

Grid-integration of large scale RE

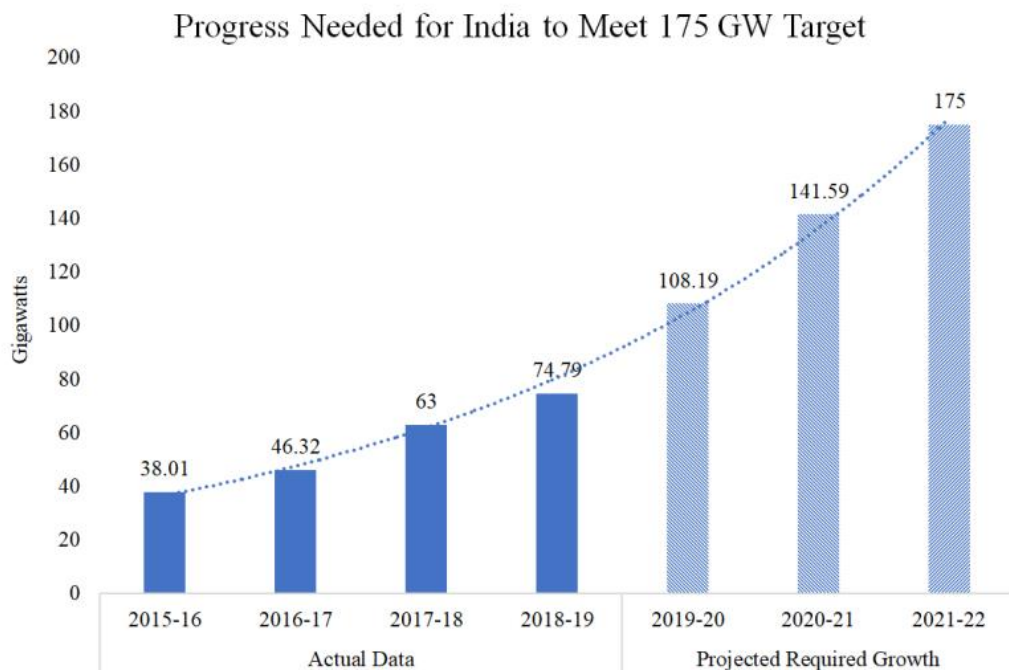
Changes proposed in the Indian Grid Code

Solar Energy Corporation of India Limited
(A Government of India Enterprise)

Growth trajectory of RE in India

Current status and the future

- Total installed capacity in India (as on 30.06.2019): 80.46 GW, comprising 36.36 GW Wind & 27.5 GW Solar capacity
- More than 22% share of India's total installed capacity
- Targets revised to **500 GW by 2030**.



- Tariff reduction to below Rs. 3/unit ensures substantial demand from Discoms for RE power
- This portends an encouraging yet a challenging way forward.
- Not just demand creation but also conducive techno-commercial ecosystem required for stable Grid

SECI's role in the growth story

Impact & anticipations

❖ Large-scale Solar PV Projects

- Awarded: 11 GW
- Commissioned as on 31.03.2019: 4555 MW

❖ Wind Power Projects

- Awarded: 8900 MW
- Commissioned as on 15.07.2019: 1450 MW

❖ **Targets: 20 GW Solar capacity & 10 GW Wind capacity to be tendered out in FY 2019-20.**

❖ Innovations in view of resource optimization:

- 7500 MW Ultra-Mega Solar Projects in Leh & Kargil districts, Jammu & Kashmir
- Hybridization of Solar, wind with Storage: supply of Peak power RE
- “Round-the-clock” supply of RE power

❖ **Innovative grid integration of large-scale RE power not possible with physical and market structures designed for the characteristics of conventional power.**

Optimal Grid Operation

Necessary RE operational modifications required

- ❖ IEGC Regulations recognizes that the primary objective of the National / Regional Grids is to enhance operational reliability and economy of the entire electric power network.
 - Grid security and stability is priority: To address this, Solar PV generators may be mandated to provide grid support services as part of regulatory requirements.
- ❖ SECI's recommendations:
 - Mandating Solar PV inverters for Projects over 10 MW to utilize inherent functions such as reactive power support and voltage ride through for forthcoming Projects: reducing investments on STATCOM and SVCs.
 - To encourage adoption of capabilities as above, Solar PV Generators should be incentivised for supporting the grid, the mechanism of which could be worked out by a technical work group
 - **As the RE capacity in the grid continues to grow, operating code should also look forward to run thermal units at their technical minimum or further less.**

