

Indian Experiences on Promoting Renewable Energy



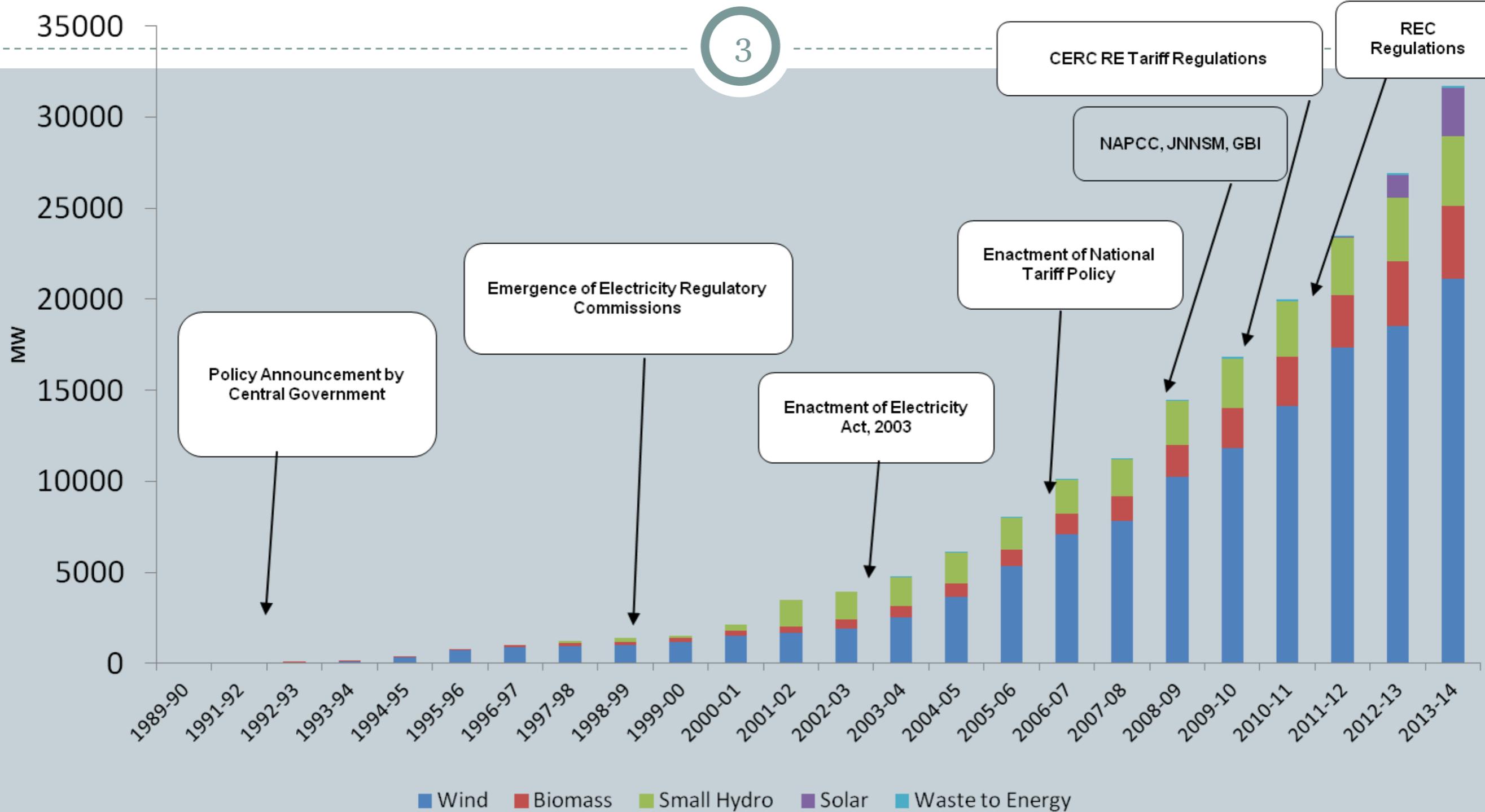
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Introduction

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- Clean energy promotion in India – Focus on
 - ⑩ Encouraging efficient technology and enhancing efficiency of conventional generation;
 - ⑩ Promotion of Renewable Energy
- With renewable installed capacity of about 34 GW
 - ⑩ India is already a global leader.
- The country has set an ambitious target
 - ⑩ for RE capacity addition (175000 MW by 2022)
- To achieve this feat,
 - ⑩ facilitative policy and regulatory framework plays a pivotal role.

