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IRADe Integrated Research and Action for Development

Workshop on "Power Market Development in India: Key Lessons Learnt"
April, 2016 | Dhaka, Bangladesh

"Role of Transmission, System Operators and Integration of Regional Grid in the Development of Indian Power Market: Key Challenges and Lessons Learnt"

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CEO, POSOCO

Electricity Market Ecosystem

Legislative - Act, Policy, Reforms, Unbundling, De-licensing, Competition, Market Access, Institution & Capacity Building

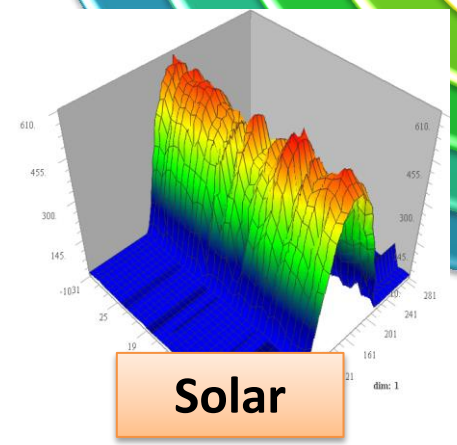
Regulatory – Grid Code, Open Access, Licensing, Tariff, Loss Administration, Payment Security, Dispute Settlement

Planning – Medium Term, Long Term, Grant of Access, Protection Coordination, Standards, Metering

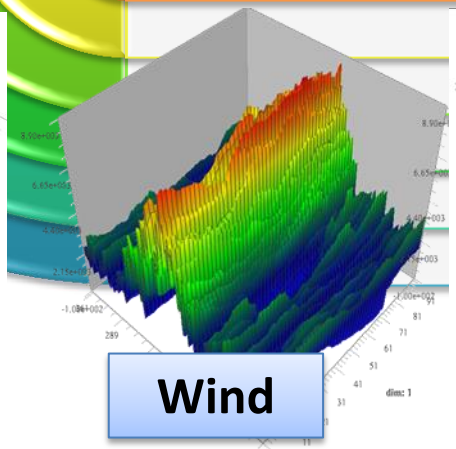
System Operation – Security, Reliability, Scheduling, Despatch, Congestion Mgmt., SCADA/EMS, Ancillary Service

Stakeholders - Generators, IPPs, Transmission Licensees, Distribution Licensees, Traders, Power Exchanges

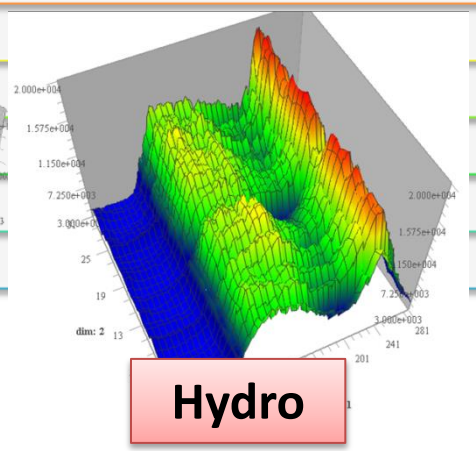
End Consumer (Now Prosumer too !)



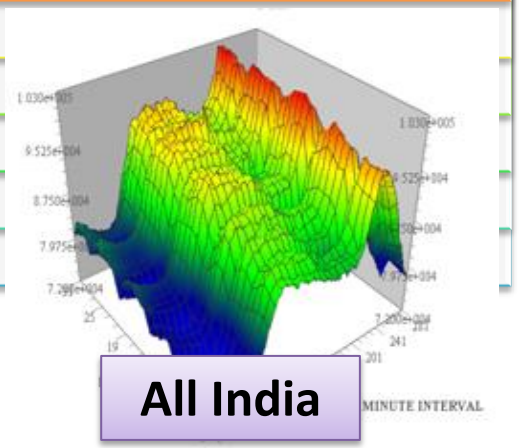
Solar



Wind



Hydro



All India

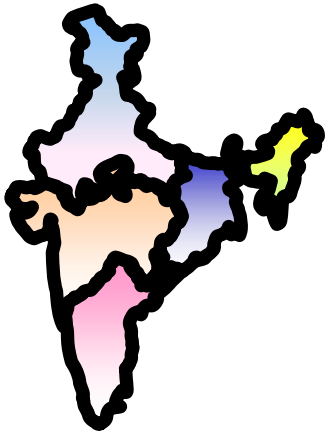
Distinctive Features of Transmission

- Public Service
- Sunk Investment
- Natural Monopoly
- Common Carrier
- Vital Infrastructure
- Regulated Business
- Non-Divisible/Transferable
- Key to Competition

Transmission is Infrastructure[3]

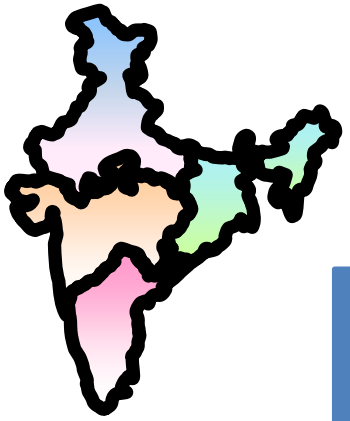
Evolution of the Grid

Changing load profile
Integration of Renewables
Need for Flexible Systems



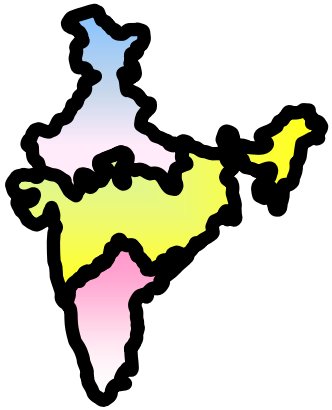
Pre 1991:

Five Regional Grids - Five Frequencies



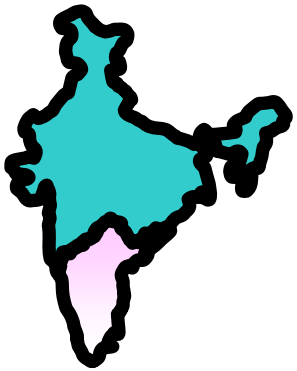
October 1991: East and Northeast synchronized

Merchant Power



March 2003: West synchronized with East & Northeast

Electricity Act, 2003, Open Access



August 2006: North synchronized with Central Grid

Merging of Markets, Power Exchanges

Dec 2013:

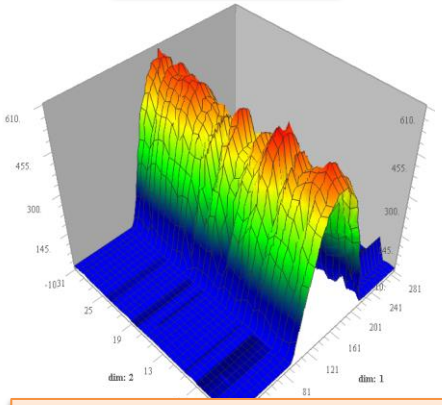
All India Synchronized Grid

Addition of large 500 MW & above gen. units and 765 kV trans. Lines, Ultra Mega Power Projects

