

A background image showing several white wind turbines on a green, rolling hill under a blue sky with light clouds. The turbines are spaced out across the landscape, with some in the foreground and others further back.

Grid Operation & Reforms and Restructuring

By

Ghanshyam Prasad

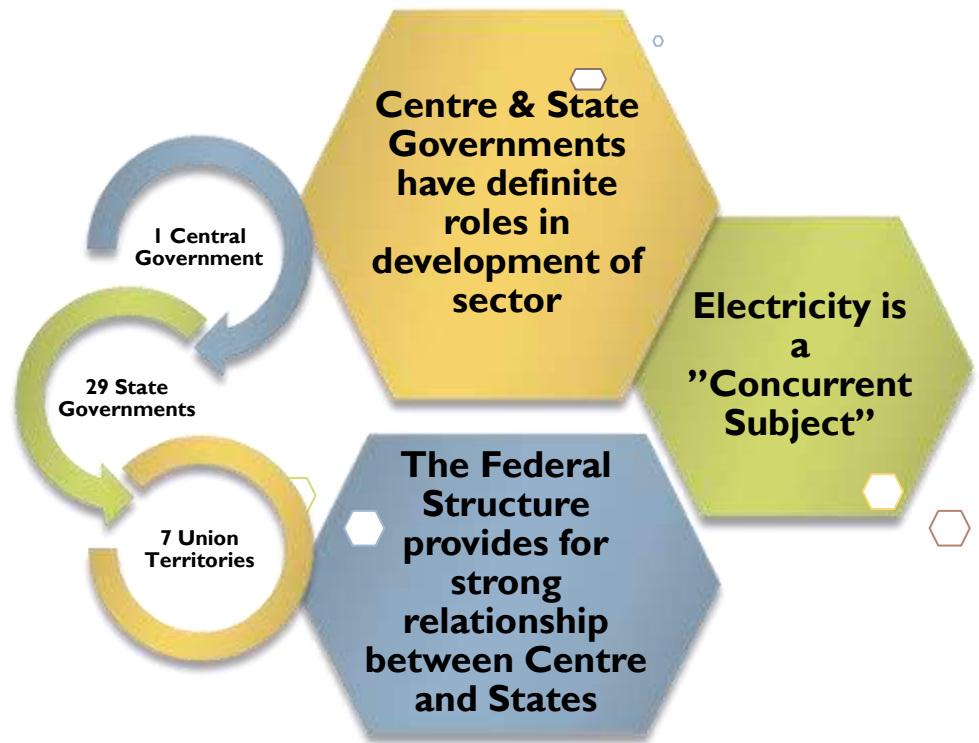
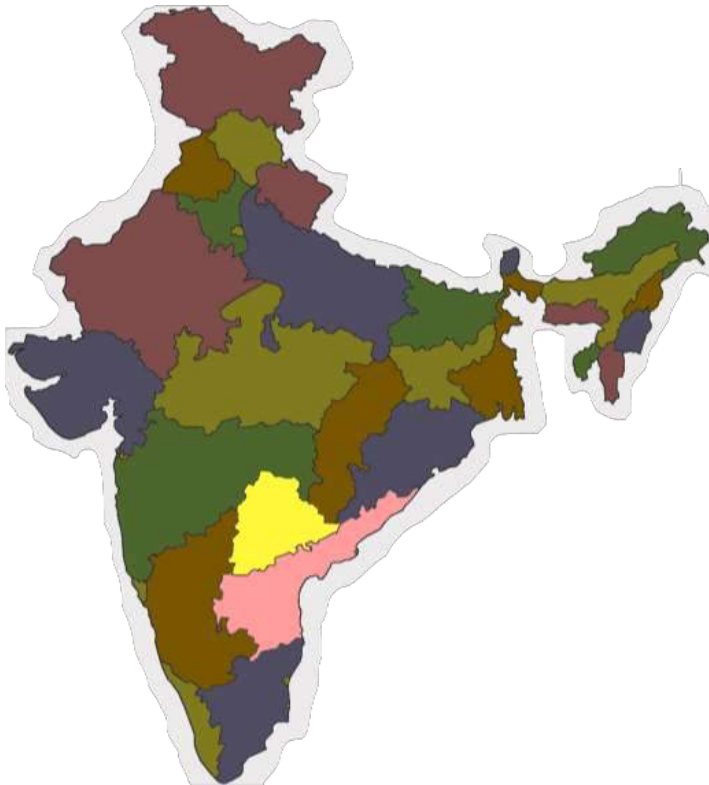
Chief Engineer (OM, R&R)

Ministry of Power, Government of India



Indian Power Sector

... in India,



Evolution – Multiplicity of Players



600+ Generating Stations

30+ Transmission Licensees

70+ Distribution Utilities

2 Power Exchanges

43 Trading Licensees

1 NLDC, 5 RLDCs, All State SLDCs (system operators)

CERC, SERC, JERC

APTEL

OPERATION OF NATIONAL GRID



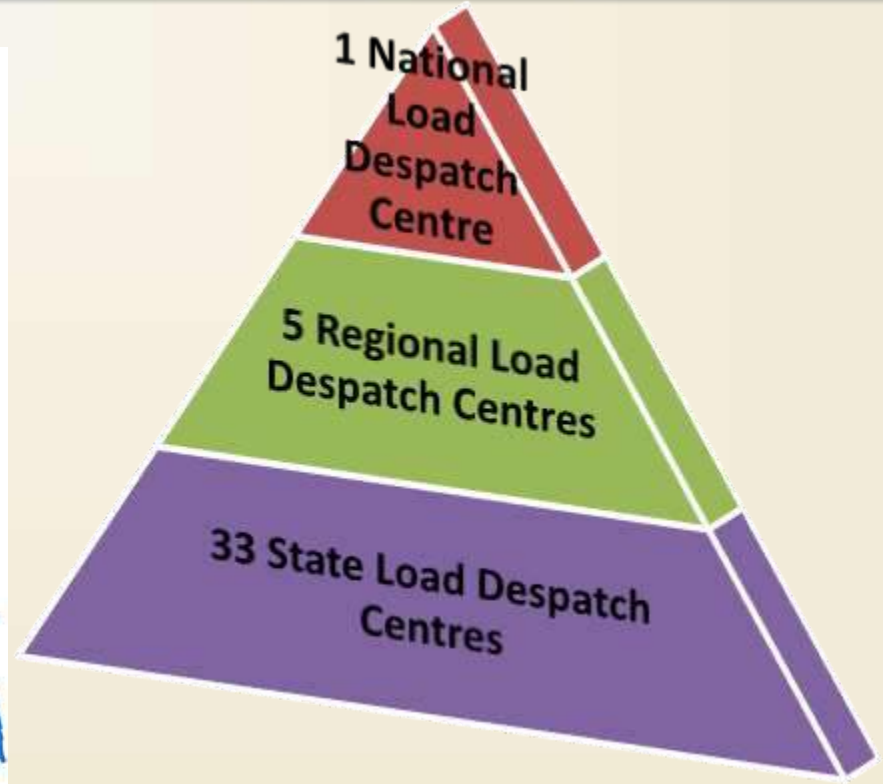
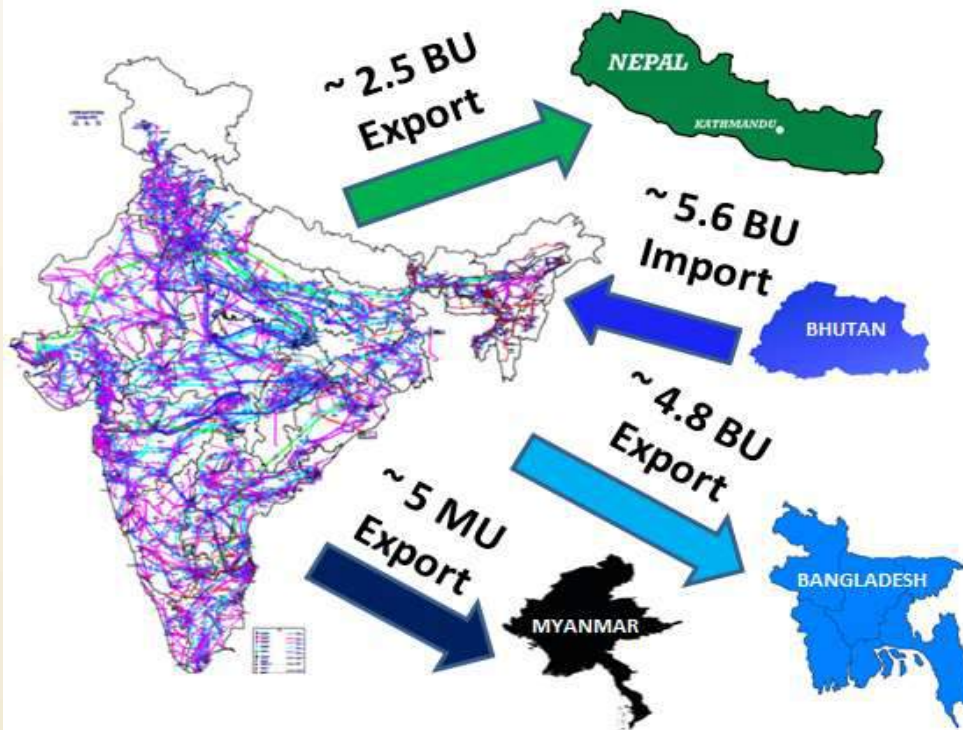
Indian National Grid