RE Development in India



Policy and regulatory intervention is essential to promote renewable energy

Renewable Energy (RE) policies

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India has adopted a unique approach to RE development by judiciously combining the policy and regulatory drivers like

- ⑩ Grants and Rebates
- ⑩ Tax Credits
- ⑩ Competitive Tenders and Auctions
- ⑩ Tradable Renewable Energy Certificates
- ⑩ Renewable Portfolio Standards and Quota systems
- ⑩ Net Metering
- ⑩ Feed-In Tariff (FIT)
- ⑩ Competing or combining policies

Regulatory Interventions in India

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- Renewable Purchase Obligation (RPO)
- Preferential Tariff
- Facilitative Framework for Grid Connectivity
- Market Development (Tradable Renewable Energy Certificates)

Feed-In- Tariff

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- **Feed-in Tariff (FIT):**

A renewable energy policy that offers a guarantee of payment to renewable energy developers for the electricity they produce.



- Must be able to connect
- Guarantee and priority
- Connection must be simple, timely, and at reasonable cost

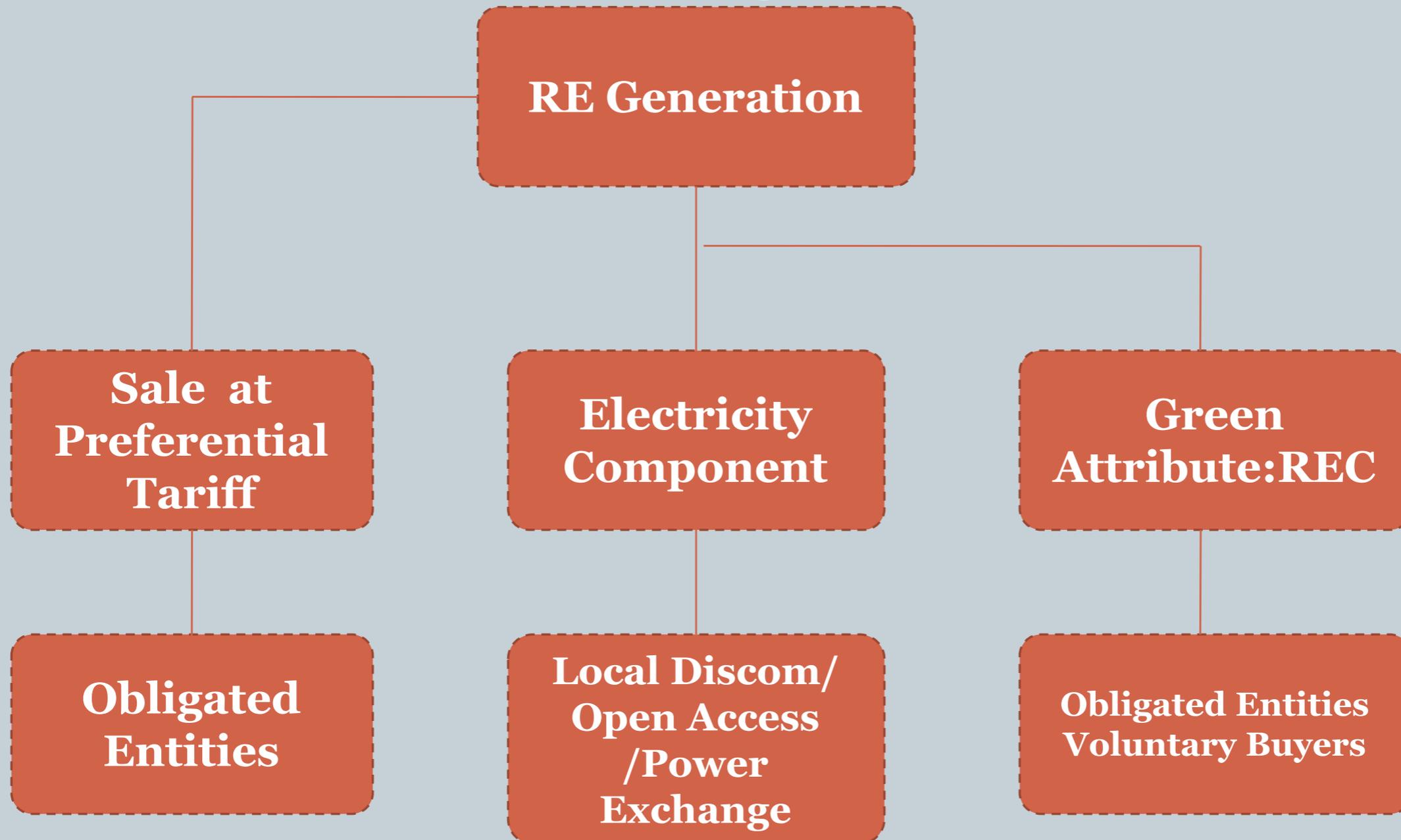
Renewable Purchase Obligation (RPO)

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- ⑩ RPO set by State Regulators
- ⑩ RPO varies across States
- ⑩ RPO generally set, based on RE availability in a State!