Maps not to scale

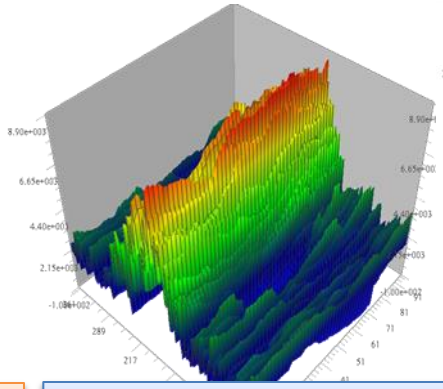
Harnessing Diversity - Regional Grids

Solar



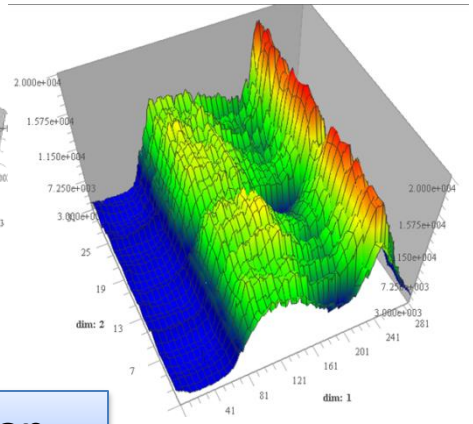
Diurnal Variation

Wind

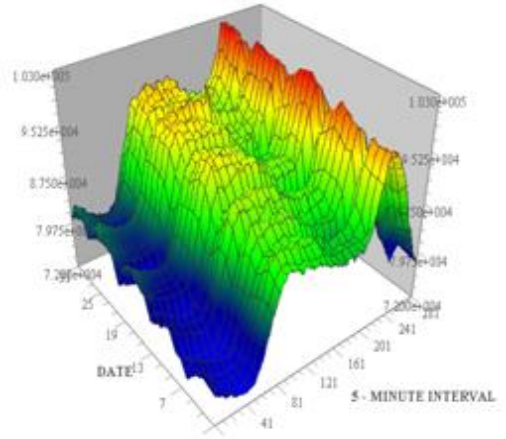


Seasonal Variation

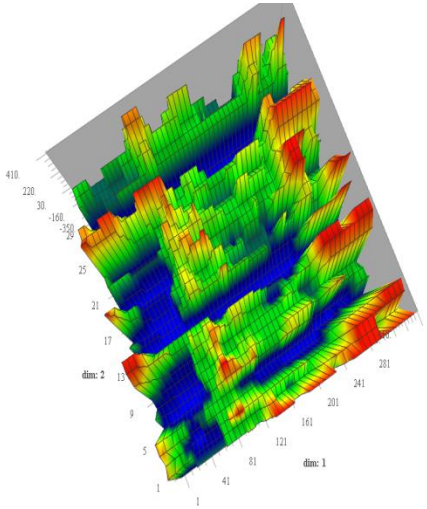
Hydro

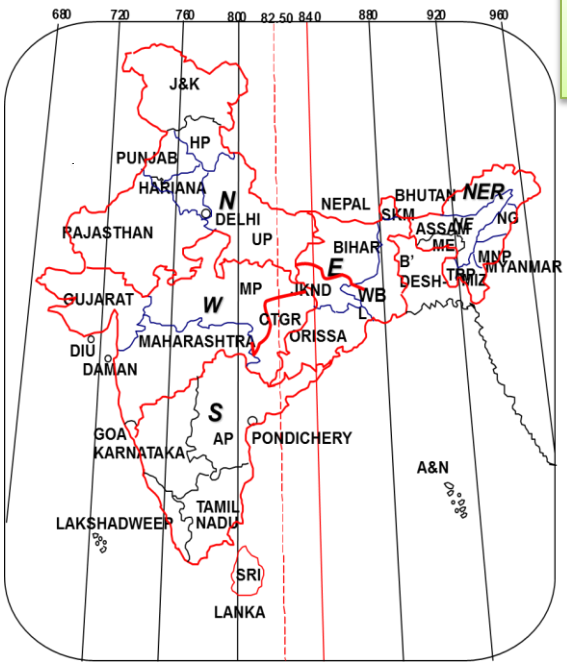


All India

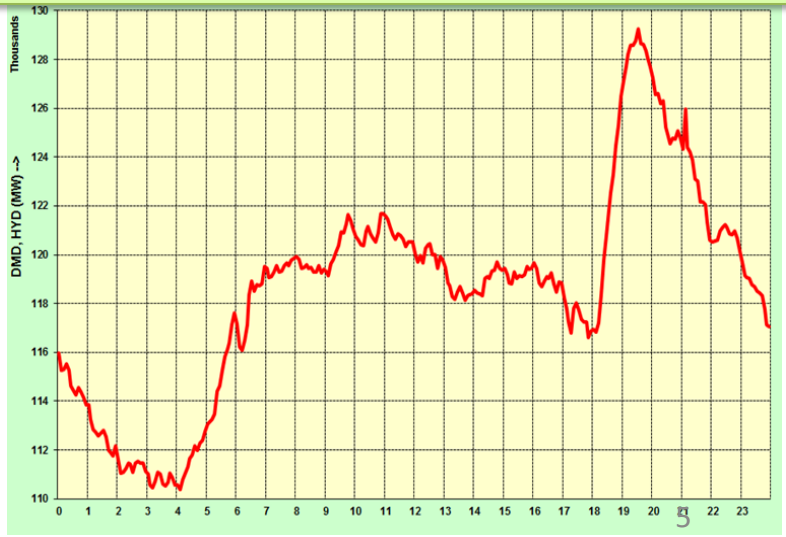


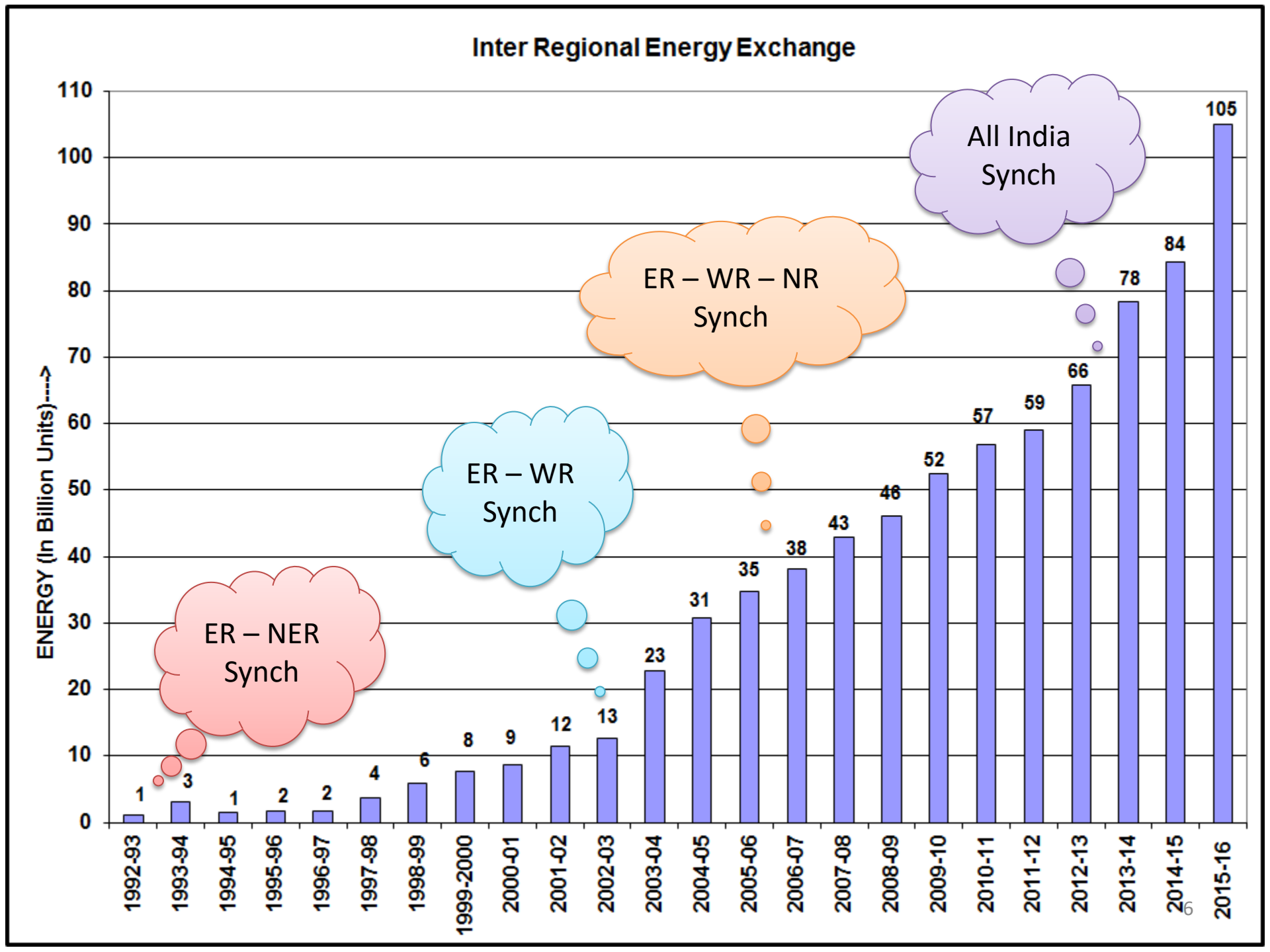
Pumped Hydro





Morning Peak @ 140 MW/min for 40 minutes
Evening Peak @ 200 MW/min for 40 minutes




Inter Regional Energy Exchange
ENERGY (In Billion Units)--->
110
100
90
80
70
60
50
40
30
20
10
0
ER – NER Synch
ER – WR Synch
ER – WR – NR Synch
All India Synch
1 3 1 2 2 4 6 8 9 12 13 23 31 35 38 43 46 52 57 59 66 78 84 105
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-2000
2000-01
2001-02
2002-03
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16

Changed Scenario

Earlier

- Generation is licensed
- Regional self-sufficiency with limited inter-regional allocation
- Predictable Transmission

Present

- Delicensed generation
- Relaxed connectivity – merchant generators
- Open access across the nation
- Economic despatch of generation

Strong Transmission System….Key to Competition

- Reduce cost of power
- Brings in economy & efficiency
  - Replacing costly power by cost effective power
- Takes care of uncertainty in Generation & Distribution
- Risk levelizer

Potential Benefits of Transmission Investments

Benefit Category	Transmission Benefit
1. Traditional Production Cost Savings	Production cost savings as traditionally estimated
1a-1i. Additional Production Cost Savings	a. Reduced transmission energy losses
	b. Reduced congestion due to transmission outages
	c. Mitigation of extreme events and system contingencies
	d. Mitigation of weather and load uncertainty
	e. Reduced cost due to imperfect foresight of real-time system conditions
	f. Reduced cost of cycling power plants
	g. Reduced amounts and costs of operating reserves and other ancillary services
	h. Mitigation of reliability-must-run (RMR) conditions
	i. More realistic representation of system utilization in "Day-1" markets
2. Reliability and Resource Adequacy Benefits	a. Avoided/deferred reliability projects
	b. Reduced loss of load probability or c. Reduced planning reserve margin

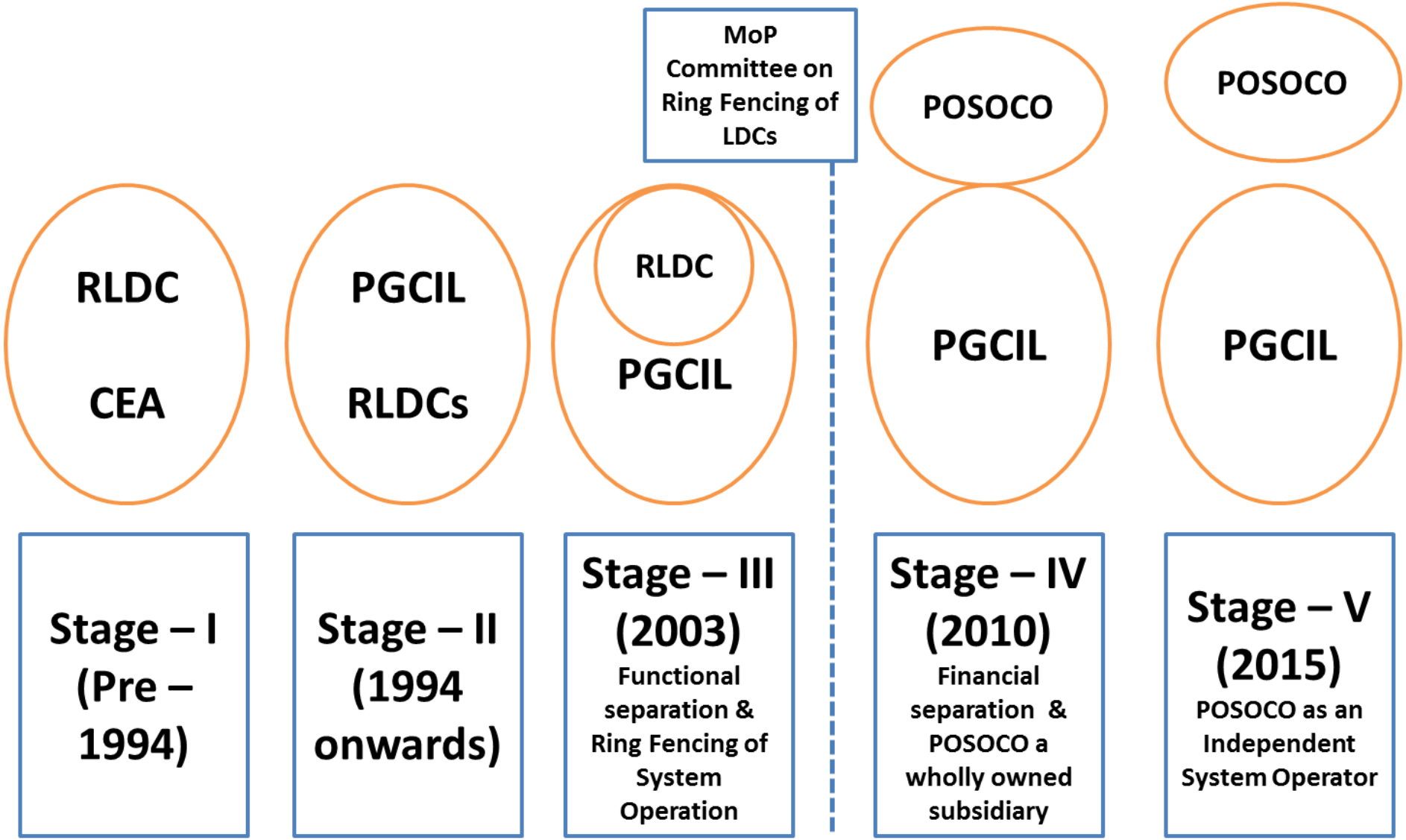
Source: A WIRES Report on The Benefits of Electric Transmission: Identifying and Analyzing the Value of Investments, 2013, The Brattle Group