**Largest National Synchronous
Grid**

in the World

Cross Border Footprint Expansion

3-Tiered Coordinated Grid Management



Export / Import with Nepal, Bangladesh, Myanmar & Bhutan

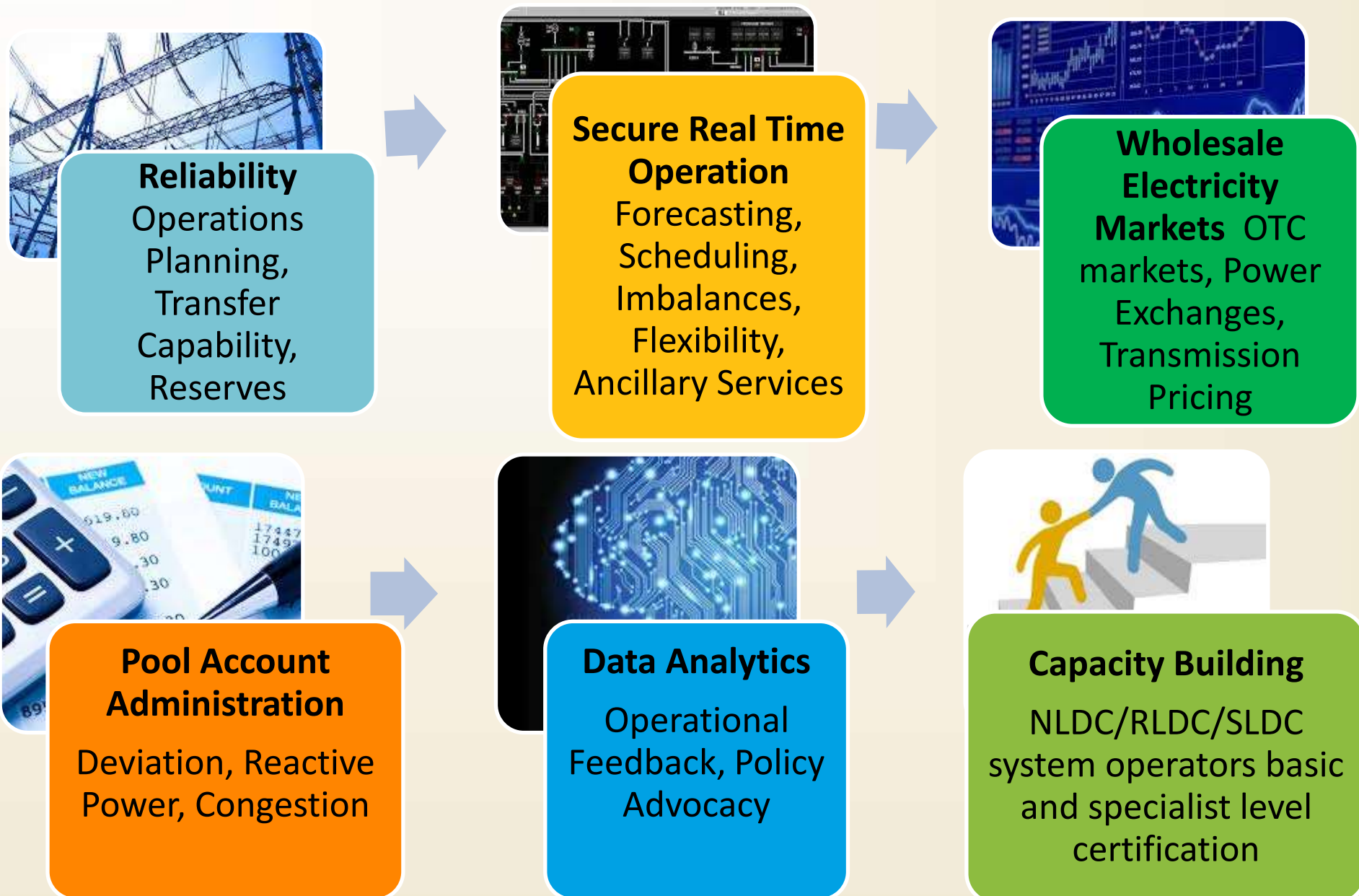
Export & Import with Neighbouring Countries

(Figures in MU)

