14th Capacity Building Programme for Officers of Electricity Regulatory Commissions

Regulatory Approach to Tariff Setting in the Power Sector – Power Procurement and Renewable Energy

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Organised by
Centre for Energy Regulation
Department of Industrial and Management Engineering
Indian Institute of Technology Kanpur
Recent Developments in Renewable Energy Sector and Future Outlook

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Renewable Energy in Legal Context

- **Electricity is a concurrent subject** under Entry 38 in List III of the Seventh Schedule of the Constitution

- **Central Government implements policies, programmes** for renewable energy **with support of States**

- Under Entry 53 in List II, **taxes on the consumption or sale of electricity is a State subject**

- Matters relating to **inter-state transactions are in Centre’s domain**

- **States responsible** for the **intra-state sale, purchase, distribution and supply** of electricity

- Responsibility for **ensuring compliance and penalizing non-compliance** lies with the **States**
As on 31 January 2021, India’s installed grid-connected power generation capacity is over 377 GW.
**Policy and Regulatory Framework for Renewables**

<table>
<thead>
<tr>
<th>Act/Policy</th>
<th>Description</th>
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| **Electricity Act (EA), 2003** | • Section 3 - Central Government to develop a national policy for optimal utilization of resources including RE  
• SERCs to: (Section 86) - fix a minimum percentage energy purchase from RE sources (RPO)  
• Section 63: Competitive Bidding |
| **National Electricity Policy, 2005** | • Section 5.2.20 - promotes private participation in RE  
• Section 5.12.1 - targets capital cost reduction in RE through competition  
• Section 5.12.2 - SERCs to specify tariffs for RE |
| **National Tariff Policy, 2016** | • Tariff principles  
• Competitive bidding for RE  
• ISTS charges waiver for solar and wind  
• Solar RPO to be 8% by 2022 |

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| **Indian Electricity Grid Code, 2010** | • Clause 5.2 and 6.5.11 provide for treatment of renewable as must run and not be subjected to ‘merit order dispatch’  
• Envisaged for improved grid discipline and accountability by mandating wind & solar Forecasting & Scheduling |
| **Renewable Energy Certificates, 2010** | • Aimed at pan-India market, optimal use of RE potential  
• Provides for selling the energy and environmental attributes of renewable power separately |
| **State Policies & Regulations** | • State RE policies  
• Regulations on tariff, RPO, Net-metering, Forecasting & Scheduling, Open Access |
Impetus to Renewables

Renewable Energy development in India has been aided by strong policy and regulatory backing

- Enactment of Electricity Act 2003
- National Tariff Policy, 2006
- National Electricity Policy, 2005
- National Action Plan on Climate Change, 2009
- Integrated Energy Policy, 2008
- National Solar Mission, 2010
- Paris Climate Declaration, 2015
- RPO Trajectory, 2018
- RPO Trajectory, 2016
- Target for 175 GW by 2020
- RPO Trajectory, 2016
RE Target - 175 GW by 2022

Capacity in GW

- Solar: 100 GW
- Wind: 60 GW
- Biomass: 10 GW
- Small hydro: 5 GW
RPO Trajectory

- Pursuant to the revised Tariff Policy, the Ministry of Power (MoP) on 22 July 2016 notified the uniform RPO trajectory for all States from the year 2016-17 to 2018-19.

- Further, on 14 June 2018, MoP notified the uniform RPO trajectory up to the year 2021-22 that seeks 21% RPO (10.5% non-solar and 10.5% solar) by 2021-22.

