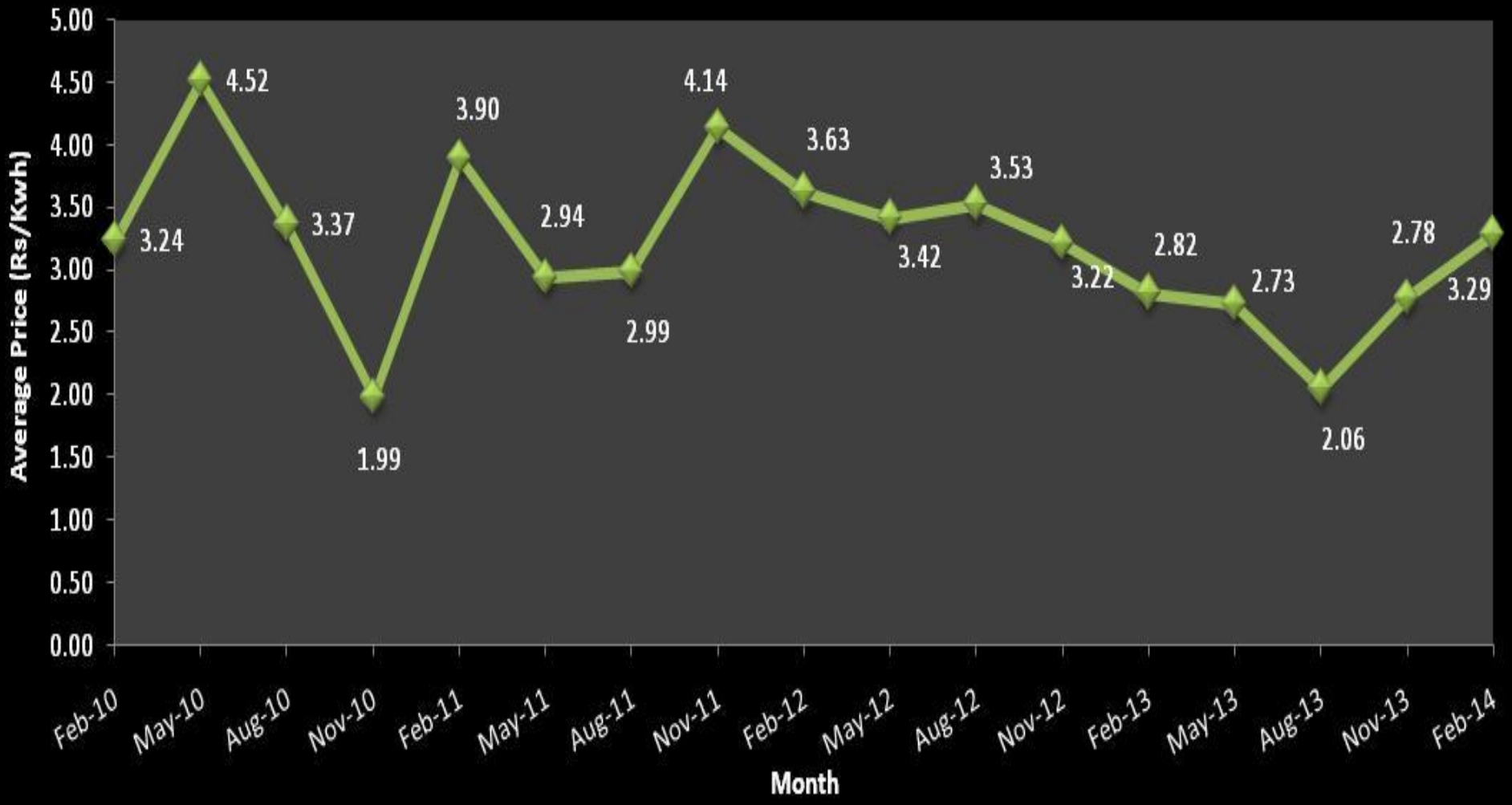
(15min wise)