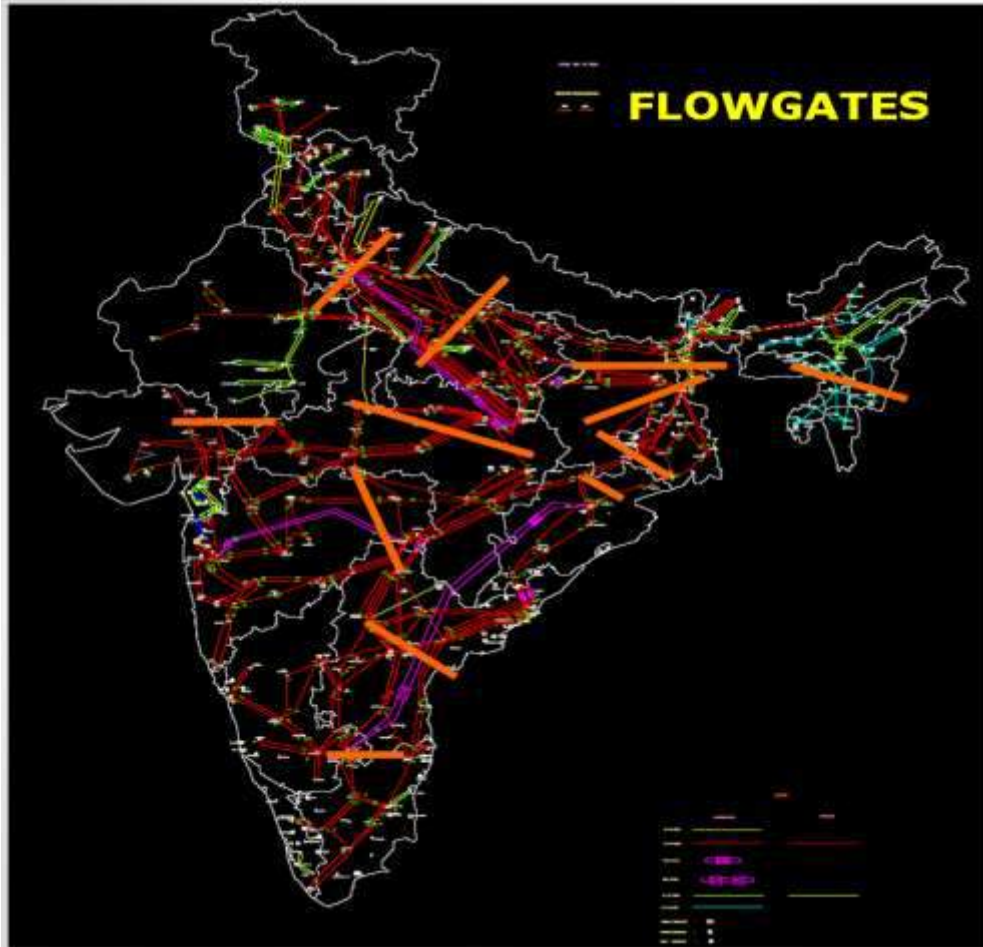
Period	Export Details				Import Details	Net of Export-Import
	Export to Nepal	Export to Bangladesh	Export to Myanmar	Total Export	Import from Bhutan	
2011-12					5,284.5	-5,284.5
2012-13					4,794.5	-4,794.5
2013-14	702.0	1,448.2		2,150.2	5,597.9	-3,447.7
2014-15	997.2	3,271.9		4,269.1	5,007.7	-738.7
2015-16	1,468.8	3,655.4		5,124.2	5,244.2	-120.1
2016-17	2,021.2	4,419.4	3.2	6,443.9	5,617.3	826.6
2017-18	2,389.0	4,808.8	5.1	7,202.9	4,778.3	2,424.5
2018-19 (Upto Dec. 2018)	1,597.5	4,139.4	5.0	5,741.8	4,376.6	1,365.2

- Export to Nepal and Bangladesh **increased 3.4 and 3.3 times** respectively in last four years.
- India **1st time becomes net exporter** of Electricity during 2016-17

GRID MANAGEMENT – NLDC, RLDCs & SLDCs



Creation of Transmission Flow-Gates



Pan India Market:
All India Economy & Efficiency

Optimal utilization of resources

Well Meshed Network

400 kV Backbone (~100,000 ckt kms)