Renewable Energy Certificate (REC)

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Framework for Grid Integration of RE

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- **Indian Electricity Grid Code**
 - ⑩ **Facilitative connectivity rules**
 - ⑩ **Must Run Status**
 - ⑩ **Framework of Forecasting, Scheduling of infirm wind and solar**

- ⑩ RPO – Non Compliance
 - State Commissions to play a crucial role
- ⑩ FiT vs REC
 - REC framework being refined
- ⑩ Grid Integration
 - Green Corridor; REMC; Forecasting/Scheduling Framework (proposed)
- ⑩ Complementary Market Structure
 - Extended (24X7) trading sessions in Power Exchanges
 - Proposed framework for Ancillary Services

⑩ Grid Integration

· Challenges

- ⑩ Evacuation Infrastructure: Cost
- ⑩ Forecasting and Scheduling: Centralized vs Decentralized
- ⑩ Handling inter-State transfer of power

· Way Forward

- ⑩ Measures initiated to address the challenges: Green Corridor; Renewable Energy Management Centre (REMC); Forecasting, Scheduling and Deviation Settlement mechanism for wind and solar generation

Proposed Forecasting, Scheduling and Deviation Settlement Mechanism for wind and solar

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Proposed Framework:

- **Applicability:** Inter-state wind and solar generators (>50 MW)

- **Forecasting:**
 - Centralized & Decentralized Forecasting aspects: Forecasting by the wind/solar generator as well as Regional System Operator (RLDC).
 - Wind/solar generator may choose between the forecasts; all commercial implications to be borne by generator
 - Renewable Energy Management Centers, once established, equipped with advanced forecasting tools/ Forecasting Agencies may be used by RLDC for forecasting. RLDC forecast would include aspect of grid stability.
 - Multiple forecasting would ensure better accuracy
- **Scheduling:** Akin to conventional generation
 - ⑩ A maximum of 16 revisions for each fixed one and half hour time slot starting from 00:00 hours during the day (as against 8)

Proposed Framework Contd.

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Settlement/Imbalance Handling

Desired Operating Band	12% of schedule (In line with DSM), but with special commercial dispensation
Payment	At Scheduled Generation
RPO Compliance	At Scheduled Generation
Under injection within Desired Operating Band	1. Generator pays to Pool @ Rs 3/kWh* 2. Generator Procures equivalent REC and Transfers to Buyer
Over injection within Desired Operating Band	1. Generator receives payment from Pool @ Rs 4/kWh* 2. Generator Receives equivalent REC
Under injection beyond Desired Operating Band	1. Generator pays to Pool @ Rs 4/kWh* 2. Generator Procures equivalent REC and Transfers to Buyer
Over injection beyond Desired Operating Band	Only REC issued to Generator

Proposed Framework Contd.

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• **Other Provisions:**

- ⑩ **Imbalance handling :** Desirable band of 12% (in line with DSM Regulations) for deviations from schedule both in positive and negative directions . A commercial mechanism delinking frequency based charges
- ⑩ **RPO fulfillment :** RE Power purchasing utility would demonstrate RE procurement as part of its RPO fulfillment in the State
- ⑩ **Data Telemetry and Communication Facilities:** The wind/solar generator to provide full data telemetry and communication facilities to the concerned REMC/RLDC.
- ⑩ **Compliance to Technical Standards:** as per the CEA Technical Standards for Connectivity of the Distributed Generation Resources Regulations 2013.
- ⑩ **Transmission Charges and losses, Reactive Charges:** Unless specifically exempted, the losses and charges shall apply as applicable to other entities

Proposed Framework Contd.

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Benefits:

- No need for separate pool/account creation
- Procurement of RE due to under injection will help REC market
- Incentive for RE generators to schedule accurately
- Delinking of Incentive/Disincentives from Frequency linked charges
 - bringing in more certainty on financial implication of scheduling.



Thank You

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