- Achievement 2019-20 - about 12% against 17.5% RPO target.
Ongoing Policies and Initiatives

- Guidelines for competitive bidding
- Waiver of ISTS charges and losses
- Flexible Operation of Thermal Power
- Green Energy Corridor and REMCs
- Wind-Solar Hybrid Policy
- PLI for domestic PV manufacturing
- KUSUM scheme to support farmers
- SRISTI – Rooftop Solar programme
Renewable Power 2023-30

India declared **aspirational target of 450 GW renewable power** installed capacity by 2030

Translates to **35 GW of renewable energy capacity addition per year during 2023-30**

**Generation Capacity Mix estimates** from various studies for 2030:

<table>
<thead>
<tr>
<th>Capacity Mix 2030 - Installed Capacity (GW)</th>
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<tbody>
<tr>
<td><strong>Nuclear</strong></td>
</tr>
<tr>
<td>CEA</td>
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<tr>
<td>LBNL</td>
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<td>TERI</td>
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</tbody>
</table>

* 37 GW / 62 GWh, # 64 GW / 256 GWh
Emerging Challenges

• Higher cost is no longer an impediment to higher penetration of renewables

• Technical limitations to reliably integrating variable and intermittent power

• Transmission pricing for renewable power, while retaining attractiveness

• Minimising RE curtailment

• Ensuring payment security, attracting investments through innovative models
Increasing penetration of Renewables

• Flexible Operation of Grid
  • Steady Power from Renewables
  • Improved Forecasting & Scheduling
  • Energy Storage

• Other modes of RE procurement
  • Widening RE Markets
  • Facilitative Open Access

• RE Penetration in other sectors
  • Hydrogen and other emergent technologies
Focus on steady power from RE

• **Discoms** ideally require **reliable and steady power** with appropriate flexibility

• **Progressive focus** on products providing **reliable, steady power from RE**

• **SECI’s tenders** during recent past have explored the following options:-
  • Solar-wind hybrid projects
  • RE projects with **assured Peak Power supply**
  • **Round-the-Clock (RTC)** Power from RE projects
  • RTC complemented with **Thermal Power**
Energy Storage

What Storage can do
• Increased flexibility of power system to absorb renewable energy
• Frequency regulation, contingency reserves, peak shaving and time shift of demand

Strategies for building storage capacity
• Demand aggregation for grid connected RE – Tenders for RTC, Peak Power supply
• Diesel replacement in islands, remote locations – Plan for fossil fuel free Lakshadweep
• R&D projects for technology developments in energy storage
• NITI Aayog piloting Mission to promote domestic manufacturing
Forecasting & Scheduling

- As on date, the Electricity Regulatory Commissions (ERCs) of 20 states have issued final Forecasting and Scheduling (F&S) regulations for wind and solar.

- There are significant variations in the regulations and their stringency from State to State.

- With increasing share of RE, a uniform F&S regime required at the National level to address Grid integration.
Facilitative Open Access

• **Commercial and Industrial sector** - significant potential for consuming electricity from renewables using **Open Access**

• **Major corporations** evinced interest for sourcing **RE for their operations**

• Many **States impose restrictions** to deter export or import of power through open access

• A **facilitative OA framework** will make renewables an attractive option

• Need to **rationalize charges** and **procedure for availing OA**
RE Markets (G-TAM)

Bundled Green Power
- Discom
- Feed-in-Tariffs (FiT)
- Competitive Bidding
- Third Party Sale to consumers

Unbundled Green Power
- To Discom @APPC
- Third Party sale to consumers
- Sell at Exchange
- Captive Consumption

Proposed Green Market @ Exchange

Sell REC

Market Mechanism under EA 2003
- Trading distinct activity, permitted with licencing. (Section 12)

- Regulatory Commission may fix ceiling on trading margin to avoid artificial price volatility. (Sections 79 (2) (b) & 86 (2) (b))

- The Regulatory Commission to promote development of market including trading. (Section 66)

Source: IEX
Green Hydrogen

Green Hydrogen has potential to act as a **carrier and enabler of renewable energy** across key economic sectors.

- **Integrating renewable power**
  - Decentralized generation
  - Energy Storage

- **Clean transportation**
  - Heavy duty, long range vehicles

- **Decarbonization of Industry**
  - Ammonia
  - Steel
  - Methanol
  - Petrochemicals

Green Hydrogen has potential to act as a **carrier and enabler of renewable energy** across key economic sectors.
Thank You