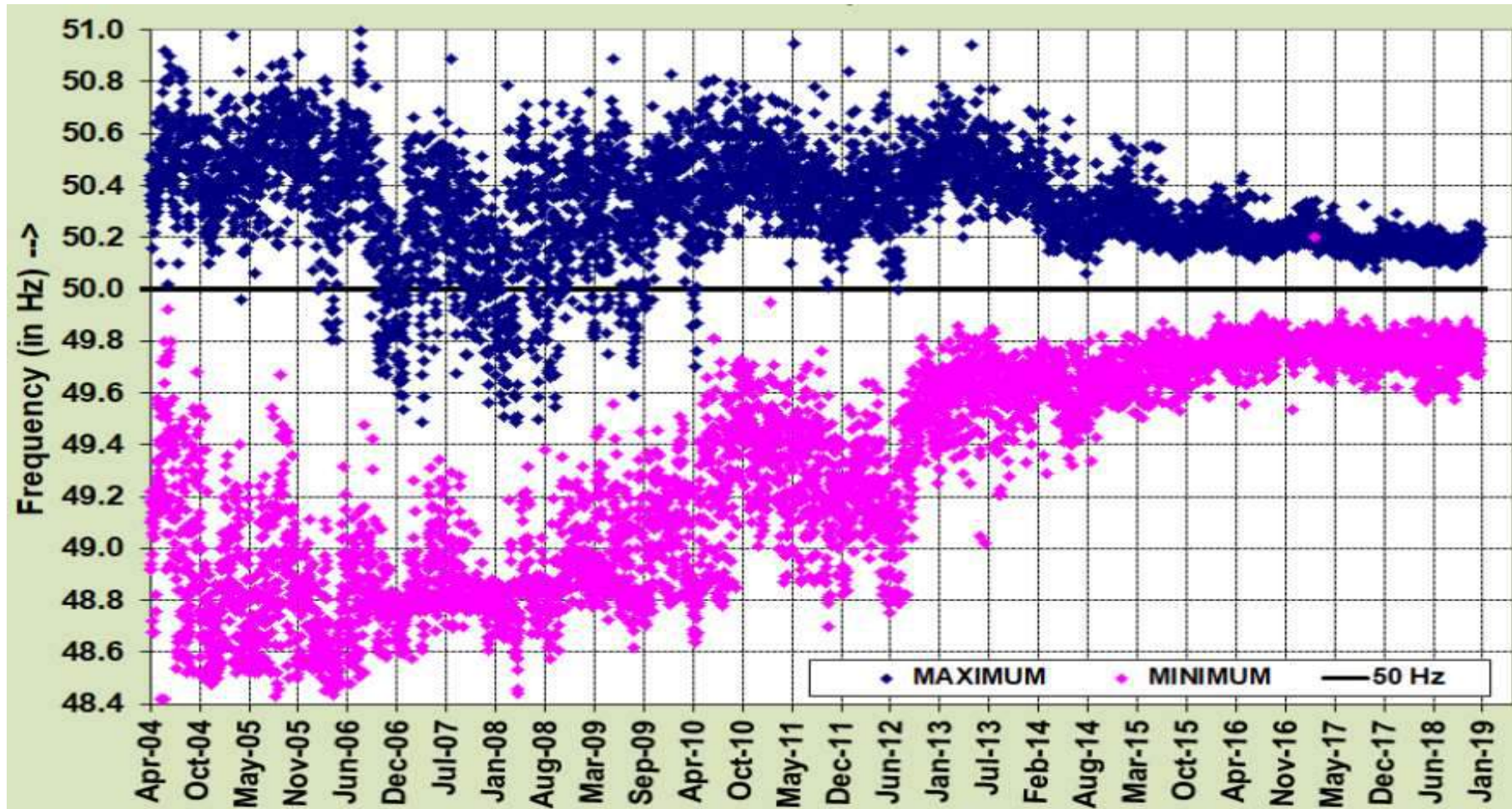
765 kV Operations commenced

Bulk transfer through HVDCs

High Capacity Corridors under construction



Ensuring Reliability of Grid Operation

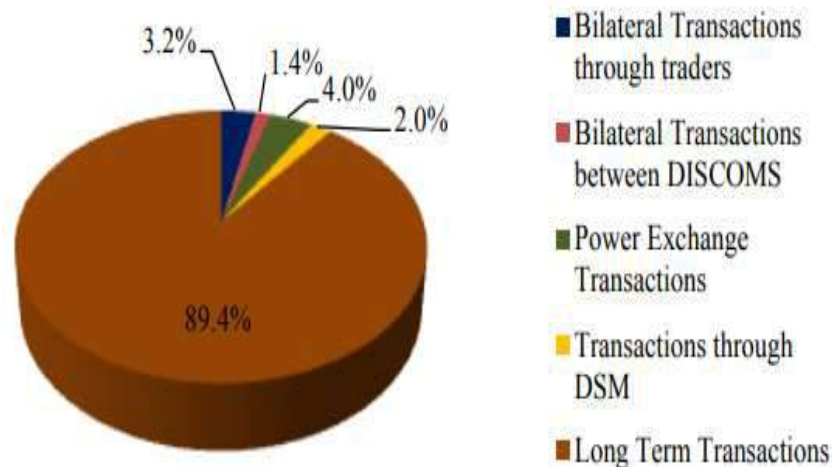


Outcome of regulatory interventions and better grid management

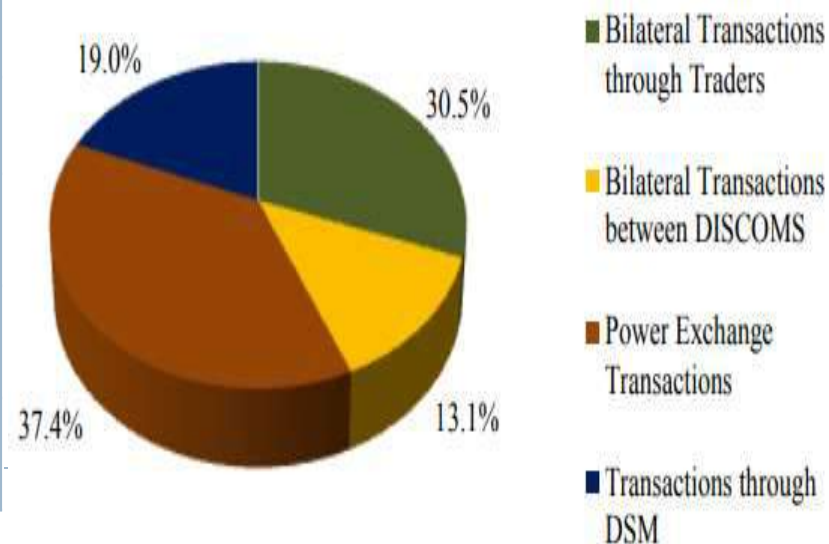
Development of Short Term Market

	Total Generation (BU)	Short Term Transaction (BU)	Trading Licensees (BU)	Power Exchanges (BU)
2009-10	769.43	65.9 (8.56%)	26.72	7.19
2010-11	811.14	81.56 (10.05%)	27.7	15.52
2011-12	876.89	94.51 (10.78%)	35.84	15.54
2012-13	912.06	98.94 (10.85%)	36.12	23.54
2013-14	967.15	104.64 (10.82%)	35.11	30.67
2014-15	1048.67	98.99 (9.44%)	34.56	29.4
2015-16	1107.82	115.23 (10.40%)	35.43	35.01
2016-17	1157.94	119.23 (10.3%)	33.51	41.12
2017-18	1202.97	127.62 (10.61%)	38.94	47.70

Share of market segments 2017-18

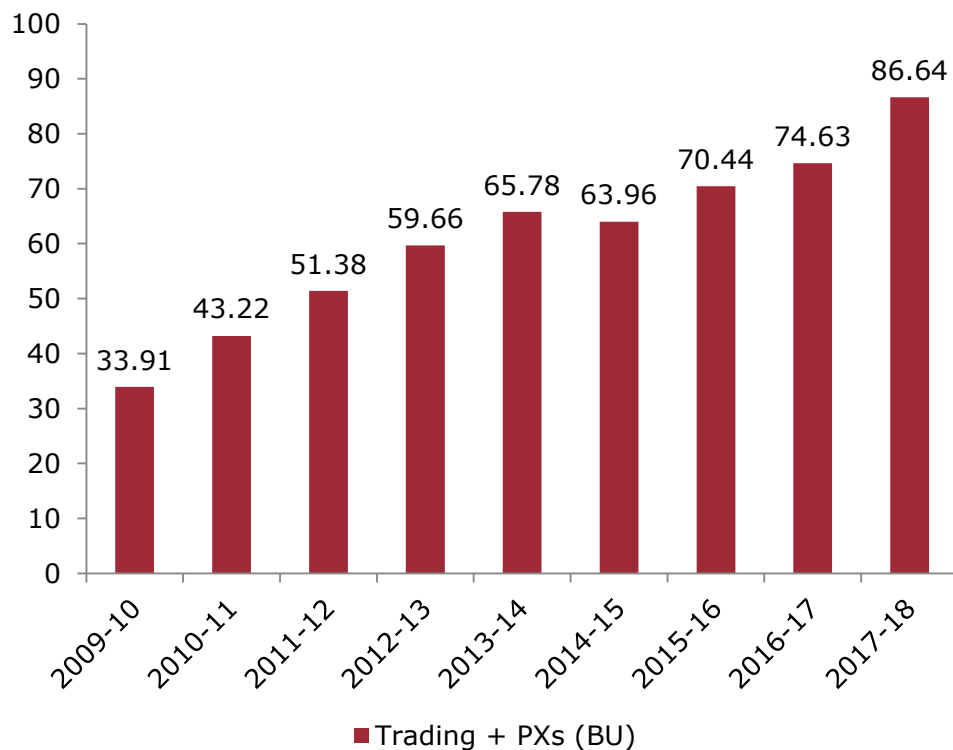


Share of short term market segments 2017-18

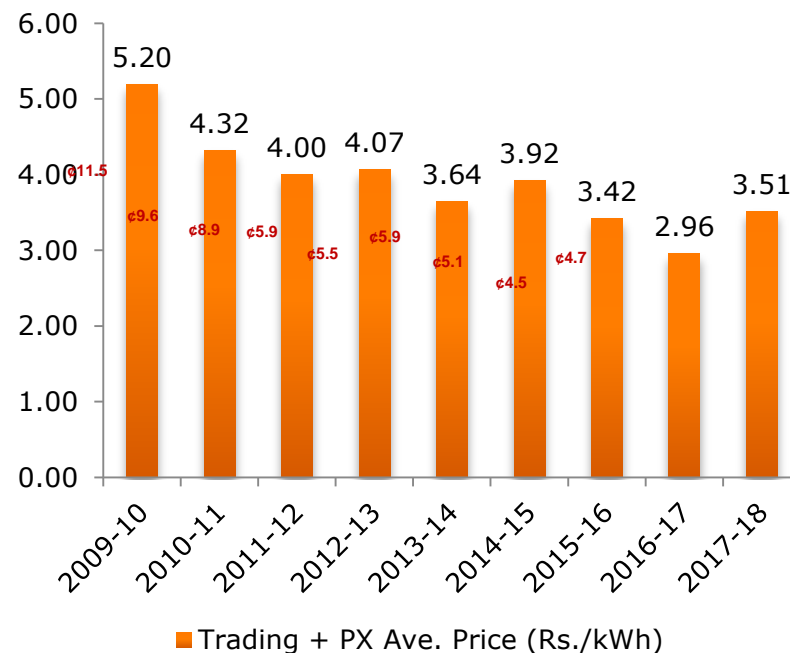


Development of Short Term Market

Trading + PXs Volume (BU)



Trading + PX Ave. Price (Rs./kWh)



Source: CERC Short Term Market Monitoring Report FY 2017-18 & <https://www.bookmyforex.com/blog/1-usd-to-inr-in-1947-2018/>