Potential Benefits of Transmission Investments

3. Generation Capacity Cost Savings	a. Capacity cost benefits from reduced peak energy losses
	b. Deferred generation capacity investments
	c. Access to lower-cost generation resources
4. Market Benefits	a. Increased competition
	b. Increased market liquidity
5. Environmental Benefits	a. Reduced emissions of air pollutants
	b. Improved utilization of transmission corridors
6. Public Policy Benefits	Reduced cost of meeting public policy goals
7. Employment and Economic Development Benefits	Increased employment and economic activity; Increased tax revenues
8. Other Project-Specific Benefits	Examples: storm hardening, increased load serving capability, synergies with future transmission projects, increased fuel diversity and resource planning flexibility, increased wheeling revenues, increased transmission rights and customer congestion-hedging value, and HVDC operational benefits

Source: A WIRES Report on The Benefits of Electric Transmission: Identifying and Analyzing the Value of Investments, 2013, The Brattle Group

Evolution of System Operator in India



Overarching Regulatory Framework

Government

- **Electricity Act 2003**
- **Section 26** – Constitution of National Load Despatch Centre
- **Section 27 -** The Central Government shall establish a centre for each region to be known as the Regional Load Despatch Centre having territorial jurisdiction as determined by the Central Government in accordance with section 25 for the purposes of exercising the powers and discharging the functions under this Part.
- **Section 28** - Functions of Regional Load Despatch Centre
- **Section 29** - Compliance of directions
- **Section 30** - Transmission within a State
- **Section 31** - Constitution of State Load Despatch Centres
- **Section 32** - Functions of State Load Despatch Centres

CERC

- **17 Regulations**
- Open Access in Inter-State Transmission
- Grant of Connectivity, LTA and MTOA
- Measures to relieve Congestion
- Grant of trading licence
- Renewable Energy Certificate
- Indian Electricity Grid Code
- Sharing of ISTS Charges & Losses
- Regulation of Power Supply
- Fixation of Trading Margin
- Intervening Transmission Facilities
- Standards of Performance
- Terms and Conditions of Tariff
- Power System Development Fund
- Deviation Settlement Mechanism
- Fees and Charges of RLDC
- Ancillary Services Operations

CEA

- **6 Standards**
- Grid Standards
- Technical Standards for Connectivity to the Grid
- Installation and Operation of meters
- Technical Standards for Connectivity of the Distributed Generation Resources
- Measures relating to Safety and Electricity Supply
- Technical Standards for Construction of Electrical Plants and Electric Lines

Grid Management

Operational Planning

- System Operation
- Market Operation

Resource Scheduling

- Decentralized Philosophy
- Congestion Management

Cooperation and Involvement Thousands of Players

Real Time Operation

- Monitoring and Control
- Handling Exigencies

Post Despatch Activities

- Events Analysis
- Metering & Settlement

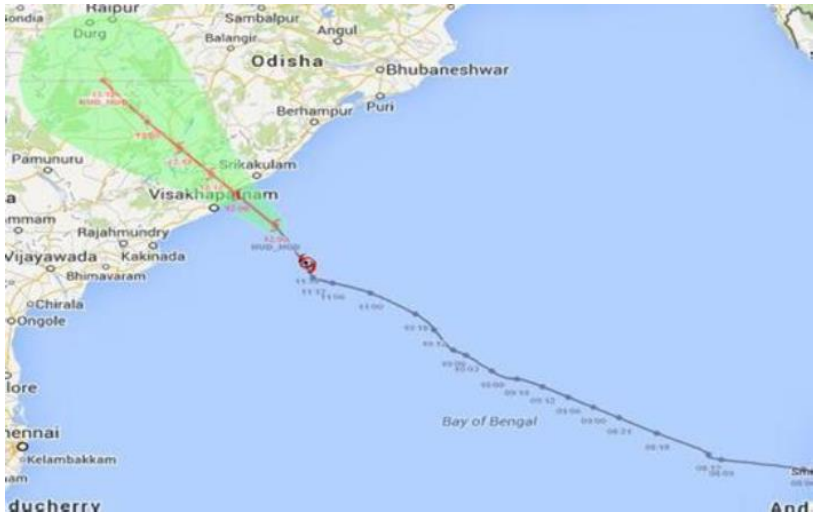
Grid Security: Collaborative Process

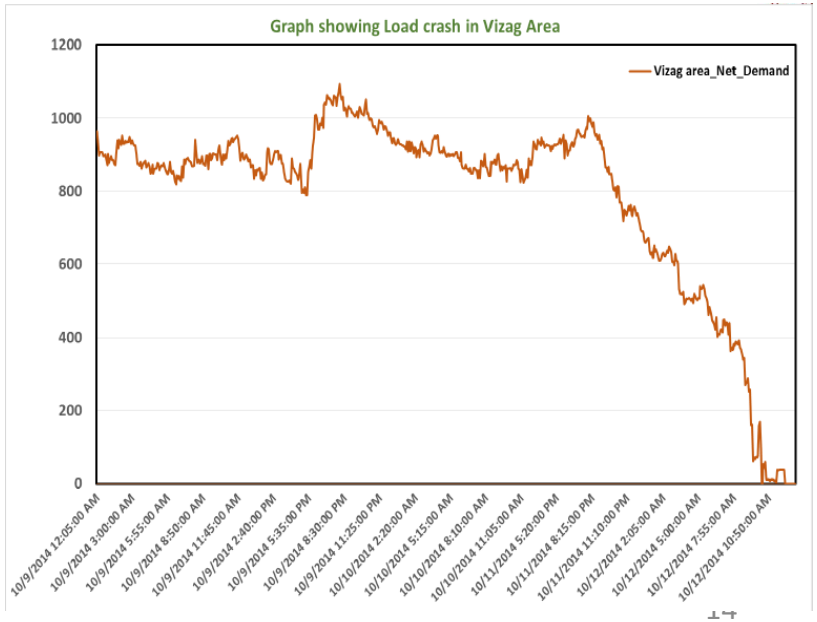
S.No	Time horizon	Responsibility	Agencies involved
1	**Perspective**	Perspective Plan (15 years)	CEA
2	**Long term**	Five year plans - growth and uncertainties	CEA, CTU, STUs, DISCOMs
3	**Medium term**	3 months to 3 years involving Monitoring of new lines and generating units, annual maintenance schedule of generating units /transmission lines, defense plans	CEA, RPCs, CTU, STUs, DISCOMs, GENCOs
4	**Operational Planning**	Up to 3 months involving co-ordination of maintenance of generating units and transmission lines, assessment of transfer capability, contingency plans	RPCs, NLDC, RLDCs, SLDCs, DISCOMs, GENCOs
5	**Scheduling**	Day in advance to 1-1/2 hours ahead involving forecast of load and scheduling generation accordingly honoring transmission constraints	NLDC, RLDCs, SLDCs, DISCOMs and GENCOs
6	**Real Time Operation**	Real time; actions are automatic through protective relays and System Protection Schemes (SPS); operator has little control	All utilities

Hudhud Cyclone

- Very Severe Cyclonic Storm(VSCS) named ‘HUDHUD’ - 07th Oct. 2014.
  - Eastern Seaboard
  - Wind speed of more than 200kmph.
  - 250,000 people, 320 villages affected
  - Number of Affected Elements:
    - 400 kV lines – 19 nos.
    - 220 kV lines – 29 nos.
    - 132 kV lines – 85 nos.
    - Transformers – 35 nos
    - Traction Sub-stations – 12 nos.
- Accurate forecast by the IMD
- Timely & massive evacuation.
- Online monitoring through PMU
- Emergency Restoration System for the transmission system

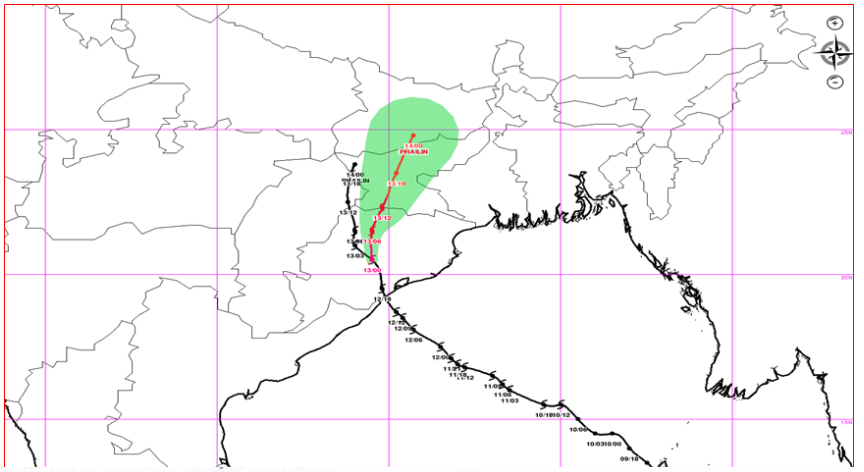
First Shoot , Then Aim Philosophy !