IEX monthly Average MCP in DAM

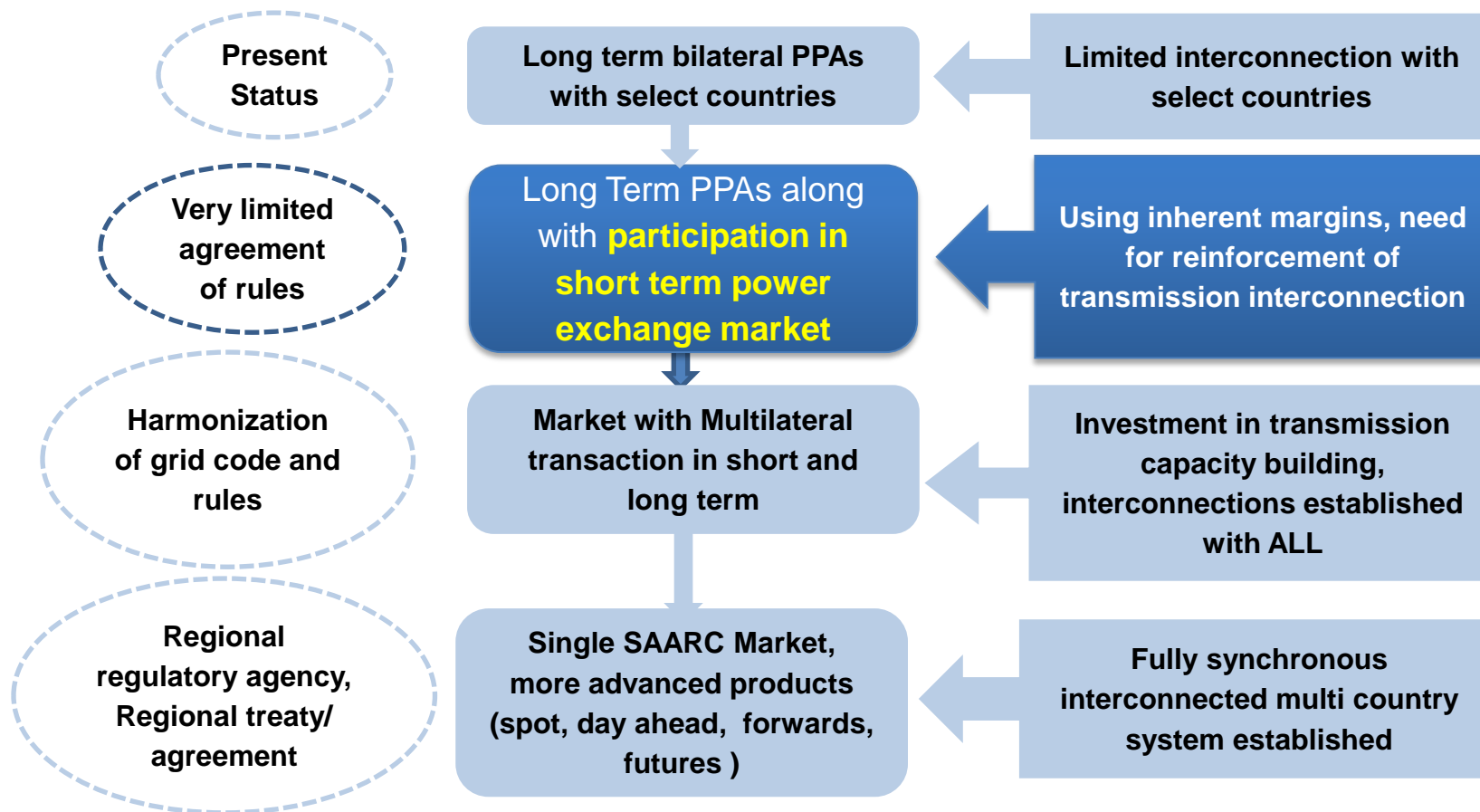
Monthly Avg Price (Rs/kWh)