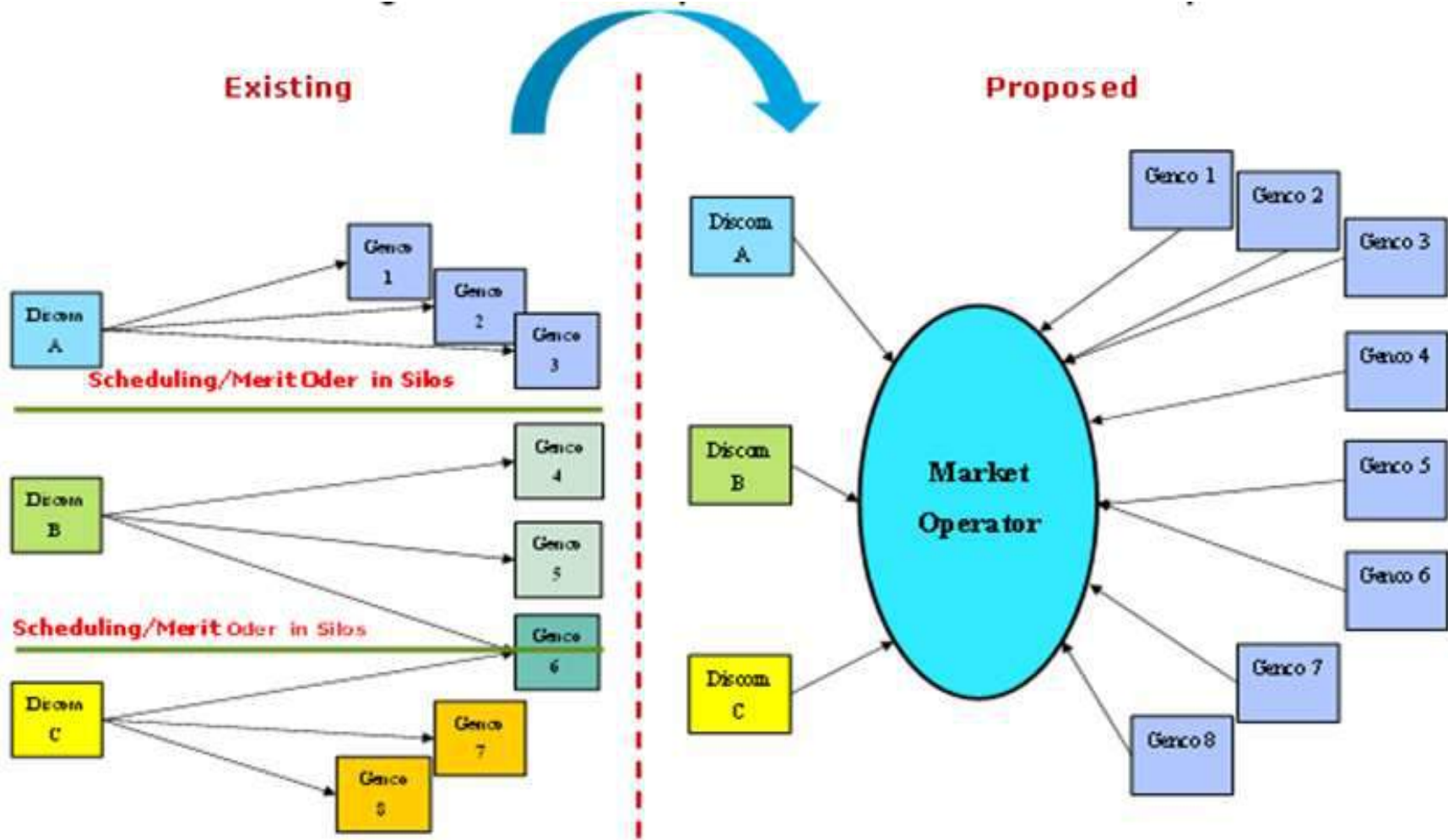
Market Design: Salient Features			
Categories of Market	Day Ahead Market (DAM)	Real Time Market (RTM)	System Imbalance/Ancillary Services Market
Purpose	Energy Trade	Energy Trade	Inadvertent deviation management
Market Design in India			
Current	DA (self-scheduling + Power Exchange (PX))	Deviation settlement Mechanism (DSM) + Ancillary Services (AS)	
Possible Way Forward	DA (self-scheduling + PX)	Hour Ahead (HA) – with gate closure	DSM + AS

Objective: Economy and Efficiency in system / market operation

Market Design in India – Next Step

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Existing Framework Vs. Proposed Market Based Economic Dispatch

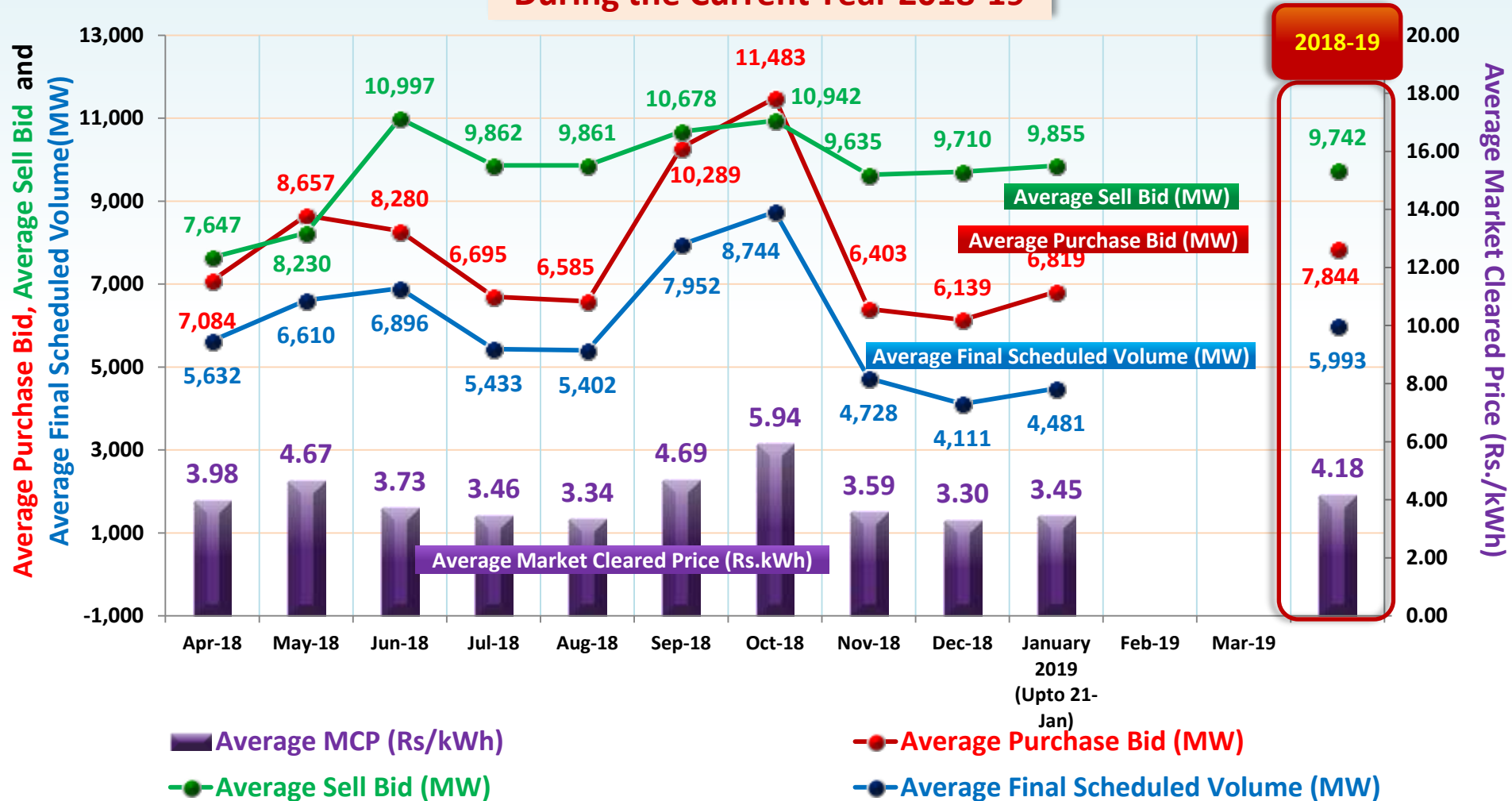


► CERC has issued suo moto order for start of the pilot economic dispatch on pan India basis from 1.4.2019