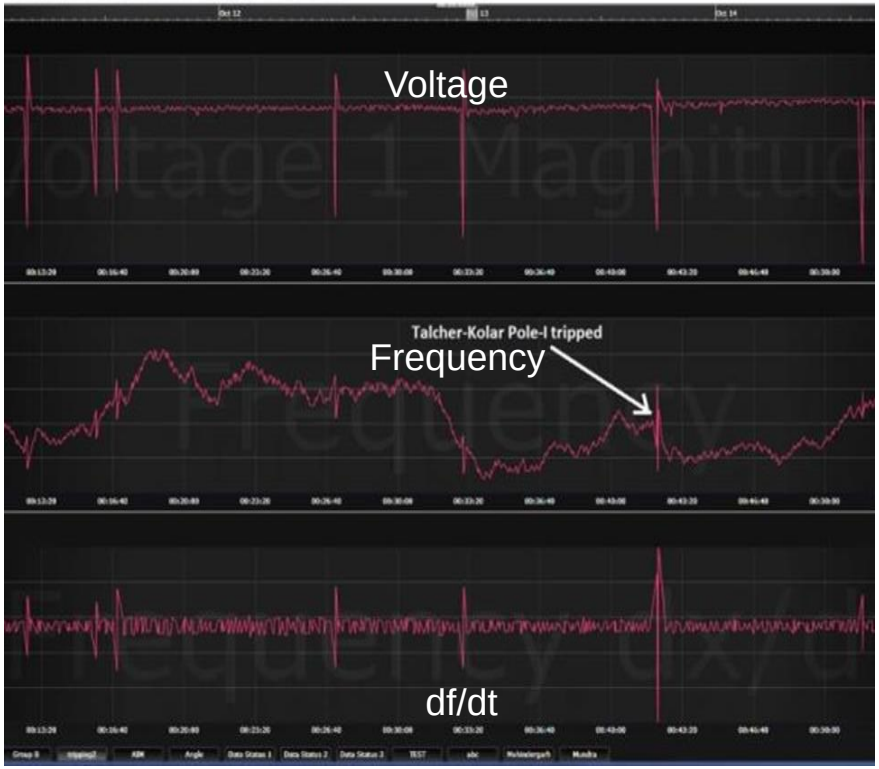




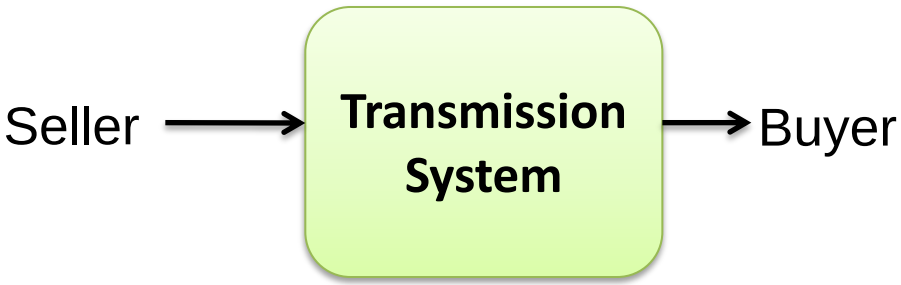
Phailin Cyclone

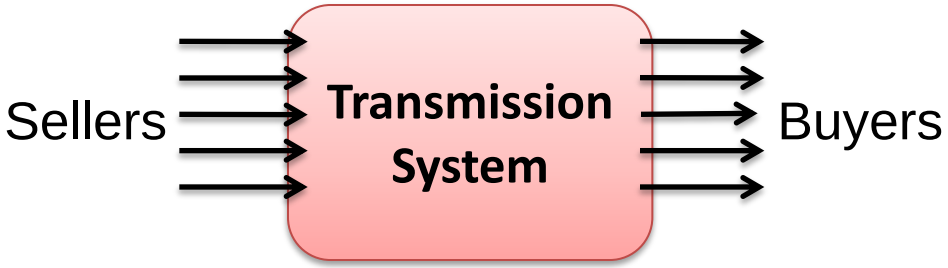
- Very Severe Cyclonic Storm(VSCS) named ‘Phailin’, 11th Oct 2013
  - Hit land near Gopalpur in Odisha
  - Wind speed of 200kmph.
- Over 12 million people affected
- Country's biggest evacuation in 23 years
- More than 800,000 residents moved inland
- More than 18,000 villages in 20 districts hit
- Crop areas > 600,000 hectares destroyed
- Power outages in more than 3,000 villages
  - 11 Nos of OPTCL Transmission lines badly damaged, 93 towers breakdown
  - Load Loss: 1900 MW
- 24-hour Operating Control Centre set up
- Curtailment of Market Trades
- Emergency Restoration Systems





Settling Electricity Transactions





- **A Simple transaction**
  - One buyer – one seller, single part settlement
- **Increasing Complexity**
  - Multiple sellers to one buyer
  - Multiple sellers multiple buyers
  - Multiple trades at different rates
- **Solution: Schedule Transactions**
  - Multi part settlement (fixed, variable, deviations)
  - Settle the scheduled quantum as deemed delivered
    - Fixed charges based on availability
    - Variable charges as per schedule
  - Settle imbalances/deviations from schedule separately

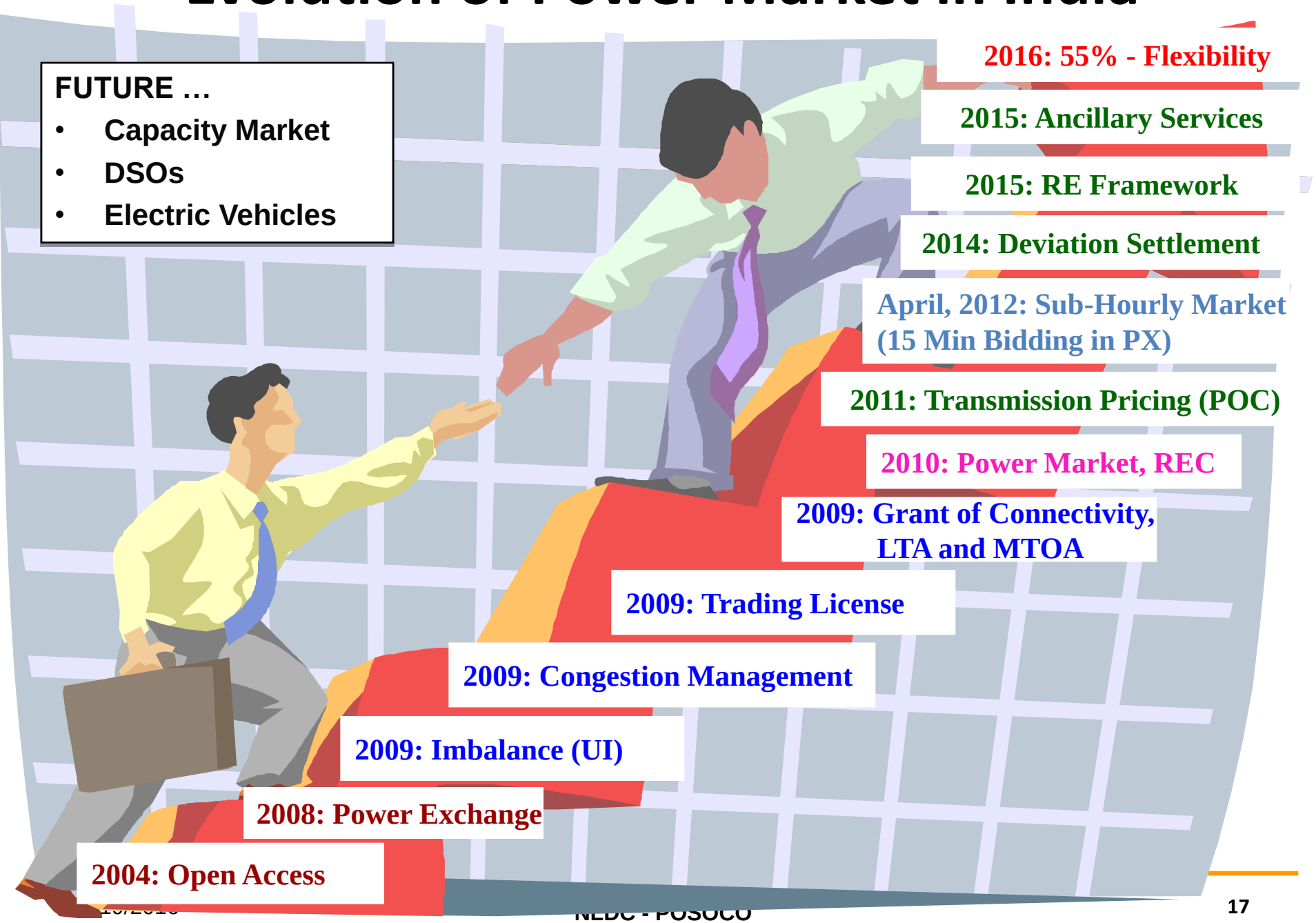
More than 5000 Interface Meters !

More than 100 Control Areas !

More than 2000 Market Participant !

Need for Deviation Settlement Mechanism !

Evolution of Power Market in India



Transparency and Information Dissemination

Bhutan

Injection Profile of Bhutan for :: 23/07/2015

Date: 23-07-2015 Revision : 9 Show

(Download as csv) (All figures are in MW)

Block	Time	ISGS	LTA	MTOA	Bilateral	Total
1	00:00-00:15	0.00	0.00	0.00	88.18	88.18
2	00:15-00:30	0.00	0.00	0.00	88.18	88.18
3	00:30-00:45	0.00	0.00	0.00	88.18	88.18
4	00:45-01:00	0.00	0.00	0.00	88.18	88.18
5	01:00-01:15	0.00	0.00	0.00	88.18	88.18
6	01:15-01:30	0.00	0.00	0.00	88.18	88.18
7	01:30-01:45	0.00	0.00	0.00	88.18	88.18
8	01:45-02:00	0.00	0.00	0.00	88.18	88.18
9	02:00-02:15	0.00	0.00	0.00	88.18	88.18
10	02:15-02:30	0.00	0.00	0.00	88.18	88.18
11	02:30-02:45	0.00	0.00	0.00	88.18	88.18
12	02:45-03:00	0.00	0.00	0.00	88.18	88.18
13	03:00-03:15	0.00	0.00	0.00	88.18	88.18
14	03:15-03:30	0.00	0.00	0.00	88.18	88.18
15	03:30-03:45	0.00	0.00	0.00	88.18	88.18
16	03:45-04:00	0.00	0.00	0.00	88.18	88.18

Bangladesh

/01/2016

Date: 11-01-2016 Revision : 6 Show

(Download as csv) (All figures are in MW)

Block	Time	ISGS	LTA	MTOA	Bilateral	Total
73	18:00-18:15	222.93	0.00	245.90	0.00	468.82
74	18:15-18:30	223.52	0.00	245.90	0.00	469.42
75	18:30-18:45	224.13	0.00	245.90	0.00	470.02
76	18:45-19:00	224.13	0.00	245.90	0.00	470.02
77	19:00-19:15	224.13	0.00	245.90	0.00	470.02
78	19:15-19:30	224.99	0.00	245.90	0.00	470.89
79	19:30-19:45	225.82	0.00	245.90	0.00	471.72
80	19:45-20:00	225.82	0.00	245.90	0.00	471.72
81	20:00-20:15	225.82	0.00	245.90	0.00	471.72
82	20:15-20:30	225.82	0.00	245.90	0.00	471.72
83	20:30-20:45	225.98	0.00	245.90	0.00	471.87
84	20:45-21:00	225.98	0.00	245.90	0.00	471.87
85	21:00-21:15	225.98	0.00	245.90	0.00	471.87
86	21:15-21:30	225.98	0.00	245.90	0.00	471.87
87	21:30-21:45	225.98	0.00	245.90	0.00	471.87
88	21:45-22:00	225.98	0.00	245.90	0.00	471.87
89	22:00-22:15	226.60	0.00	245.90	0.00	472.50
90	22:15-22:30	226.60	0.00	245.90	0.00	472.50
91	22:30-22:45	226.60	0.00	245.90	0.00	472.50
92	22:45-23:00	226.60	0.00	245.90	0.00	472.50
93	23:00-23:15	226.60	0.00	245.90	0.00	472.50