Proposed mechanism for regional electricity market-SAARC

Next steps in the SAARC Market Integration



Anticipated evolution of SAARC Integration

Why Exchange for cross border trade

Competitive & Vibrant Markets

Transparent and neutral
platform

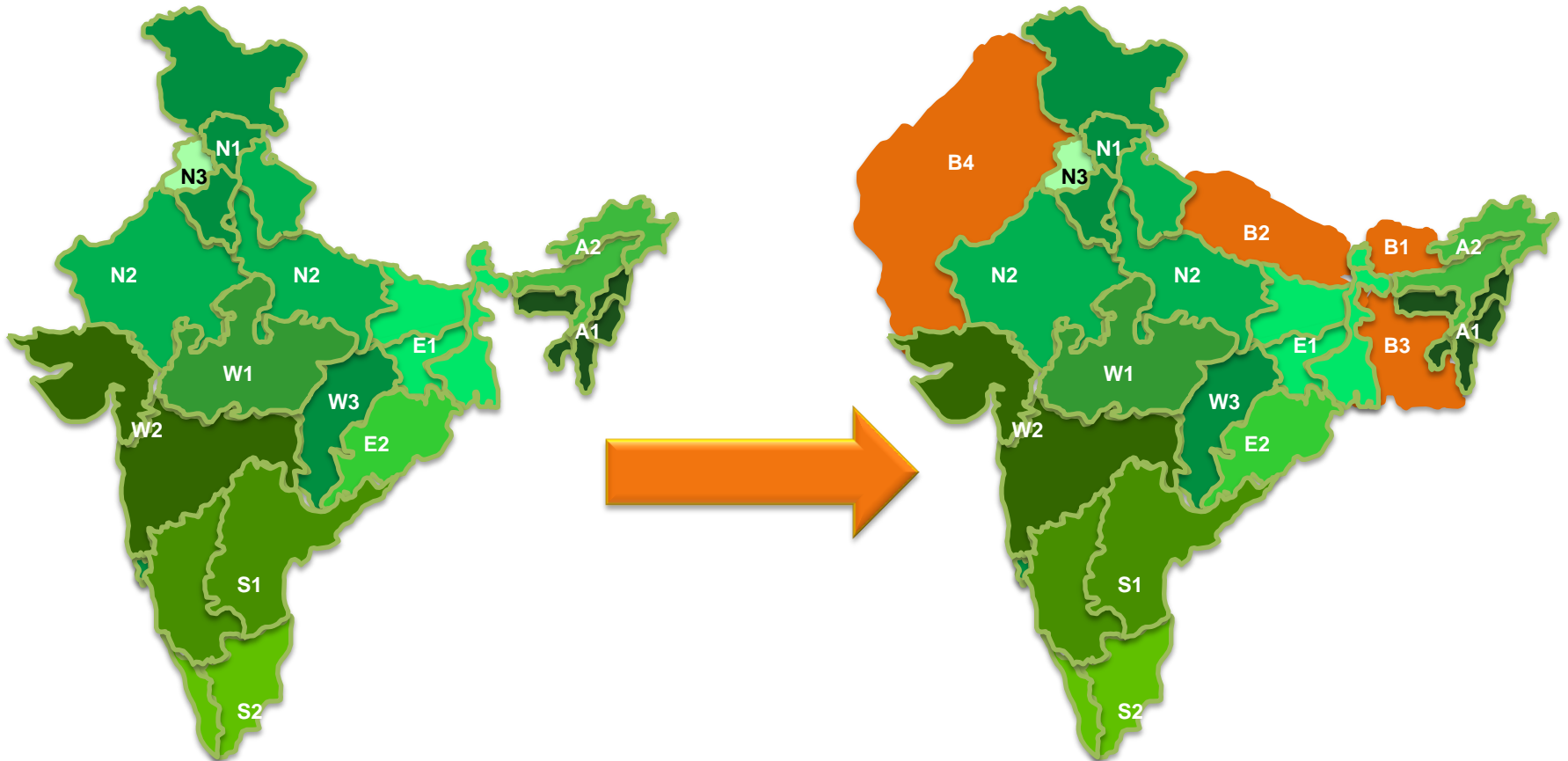
Price discovery – trusted and
reliable

Double-sided bidding – best
price discovery tool

Implicit Auction: Transmission
management

- **Better resource optimization**
 - Can use the inherent margins in transmission to transact power
- **Management of daily demand variations**
 - Daily demand variations and Peak requirements can be managed optimally through Day-Ahead Transactions.
- **Competitive, transparent and neutral market**
- **Liquid, diversified market**
- **Standardized contracts, competitive prices**
through market determined prices (no need for negotiations)