Indian Energy Exchange : Day Ahead Market Snapshot

Average Purchase Bid (MW), Average Sell Bid (MW), Average Final Scheduled Volume (MW) and Average Market Cleared Price

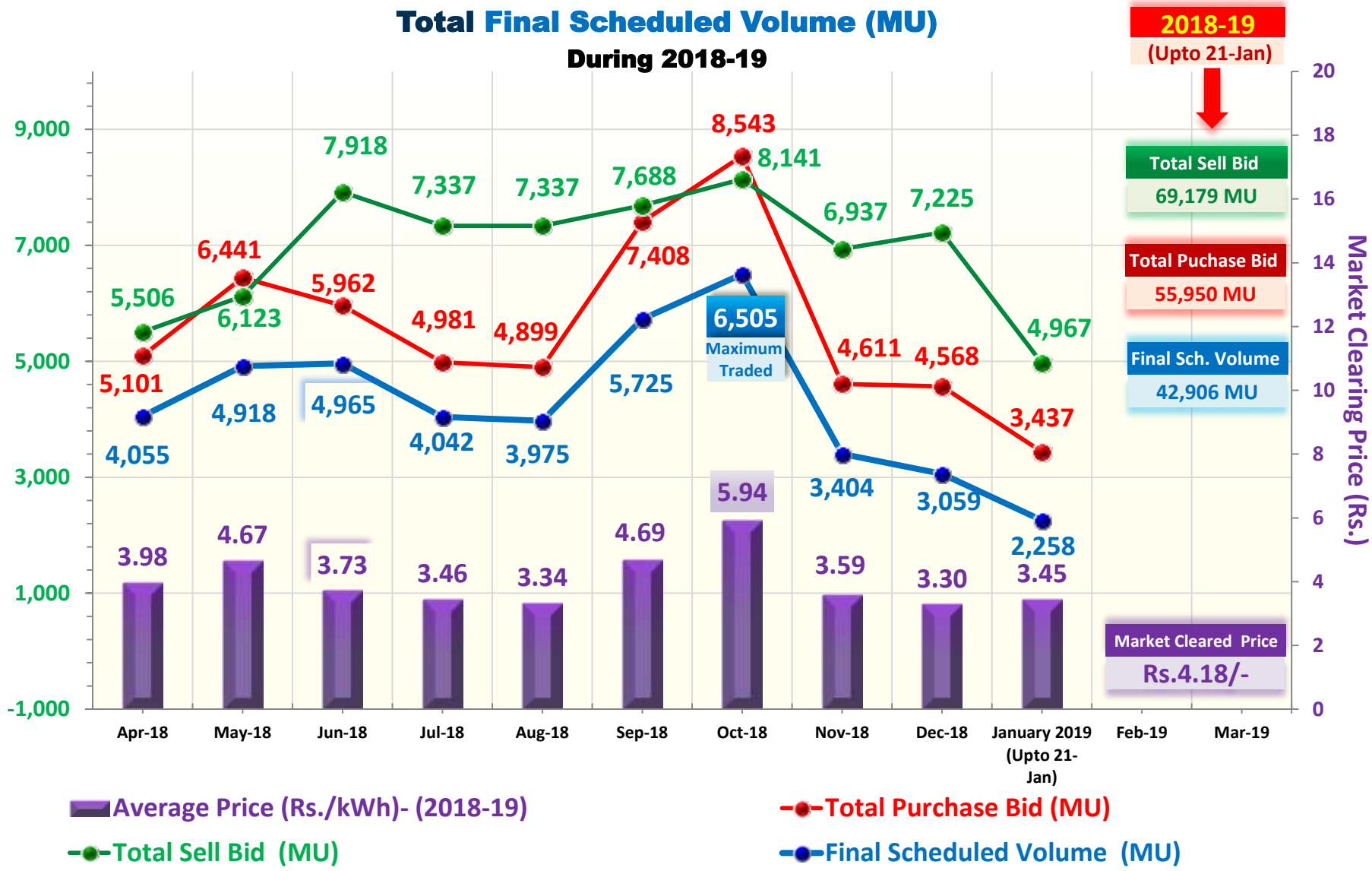
During the Current Year 2018-19



Total Sell Bid (MU)
During 2018-19

Indian Energy Exchange : Day Ahead Market Snapshot
**Total Purchase Bid (MU), Total Sell Bid (MU) &
Total Final Scheduled Volume (MU)**
During 2018-19

Total Purchase Bid, Total Sell Bid and Final Scheduled Volume (MU)





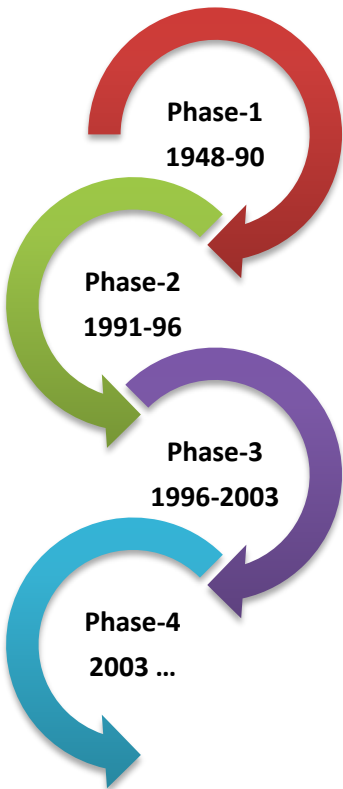
सत्यमेव जयते

Ministry of Power

Reforms & Restructuring

Major Policies in Indian Power Sector

- Electricity Act 2003
- Tariff Policy 2006 and amendments
- National Electricity Policy
- National Generation Plan
- Competitive Bidding Guidelines for procurement of Power
- Promotion of Renewable Energy
 - RPO Trajectory till 2022
 - Waiver of ISTS charges
 - Solar Bidding Guidelines
 - Wind Bidding Guidelines
 - Flexibility in generation and scheduling of TPPs to reduce emissions
- Other initiatives



Phase-4

2003
onwards

..... **Holistic development** of sector through **Electricity Act, 2003**

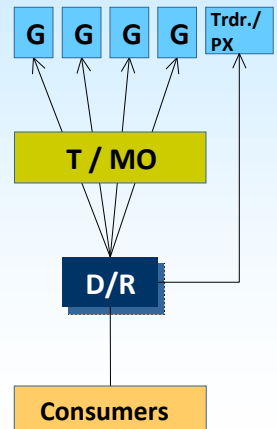
Competition – Delicensed generation, Open Access, Unbundling of SEBs, Traders, Power Exchanges, etc.