Nepal

chedule of NEPAL for :: 11/01/2016

Date/Time :: 11/01/2016 23:05 Hrs

Revision :: 51

tate : NEPAL Revision : 51 Show

(Download as csv)

Block	Time	ISGS	LTA	MTOA	Shared	Bilateral	IEX	PXIL	Total
76	18:45-19:00	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
77	19:00-19:15	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
78	19:15-19:30	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
79	19:30-19:45	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
80	19:45-20:00	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
81	20:00-20:15	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
82	20:15-20:30	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
83	20:30-20:45	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
84	20:45-21:00	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
85	21:00-21:15	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
86	21:15-21:30	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
87	21:30-21:45	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
88	21:45-22:00	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
89	22:00-22:15	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
90	22:15-22:30	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
91	22:30-22:45	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
92	22:45-23:00	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
93	23:00-23:15	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
94	23:15-23:30	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
95	23:30-23:45	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
96	23:45-24:00	6.56	0.00	0.00	0.00	26.96	0.00	0.00	33.52
MWHR		146.20	0.00	0.00	0.00	647.04	0.00	0.00	793.24

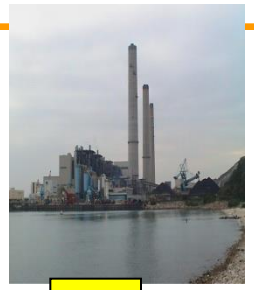
Long Term
12 – 25 Years

Medium Term
3 Year – 3 Months

Short Term
< 3 Months

Round-the-Clock
24X7 Intraday / Contingency Market
Jul'15 Onwards

Coordinated Multilateral Model



09:00

10:00

15:00

18:00

22:00

23:00

ISGS

RLDC

SLDC

Availability Declaration

Entitlements

Collective Transactions (PX)

Requisition & Bilateral Agreements

Injection Schedule

Drawal Schedule

Revision in DC

Revision in Requisition

Final Injection Schedule

Final Drawal Schedule

0 to 24 hours

Revisions during Current day

Revisions during Current day

Products in Different Time Frames

25 – 12 Years

3 Years – 3 Months

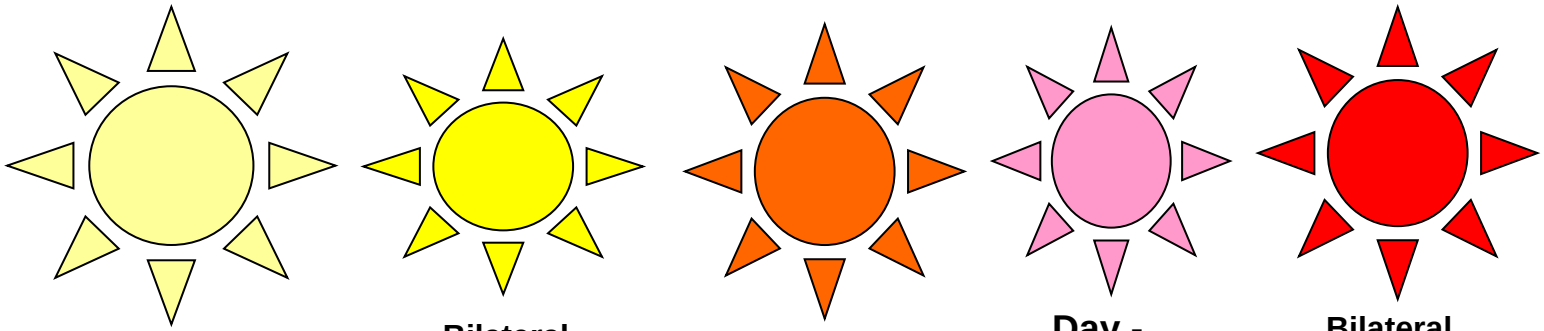
< 3 Months

Long Term

Medium Term

Short Term

Products in the Short Term Market



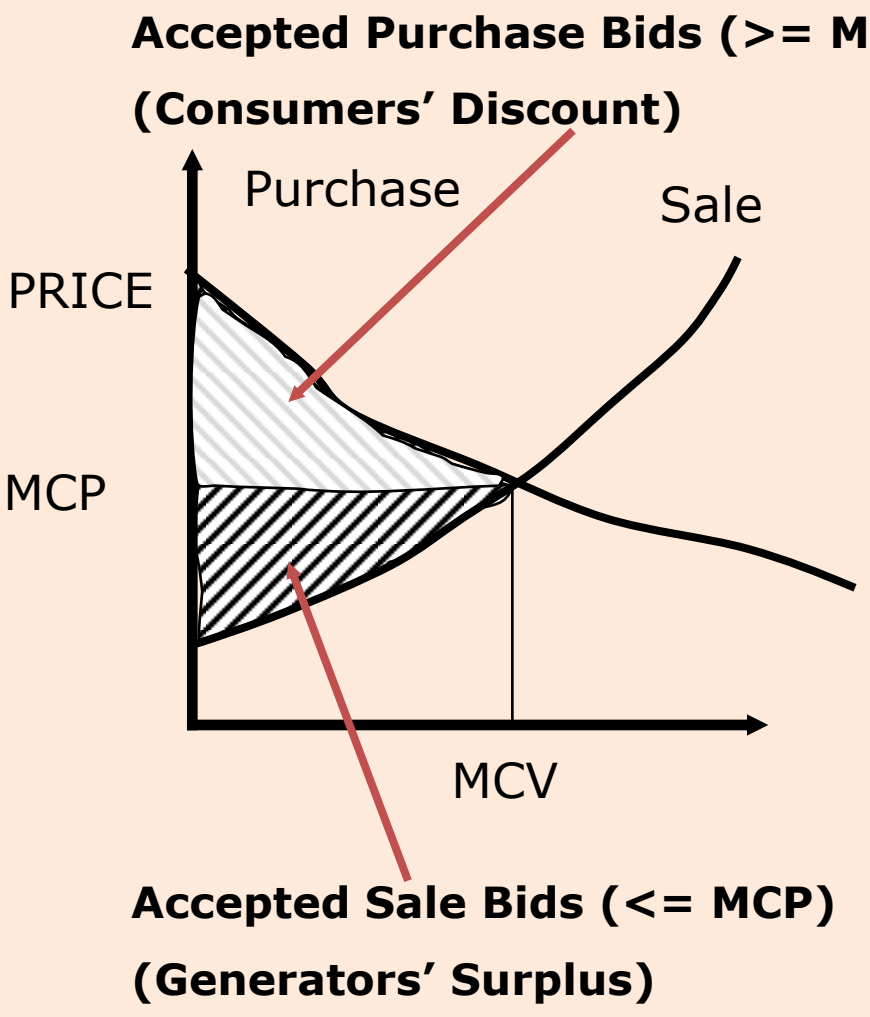
Round-the-Clock Power Exchanges – Jul'15 Onwards
24X7 Intraday / Contingency Market

Power Exchange Operations

Salient Features

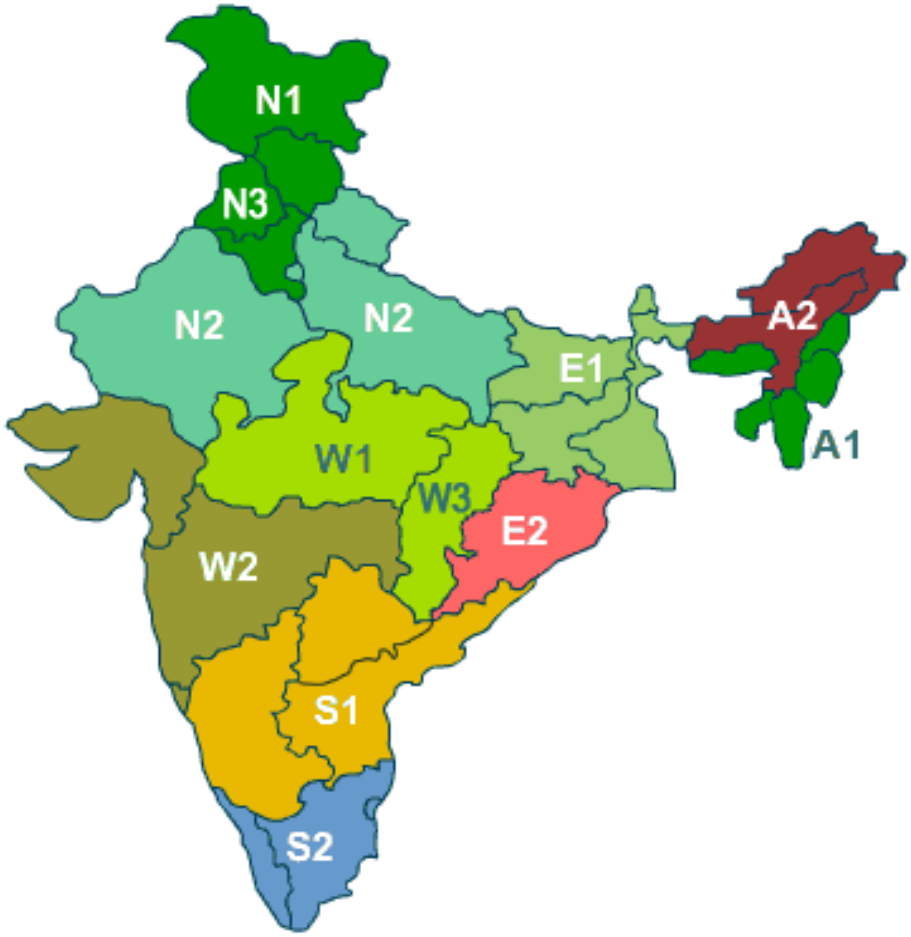
- **Multiple Power Exchanges**
  - Competition amongst Exchanges
- **Voluntary participation**
- **Double sided bidding**
- **Uniform pricing**
- **Day-ahead exchange**
- **15 Minute Bids**
- **Congestion management by market splitting**

Social Welfare Maximization



Congestion Management: Bid Areas

Sr. No.	Bid Area	Region	States covered under Bid Area
1	N1	North Region	Jammu and Kashmir, Himachal Pradesh, Chandigarh, Haryana
2	N2	North Region	Uttar Pradesh , Uttaranchal, Rajasthan, Delhi
3	N3	North Region	Punjab
4	E1	East Region	West Bengal, Sikkim, Bihar, Jharkhand
5	E2	East Region	Odisha
6	W1	West Region	Madhaya Pradesh
7	W2	West Region	Maharashtra, Gujarat, Daman and Diu, Dadar and Nagar Haveli, North Goa
8	W3	West Region	Chhattisgarh
9	S1	South Region	Andhra Pradesh, Telangana, Karnataka, Pondicherry (Yanam), South Goa
10	S2	South Region	Tamil Nadu, Kerala, Pondicherry (Puducherry), Pondicherry (Karaikal), Pondicherry (Mahe)
11	A1	North East Region	Tripura, Meghalaya, Manipur, Mizoram, Nagaland
12	A2	North East Region	Assam, Arunachal Pradesh