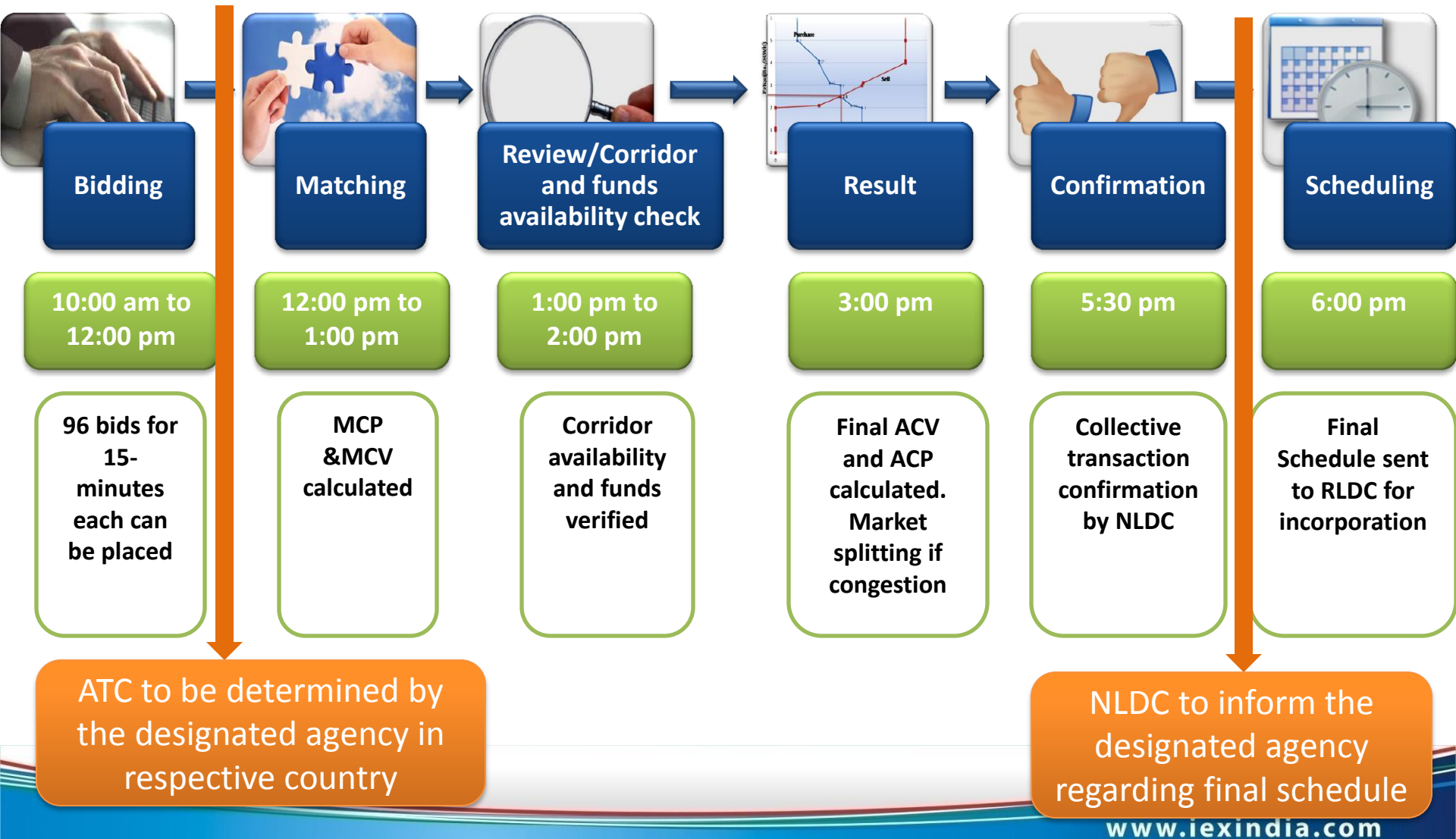
Identification of separate bid area



12 Bid Areas

Additional bid area could be added for each country

Exchange process



Proposed Single Market for SAARC

Salient Features



System Operator

- Separate Market and Transmission System operator

Transmission capacity

- Short-term transactions to use balance margins after long term

Allocation of Capacity

- Implicit auctioning; congestion management through market splitting

Trade/ Bid entry

- Bids/offers in common exchange
- Multi-currency trade possible

Scheduling and Financial Settlement

- Scheduling: TSOs
- Financial: local MO/TSO/Utility

Trading through exchange: Enablers

Identifying a Nodal Agency for ATC

- Nodal agencies for ATC Calculations. TSOs in each country eg NLDC in India

Nodal Facilitator to carry out trade

- A member at exchange from each country can carry out the trade on behalf of the country

Policy Interventions

- Necessary regulatory bottlenecks to be relieved

Payment Security

- full pay-in by Buyers in advance, sellers can be paid post delivery

Deviation settlement

- Country with Multiple parties will need to evolve a deviation settlement mechanism

Dispute Resolution

- Forum of SAARC Electricity Regulators (FoSER) or SAARC Energy Centre

Regional Market Evolution in phases...