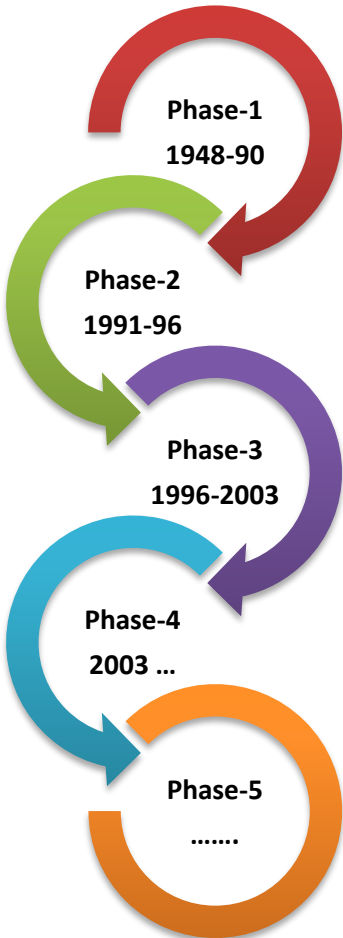
Expanded role of Regulators -Licensing, Tariff, Grid security, Adjudication, Market Development, Promotion of RE, DSM & EE etc.

Drivers for next Phase

- **Effective RE integration**
- **Need for introducing competition in retail sale of electricity**
- **Close to real-time balancing**

Wholesale Competition
• Distribution/retail companies have choice





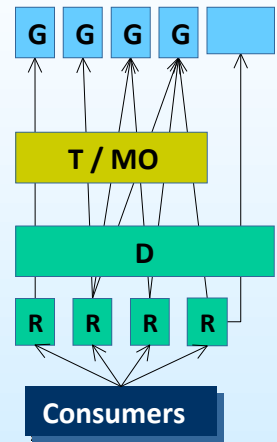
Phase-5 RE Integration

Under
discussion

Separation of **Carriage** and
Content

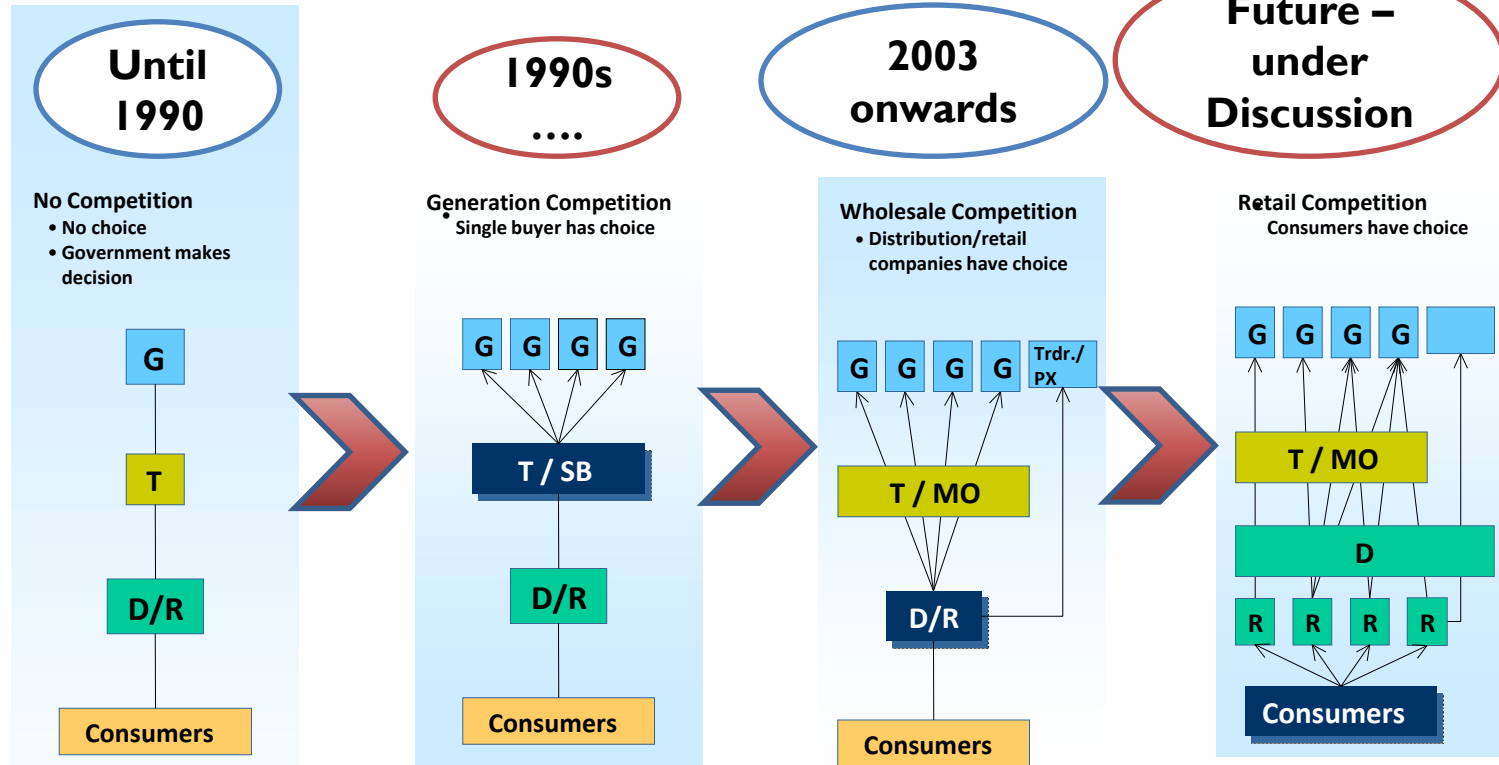
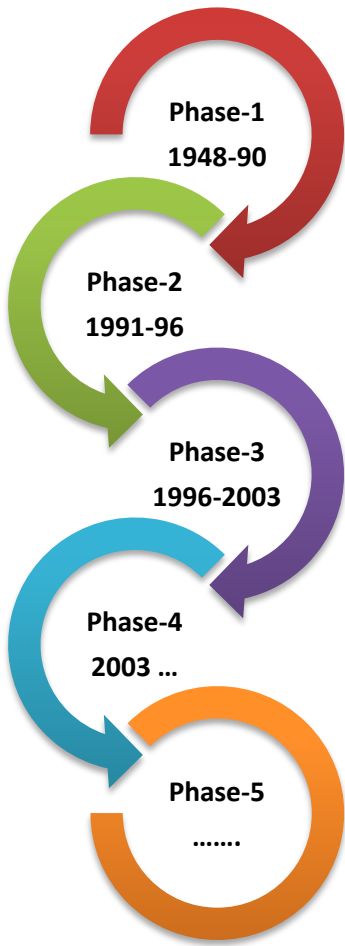
Market Design **Reforms**
incl. **real-time market**
design