Declaration of Transfer Capability

National Load Despatch Centre
Total Transfer Capability for March 2016

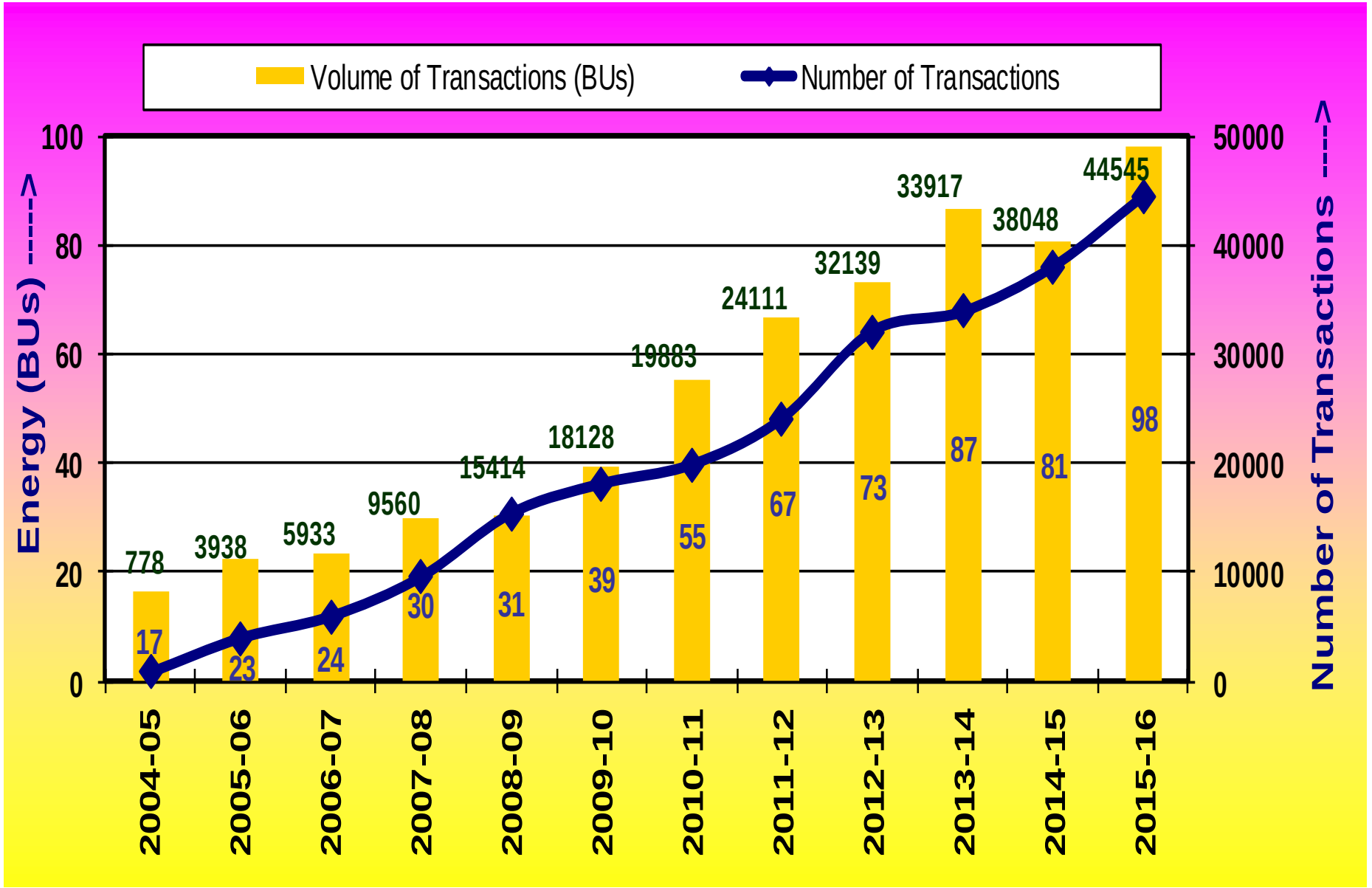
Issue Date:29/02/2016 Issue Time: 1300 hrs Revision No. 1

Corridor	Date	Time Period (hrs)	Total Transfer Capability (TTC)	Reliability Margin	Available Transfer Capability (ATC)	Long Term Access (LTA)/ Medium Term Open Access (MTOA) #	Margin Available for Short Term Open Access (STOA)	Changes in TTC w.r.t. Last Revision	Comments
NR-WR *	1st Mar 2016 to 31st Mar 2016	00-24	2500	500	2000	706	1294		
WR-NR*	1st Mar 2016 to 31st Mar 2016	00-24	7450	500	6950	6103	847		STOA Margin revised due to grant of LTA/MTOA
NR-ER*	1st Mar 2016 to 31st Mar 2016	00-06	2000	200	1800	293	1507		
		06-18'	2000		1800	358	1442		
		18-24	2000		1800	293	1507		
ER-NR*	1st Mar 2016 to 31st Mar 2016	00-24	4800	300	4500	2431	2069		
W3-ER[5]	1st Mar 2016 to 31st Mar 2016	00-24	No limit is being specified. No Re-routing is allowed via W3-ER-NR.						
ER-W3	1st Mar 2016 to 31st Mar 2016	00-24	No limit is being Specified.						
WR-SR	1st Mar 2016 to 31st Mar 2016	00-05	4000	750	3250	3250	0	800	Revised due to commissioning of new transmission elements on WR-SR corridor.
		05-22'	4000		3250	3250	0		
		22-24	4000		3250	3250	0		
SR-WR *	1st Mar 2016 to 31st Mar 2016	00-24	No limit is being Specified.						
ER-SR	1st Mar 2016 to 31st Mar 2016	00-06 18-24	2650	0	2650	2585	65		
		06-18'				2650	0		
SR-ER *	1st Mar 2016 to 31st Mar 2016	00-24	No limit is being Specified.						
S1-S2	1st Mar 2016 to 31st Mar 2016	00-24	S1-S2 corridor TTC/ATC is uploaded on NLDC website under Intra-Regional Section in Monthly ATC.						
ER-NER	1st Mar 2016 to 31st Mar 2016	00-17 23-24	1470	45	1425	210	1215		
		17-23	1420		1375		1165		
NER-ER	1st Mar 2016 to 31st Mar 2016	00-17 23-24	1300	45	1255	0	1255		
		17-23	1340	45	1295		1295		
W3 zone Injection	1st Mar 2016 to 31st Mar 2016	00-24	No limit is being specified (in case of skewed inter-regional flows or any constraints appearing in the system, W3 zone export would be revised accordingly)						

Energy Accounting

- Regional Power Committees (RPCs) prepare the following accounts as per provisions of Regulations:
  - Weekly Deviation Settlement account
  - Weekly Reactive Energy Charge account
  - Monthly Regional Energy Account
  - Monthly Regional Transmission Account
  - Monthly Regional Transmission Deviation Account