Indian Trader as Nodal Facilitator Agency

Exchange deals thru
Nodal Agency with Cross-
border participants

Indian licensed Trader as
nodal agency for all the
transactions with other
countries

A Cross-border trader as Nodal Facilitator Agency

Exchange deals thru
cross-border Member
with local participants

Cross-border Member
having government's
mandate and guarantee

Allow existing under-utilized line of 132 kV and 33 kV for transaction through exchange

Prices determined on competitive basis should not be subject to ETFC approval and cost to be build in tariff regulations

Relaxing conditions to buy/sell power out side Nepal

- As per Electricity Act, 2049, export only feasible as per an agreement between the exporter and government of Nepal
- General exemption from this rule for trading on Power Exchanges will further foster cross border electricity trade through Power Exchange

General exemption from import/export duty specified in the Electricity Act, 2049.



The Electricity Act, 1910 allows for Board/Single buyer to import/export of electricity with previous sanction from Government at Transmission rates determined by the Government

Utilise IEX platform for the remaining 30 MW as per the agreement after securing 220 MW under medium term arrangements

Designate PTC/ Trader as the nodal facilitator for cross border trade with the exchange



The Scheduling and Despatch code of Bhutan already technically compatible with Scheduling and Despatch code of IEGC

Treatment of cross border imbalances can be adopted in the grid code

BPC to be entrusted with determining the ATC, scheduling on a daily basis and energy accounting for facilitating transactions through the Power Exchange



Regional Trade: Issues to be addressed

Trading

- Different Time Zones (Standard Time)
- Bidding Currency

Delivery

- Linking transmission lines
- Co-ordination in scheduling and dispatch
- Energy Metering and Accounting

Clearing and settlement

- Payments transfer mechanism
- Currency risk
- Imbalance Settlement

Margins, Collaterals

Legal Recourse, dispute resolution mechanism

- Overcoming different legal, regulatory and policy regimes to arrive at a standard set of procedures and policies

Thank You for your attention

www.iexindia.com



Best Power Exchange in India

– Enertia Awards '13

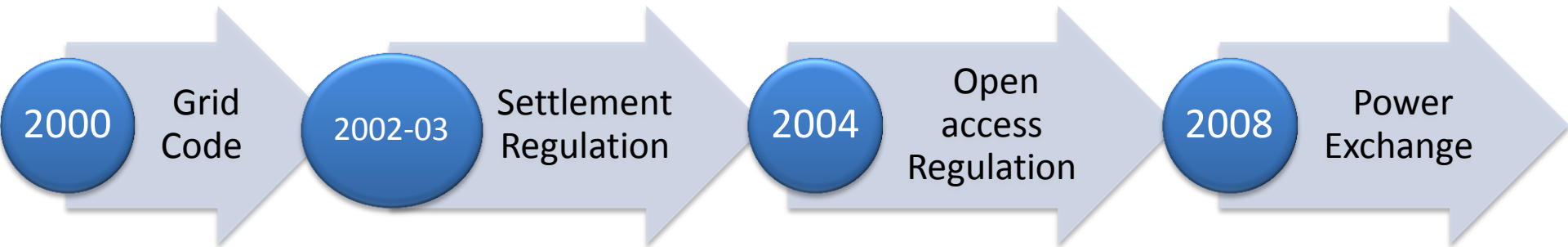
Best Performing Power Exchange

– Power Line Awards '13 & '12

Best E-enabled consumer platform

– India Power Awards '09

Evolution Of Power Market in India



- **SAARC single Electricity Market**
 - Single Day-Ahead Market for SAARC Market
 - Examples around world:
 - NORDPOOL (4 countries +Lithuania & Estonia)
 - Central West Europe
 - SAPP
- **Limited Harmonisation of Rules (Common minimum)**
 - Balancing & Settlement Rules across countries
 - Payment Security & Commercial terms
 - Grid connectivity standards
- **Gather political will for mutual benefit of energy sectors of countries**

Highly Scalable model for competitive electricity market