Retail Competition
Consumers have choice



Evolution of Electricity Industry

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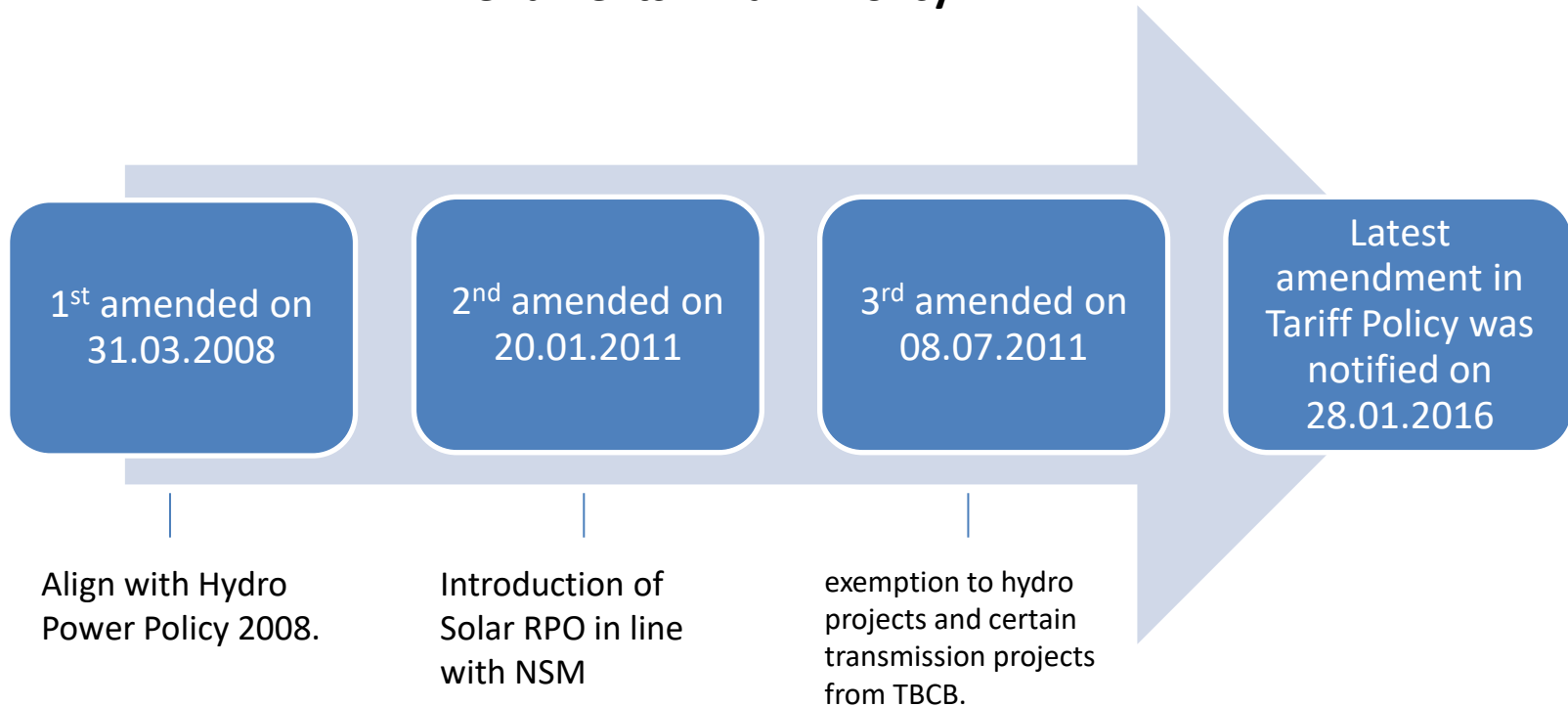
EA- Major amendments proposed

- Separation of Carriage and Content in the distribution sector.
- Grid Security.
- Promotion of Renewable Energy.
 - Renewable Generation Obligations and
 - Renewable Purchase Obligations.
- Rationalization of Tariff determination process.
- Strengthening/Performance review of Regulatory Commissions.
- Obligation of 24x7 power supply by Distribution Licensee
- Cross Border exchange of electricity
- Subsidy through DBT mechanism.

Tariff Policy

- Section 3 of the Electricity Act, 2003 empowers the Central Government to **formulate** the Tariff policy and **review and revise** the Tariff Policy.
- Central Government notified the Tariff Policy on **6th January 2006**

Amendments in Tariff Policy



Salient Features

Proposed Tariff Policy 2019

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graph TD; A[Proposed Tariff Policy 2019] --> B[Consumer Focus]; A --> C[Sustainability in sector]; A --> D[Towards greener and cleaner Environment]; A --> E[Addressing problems which led to stress in Power Sector]; A --> F[Encouraging Competition];
```

Consumer
Focus

Sustainability
in sector

Towards
greener and
cleaner
Environment

Addressing
problems
which led to
stress in
Power Sector

Encouraging
Competition

Proposed amendments in the Tariff Policy

The key changes proposed are

- Ensuring 24x7 reliable and quality power to consumers
- Licensee to pay compensation to the consumers if a licensee fails to meet the standards of Performance
- Inefficiencies due to high AT&C Loss not to be passed on to the consumers
- Better accountability of the Subsidy to consumers through DBT
- No creation of Regulatory Asset to ensure viability of Distribution Licensee
- Pre- Paid Metering to give choice to consumer to pay as per their affordability and convenience

Proposed amendments in the Tariff Policy

The key changes proposed are

- Simplification of tariff categories and rationalization of retail tariff
- Reduction in Surcharge for Open Access
- Procurement of Power through competitive bidding
- Addressing the issue of short supply of domestic coal by CIL to the competitively bid power projects
- Clarity on Change in Law events
- Uniform RPO Trajectory and Review of Renewable Energy Certificate (REC) Mechanism
- Promoting Electric Vehicles
- Promoting Waste to Energy Plants, use of Bio Mass Pellets/ Briquettes and co-generation

Initiatives Taken

towards revamping Power Sector

Promotion of Renewable Energy

- **RPO Trajectory till the year 2022:** An order on RPO Trajectory for a further period of three years i.e. from 2019-20 to 2021-22 has been issued.

Long term RPO trajectory	2019-20	2020-21	2021-22
Non-Solar	10.25%	10.25%	10.50%
Solar	7.25%	8.75%	10.50%
Total	17.50%	19.00%	21.00%

- **Waiver of ISTS Charges and Losses:** Extension of waiver of ISTS Transmission charges and losses for Solar and Wind based Projects has been done till **March 2022**. This move is expected to encourage capacity addition of Solar and Wind based power projects.

Initiatives Taken

towards revamping Power Sector

Notification of Solar and Wind Competitive Bidding Guidelines:

- **Solar Bidding Guidelines** have been issued on **03.08.2017** and **Wind Bidding Guidelines** were issued on **08.12.2017** for long term procurement of electricity by the distribution licensees.

Initiatives Taken

towards revamping Power Sector

- Flexibility in generation and scheduling of Thermal Power Stations to reduce cost of power to consumers
- **Flexibility in Generation & scheduling of Thermal Power Stations to reduce emissions:**
- Clarification on Charging Infrastructure for Electric Vehicles :
To promote Electric Vehicles , a clarification on the issue of applicability of any license for the Charging Stations for Electric Vehicles has been issued on 13.4.2018

Initiatives Taken

towards revamping Power Sector

Revival of the stressed assets

- a Pilot Scheme to facilitate procurement of aggregated power of 2500 MW for 3 years from the generating companies (Successful tie up of 1900 MW)
- Pilot Scheme –II for procurement of another 2500 MW for the period of three years under medium term has been notified on 01.02.2019.

Initiatives Taken

towards revamping Power Sector

In order to facilitate use of linkage coal as per **SHAKTI Policy** in the **medium term** procurement of power by Distribution Licensees, **Model Bidding Documents for medium term** has been revised and **issued in January 2019**.

Model Bidding Documents for long term is under approval

Ensure accountability and transparency

Mobile applications and Web-Portal

- i. **‘Vidyut PRAVAH’**-on Electricity Pricing and Availability Highlights launched on 31st March, 2016. highlights of the power availability in the country on real time basis.
- ii. **DEEP (Discovery of Efficient Electricity Price) e-Bidding & e-Reverse Auction portal-** launched on 12th April, 2016.
- iii. **MERIT (Merit Order Despatch of Electricity for Rejuvenation of Income and Transparency)** launched on 23rd June 2017

Reforms and Restructuring - Way Forward

- **Aligning the Electricity Act, Tariff Policy, National Electricity Policy etc wrt the Dynamic changes in the power sector**
- **Move towards Market based power Sector**

Thank You