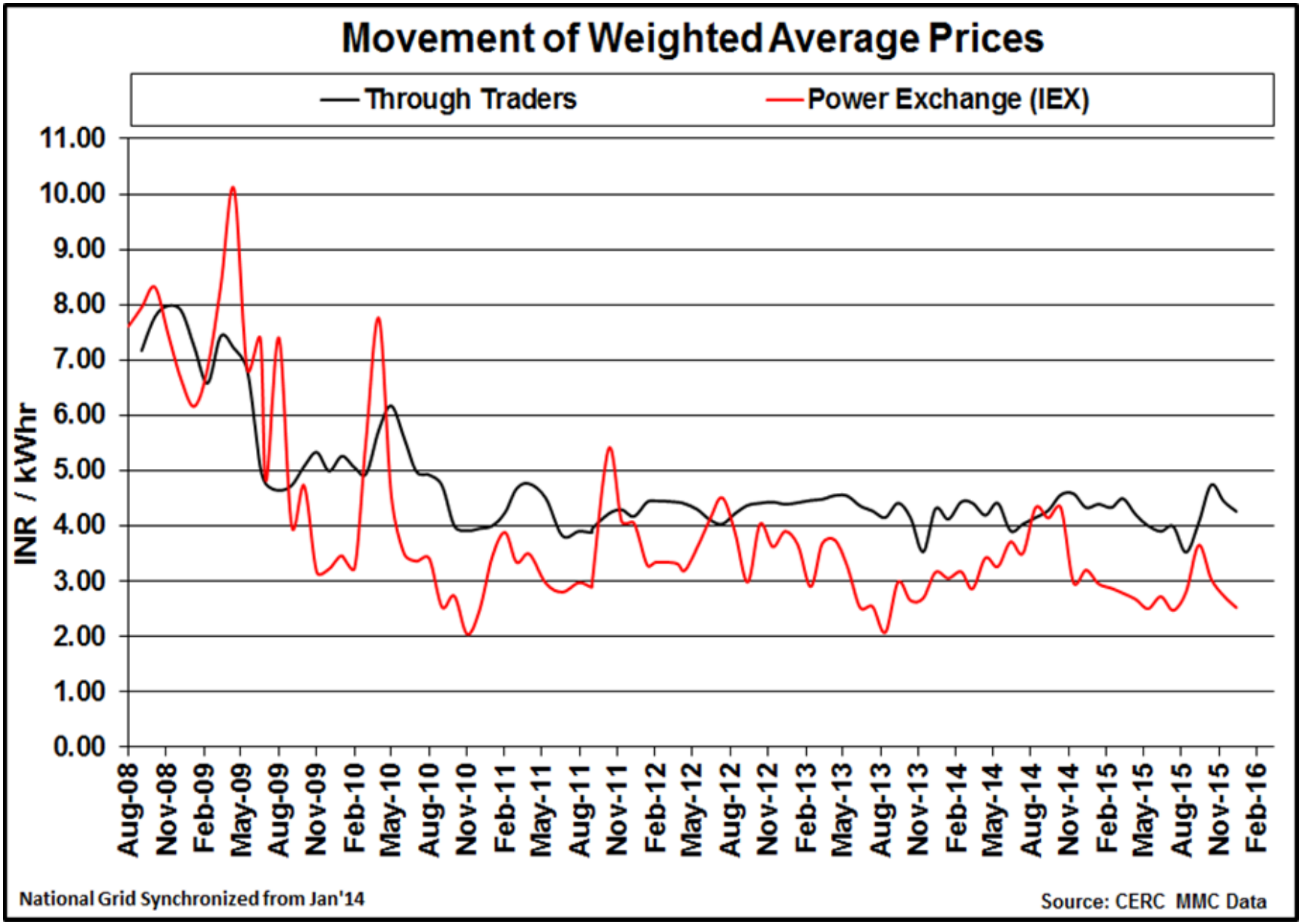
Volume of Short Term Transactions



*Includes Bilateral + Collective

25

Prices of Short Term Transactions



Operational Feedback

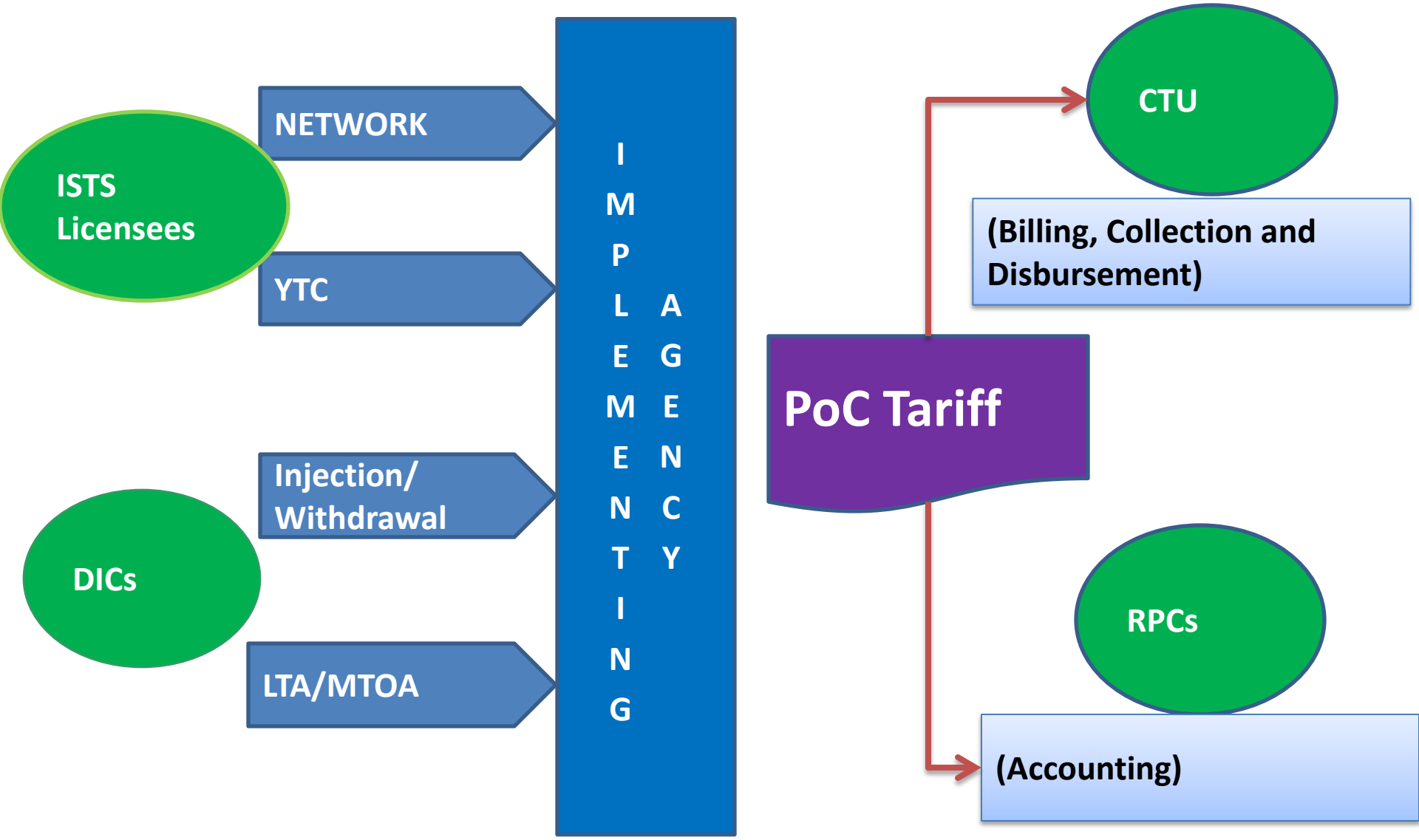
- Clause 4(j) of NLDC rules:

"Providing Operational feedback for national grid planning to the Authority and Central Transmission Utility."

- Quarterly Operational Feedback
- Need based Operational Feedback
- Prioritisation of Lines

http://nldc.in/documents/operational-feedback

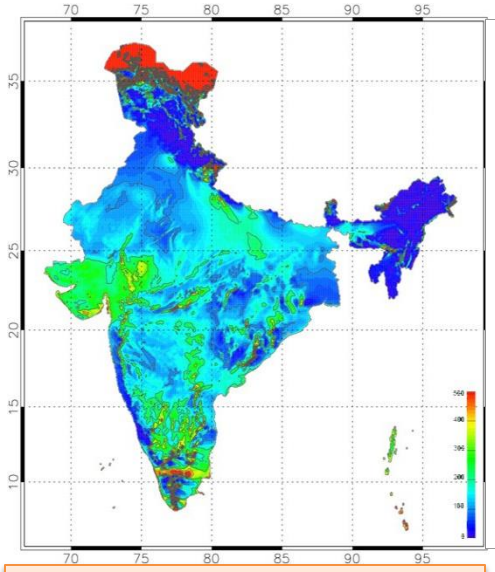
Implementing Agency for PoC Framework

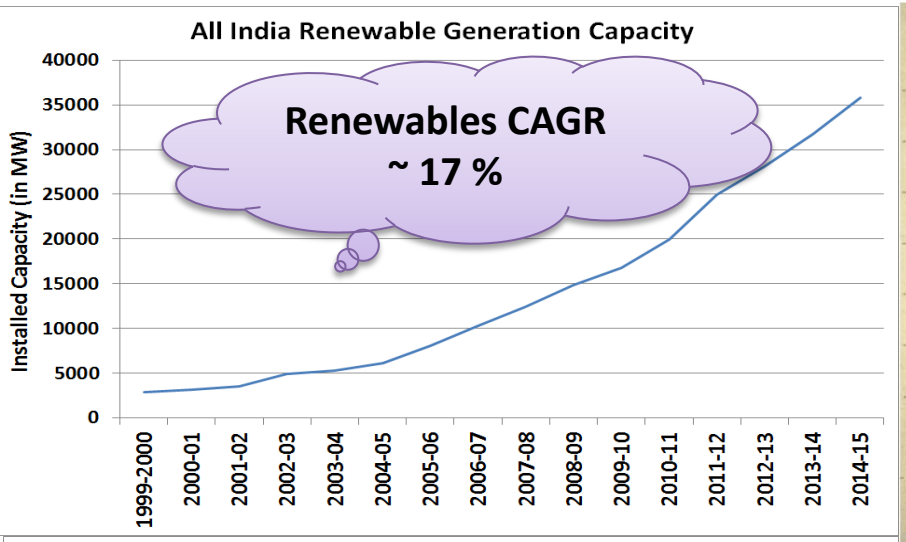


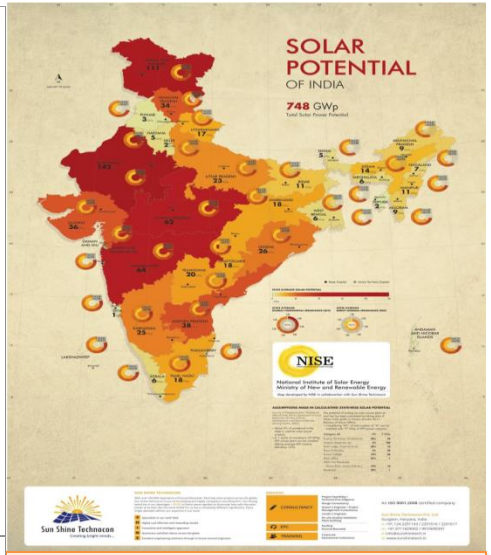
Paradigm Shift in Operations

- Classical despatch
  - Forecast your load; generation fleet has to follow load
- Renewable Generation: the first game changer
  - Forecast load as well as RE; Load-RE or Net Load more important
  - Conventional generation has to follow net load
- Storage/Distributed Generation/Electric Vehicles
  - Is load forecastable?? Is generation despatchable?
  - From consumers to prosumers
- A flexible power system
  - but one that does not break.

Growth of Renewables



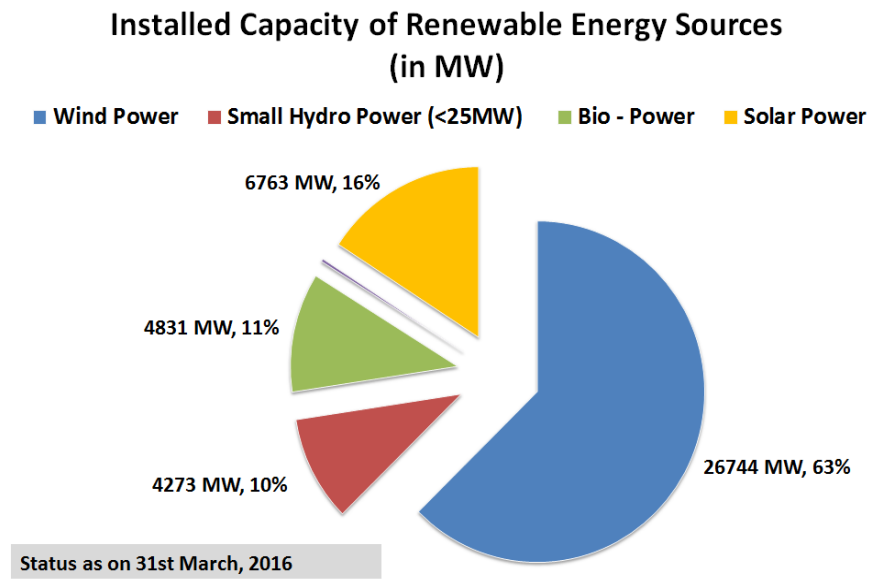




Wind Potential
~ 100 GW
(at 80 m hub- height)

Green Energy Corridors

National Offshore Wind Energy Policy



Solar Potential
~ 750 GW
(4-7 kWh per sq. m per day)

Solar Cities
~ 55 Nos.

New Solar Power Policy

All India RE Installed Capacity – 42, 726 MW

Central Agency for REC Framework

GREEN ATTRIBUTE

Energy

RENEWABLE ENERGY CERTIFICATE (REC)

SOLAR CERTIFICATE

NON-SOLAR CERTIFICATE

Generation

ELECTRICITY

Accreditation by State Nodal Agency

Registration by Central Agency (NLDC)

REC Issuance & Redemption by Central Agency (NLDC)

REC Trading at Power Exchanges

Renewable Energy Certificate

Web Portal: www.recregistryindia.nic.in

भारतीय अक्षय ऊर्जा प्रमाणपत्र पंजीकरण
RENEWABLE ENERGY CERTIFICATE REGISTRY OF INDIA

Welcome Guest

मुख्य पृष्ठ / Home | आरईसी के बारे में / About REC | संबंधित दस्तावेज़ / Reference Documents | कार्यप्रणाली / Procedures | आरई जेनरेटर / RE Generators | राज्य एजेंसियां / State Agencies | रिपोर्ट / Reports | सहायता / Help
हमसे संपर्क करें / Contact Us | पंजीकरण/निर्गमन जांच सूची / Registration / Issuance Checklist | पंजीकरण/निर्गमन शुल्क / Registration / Issuance Fee | क्षमता अभिवृद्धि / Capacity Building | मुख्य बिन्दु / Highlights | मानचित्र / Map
डाक प्रक्रिया / Dak Procedure | प्रतिक्रिया / Feedback

Draft CERC REC (fi

What is REC?

