Initiatives taken for Facilitating Large Scale Integration of Renewable Energy in India

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Submission ID : 195

1st International Conference on Large-Scale Grid Integration of Renewable Energy in India
Introduction

• Huge RE Potential
  • 175 GW RE by 2022
  • 40% cumulative capacity from non-fossil fuel based energy resources by 2030

• High Growth rate of RE

• Large Scale RE Integration
  • Conducive Policy
  • Meticulous Planning
  • Level playing regulations
  • Reliable System Operation
Policy Measures

• Electricity Act 2003
  • Preambles defines the “promotion of efficient and environmentally benign policies” as an objective

• National Electricity Policy, 2006
  • Recognizes the need for promotion of generation from non-conventional sources of energy

• Tariff Policy, 2016
  • Provisions for 8% solar RPO by the year 2022, Renewable Generation Obligation
  • Guidelines for long term growth of RPOs for non-solar as well as solar energy.
Policy Measures

• National Solar Mission
  • 50 Solar Parks and Ultra Mega Solar Power Projects targeting over 40 GW of installed capacity within a span of 5 years starting from 2014-15

• India's Renewable Electricity Roadmap 2030
  • Legal, institutional and policy changes that will be needed to successfully adopt renewables on large scale
  • Recommends National RE Law or Policy

• National Electric Mobility Mission Plan (NEMMP)
  • Promotion of hybrid and electric vehicles

• Guidelines on Cross Border Trade of Electricity, 2016
  • Promote transparency, consistency and predictability in regulatory approaches across jurisdictions and minimize perceptions of regulatory risks.
  • Larger footprint to facilitate large scale RE Integration
Policy Measures

• Expert Committee at GOI level on Large Scale Integration of RE
  • Committee constituted by Central Government in April, 2015
  • Key recommendations such as
    • Bringing flexibility in the conventional generation,
    • Tighter frequency control,
    • Maintaining generation reserves,
    • Introduction of ancillary services,
    • Forecasting, Scheduling, Imbalance handling mechanism and
    • Robust data telemetry and communication systems
Regulatory Interventions

• Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST)

• Model Regulations by FOR
  • Model Regulations on Forecasting, Scheduling and Deviation Settlement of Wind and Solar Generating Stations, Nov 2015
  • Model regulations for Deviation Settlement Mechanism at intra state level, March 2017

• Draft Connectivity Standards for Renewables
  • Provisions related to frequency response, HVRT, LVRT, ramping requirements, voltage regulations requirements, compliance monitoring etc
Regulatory Interventions

• Amendments to Indian Electricity Grid Code (IEGC) to incentivise Flexbility
  • 4th Amendment to IEGC
    • 55% Technical Minimum
    • Additional compensation for degradation of Station Heat Rate (SHR) and frequent start/stop
  • 3rd Amendment to IEGC
    • Forecasting and Scheduling Framework for RE
    • Decentralised Forecasting
    • 40 MW Solar being scheduled by RLDCs
    • 16 revisions for RE in a day
Regulatory Interventions

• **Imbalance Handling**
  • Definition of RE Rich state with more deviation limit
  • RE deviation charges delinked from frequency
    • Computed at a fixed rate for the shortfall energy for absolute error up to 15%.

• **Ancillary Services**
  • Implemented w.e.f April 2016
  • Tertiary Reserves (RRAS UP/DOWN)
  • Markup price of 50 pasie/unit for RRAS UP
  • 25% savings of variable charges retained by generators for RRAS DOWN
Regulatory Interventions

• Reserves and Automatic Generation Control (AGC)
  • Reserves roadmap by CERC in Oct 2015
  • Primary Reserves : Size of Largest Generating Station in the country
  • Secondary Reserves : Largest Generating Unit size in a region
  • Tertiary Reserves : 50% of the largest generating unit available in the state control area

• Changes in Market Design
  • Sub hourly bidding in Power Exchanges since April 2012
  • 24 X 7 Electricity Market since July 2015

• Other Interventions
  • Draft regulations for Transmission Planning and staff paper for Electricity Storage
  • CERC regulations for communication system for inter-State transmission of electricity
Transmission Planning

• Larger Footprint
  • Synchronous operation of all regions and trans-national interconnections

• Green Energy Corridors
  • Coordinated planning for RE
  • Planning of HVDCs

• National Electricity Plan
  • Draft in 2016
  • RE contribution around 20% in 2021-22 and 24% in 2026-27
Power System Operation

- Upgradation of Control Centres and Dedicated Control Centre for Renewables
  - Renewable Energy Management Centres
  - Upgradation of RLDCs/SLDC in 2016 and NLDC by 2019
- Large Scale deployment of Phasor Measurement Units (PMU)
  - More than 1600 PMUs under Unified Real Time Dynamic State Measurement (URTDS) scheme
- Optimization of Hydro Resources
  - Flexibility of hydro to be harnessed
  - FOLD report on optimization of hydro resources
Power System Operation

• Big Data Analytics
  • Reports by POSOCO extracting wisdom out of the data archived in last eight years
RE Integration Studies

• RE Integration Studies
  • Assessment of high RE impact on power system
  • Joint project of MOP, GoI and USAID
  • Final report released in June 2017
  • Important recommendations in areas such as
    • Transmission Planning
    • RE Flexibility
    • Incentive for flexible generation
    • Balancing Area etc.