The Electricity Act, 2003, the policies framed under the Act, as also the National Action Plan on Climate Change (NAPCC) provide for a roadmap for increasing the share of renewable in the total generation capacity in the country.However, Renewable Energy (RE) sources are not evenly spread across different parts of the country. Read More >>

Total Signed Up RE Generators Till Now - 2693

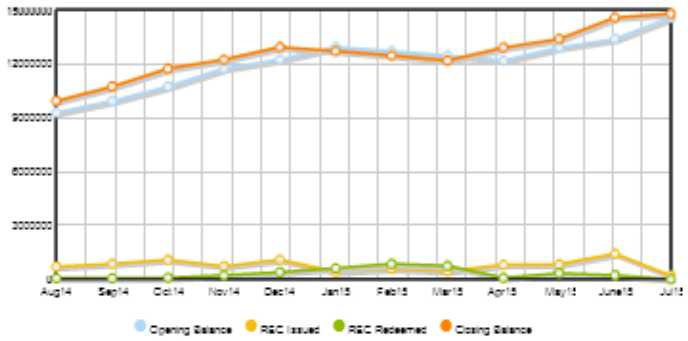
Steps for REC

4 of 4

The basic procedure for redemption of renewable energy certificates shall include following steps:

STEP 4: The Eligible Entity shall place for dealing of renewable energy certificates, both 'Solar' and 'Non-Solar' Certificates, on any Power Exchange authorised to deal in renewable energy certificates by CERC.
Read More >>

REC Graph



REC Summary

Month, Year	Opening Balance (A)	REC Issued (B)	No. of REC Redeemed		Total E=(C+D)	Closing Balance (F=A+B-E)
			RECs Redeemed through Power Exchanges (C)	RECs retained by RE Generators (D)		
Aug, 2014	9283398	702700	51844	-	51844	9934254
Sep, 2014	9934254	859795	24013	25000	49013	10745036
Oct, 2014	10745036	1074046	74381	20000	94381	11724701
Nov, 2014	11724701	731207	197162	25457	222619	12233289
Dec, 2014	12233289	1087197	337782	60400	398182	12922304
Jan, 2015	12922304	411590	569149	46085	615234	12718660
Feb, 2015	12718660	593085	792356	57747	850103	12461642
Mar, 2015	12461642	453091	723967	13543	737510	12177223
Apr, 2015	12177223	810257	64134	8563	72697	12914783
May, 2015	12914783	821264	339768	2879	342647	13393400
June, 2015	13393400	1420931	185493	45627	231120	14583211
Jul, 2015	14583211	203862		-	0	14787073
Total:		25097897	10005523	305301	10310824	

Log In

Password

Log In

Forget/Resend Password

Sign Up
New RE Generators

Related Links

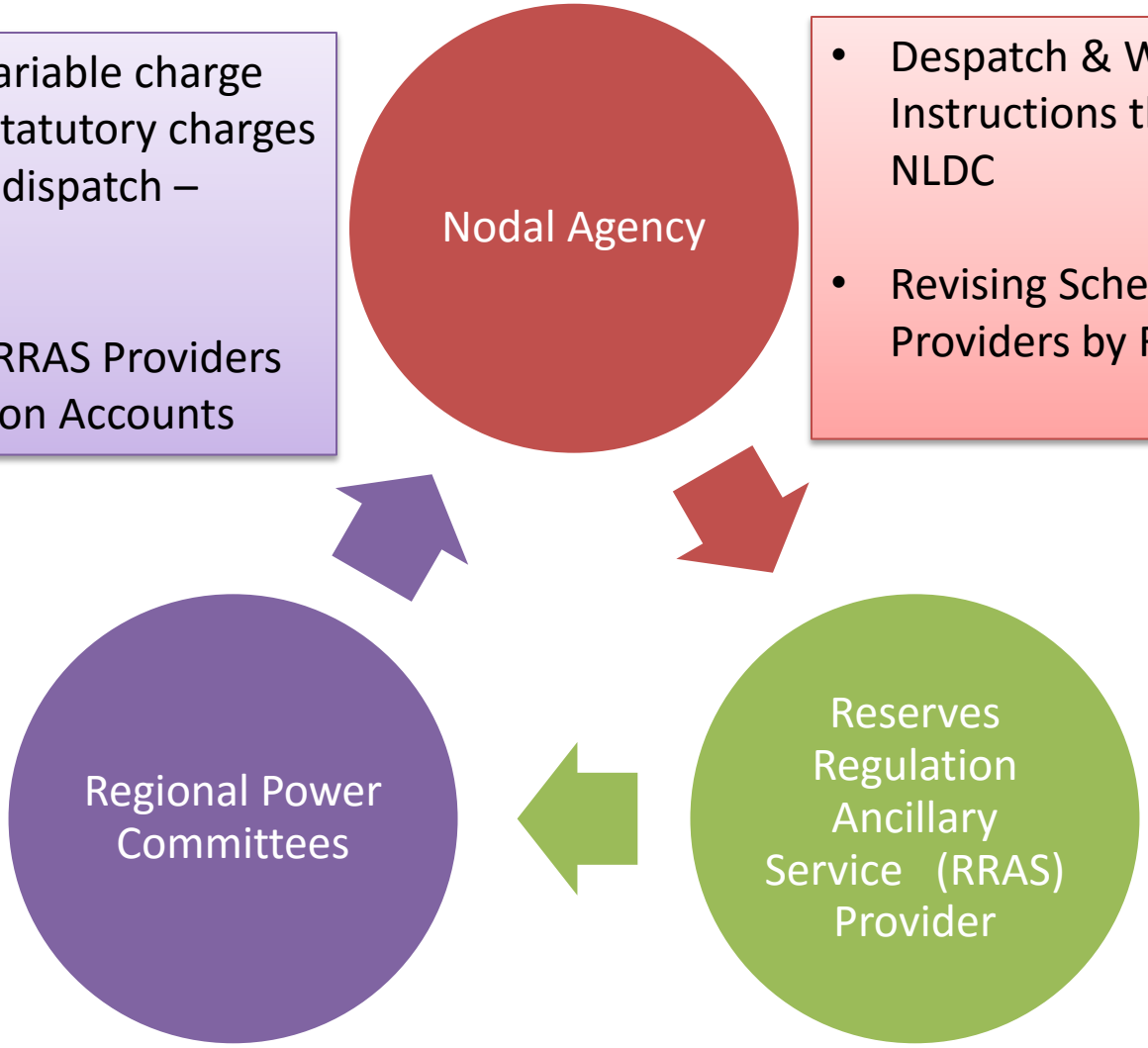
- MNRE
- MoP
- CERC
- FOR
- Central Agency/NLDC
- SERCs
- State Agencies
- Power Exchange

Visitor Number - 5337747

PhotoGallery

Nodal Agency for Ancillary Services Operations

- Fixed charge, Variable charge and any other statutory charges for merit order dispatch – Monthly basis
- Preparation of RRAS Providers Energy/ Deviation Accounts



- Despatch & Withdrawal Instructions through RLDCs by NLDC
- Revising Schedules of RRAS Providers by RLDCs

Fixed charge, Variable charge and any other statutory charges

Cross Border Scheduling and Despatch – Need for Nodal Agency

- Power transfer between countries
- Need for Nodal Agency
  - Settle transactions and deviations in Indian Pool
  - Back to back arrangement with buying entities in other country
  - Coordinate day-to- day scheduling with Load Despatch in both Countries
  - Transactions feasible
    - Long term Access/ Medium Term Open Access
      - Schedule to the LDCs on Day ahead basis
      - Revision allowed
      - Effective from 6th Time block
    - Short Term Open Access
      - Bilateral transactions - Revision as per Open Access regulations
- Net schedule – datum for exchange of power through the link
- Deviations settled as per CERC Deviation Settlement Regulations

Key Success Factors for Robust Electricity Market

- Robust Transmission System
- Control Area Demarcation & Boundary Metering
- Streamlined Scheduling and Settlement Mechanism
- Assessment of Transfer Capability
- Congestion Management
- Imbalance Handling Mechanism
- Methodology for Transmission Charge Sharing
- Treatment of Transmission Losses
- Transparent and Non-discriminatory Implementation
- Compliance Monitoring and Regulatory Oversight
- Dispute Redressal Mechanism

Cross Border Operational Coordination

- System Security Aspects
- Protection
- Operating instructions
- Outage planning
- Recovery Procedures
- Event information
- Transfer Capability Assessment
- Scheduling and Despatch
- Congestion management
- Formation of coordination groups

Way Forward

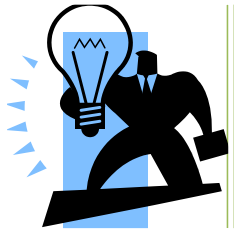
- **Coordination amongst Planners, Regulators and Grid Operators**
- **Scheduling, Metering, Accounting and Deviations Settlement**
- **Stabilized bilateral transactions with multi buyer – multi seller model**
- **Harmonized Cross-country scheduling and despatch procedures**
- **Application of (transmission & system operation) charges and losses**
- **Payment Security & Dispute Resolution Mechanism**

Consensus on the legal, regulatory, technical and commercial aspects !

Future Grid Management Challenges

Ramping Requirements, Peak-Shaving	Dynamic Optimization of Grid Operation and Security	Smart Grid, Self-Healing, Resilient, Storm Hardy Grid
Distributed Generation Resources	Cyber-Security, Interoperable Protocols, CIM	Micro-Grids, Demand Response, Prosumers
Energy Efficient, Climate Friendly Grid, Environmental Stewardship	Digital information, Fast Communication ,Automated Real-Time Interactive Controls	Electricity Storage, Plug-in Hybrid Electric Vehicles

System Operation



a **'mission critical activity'** for uninterrupted, secure, reliable and quality power supply in the country

a **'relentless pursuit'** for optimization of precious power generating resources and minimization of inherent system losses

a **'facilitator'** for an efficient electricity market

a **'vehicle'** for equitable and fair use of the transmission infrastructure in the country

a **'vital link'** between the administrators, planners & regulators on one end and physical system on the other end

Decades back, Dr. R .Buckminister Fuller proposed interconnecting regional power system into a single, continuous world-wide electric energy grid as a number one solution to solve many of the world's pressing problems.

Fuller also saw power grid as the way to reduce human suffering, preserve environment besides creating economical power systems.