Optimal Grid Operation

Code for efficient Inter-state transmission

- ❖ **East-west disparity w.r.t. demand-supply of RE power: Necessitates rapid augmentation of ISTS network in time with commissioning of upcoming Projects:** reflecting in tepid response in recent ISTS-wind tenders rolled out by SECI.
- ❖ Essential that transmission corridor planning is carried out in close co-ordination with the rollout plan for RE capacities: Plans for 67.5 GW addition approved by ECT.
- ❖ **SECI's recommendations:**
 - As the nodal agency for all RE power in the country, SECI shall issue bids as per transmission infrastructure in the country.
 - Requirement of LTA for starting construction of transmission system in advance should be done away with.
 - To encourage states for faster off take of RE power, a single tariff based on the all India average tariff of the past year to be prescribed.

Optimal Grid Operation

Schedule & Despatch Code

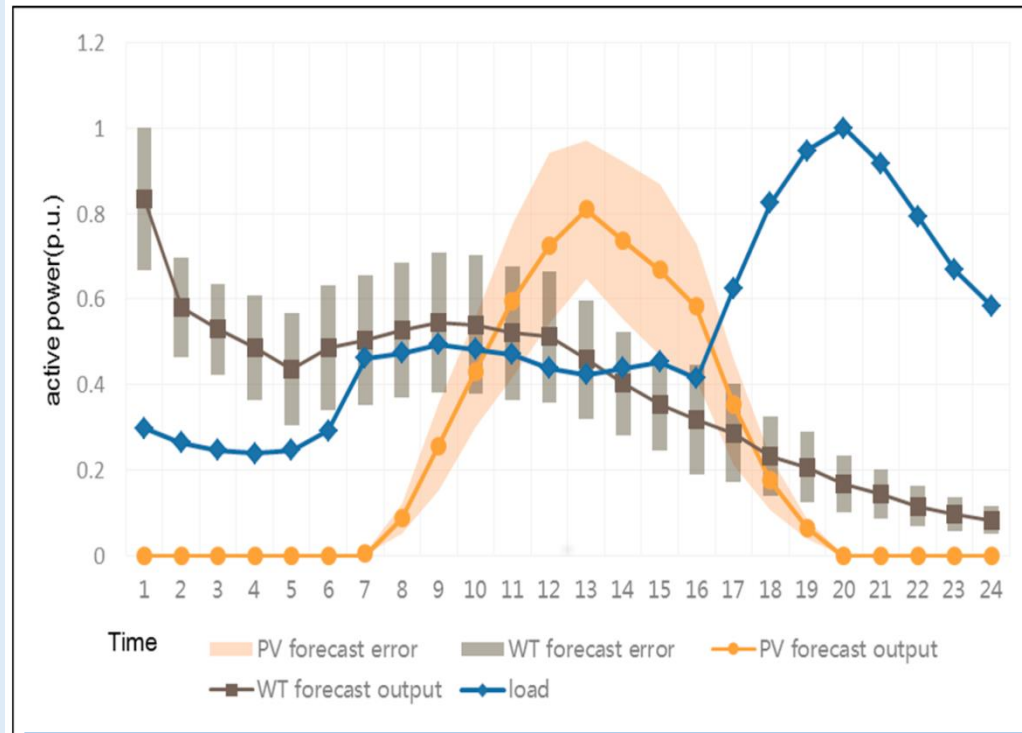
- ❖ **Optimal scheduling and dispatch of available generation to be done with the objective of minimizing total production costs subject to physical, operational, & market constraints.**
 - Forecasting of RE generation involves forecasting of local weather conditions.
 - While thermal plants always incur fixed cost charges, losses incurred by RE plants due to curtailment or grid congestion leave no recourse for recovery of losses.
 - Karnataka and AP SERC's allows aggregation of forecasts at QCA level, which ensures penalty payable by generators is only to extent SLDC is getting affected at state level.
 - Other SERCs levy penalties at PSS level. RE generators bear DSM penalties at PSS level & State level.
 - **A uniform strategy in all states is required with the proposed REMCs at the focal point as information repository and coordination agency for RE penetration**

Optimal Grid Operation

❖ SECI's recommendations:

- Modernize RLDC/SLDCs & Grid management system to collect, process the schedules and real time SCADA data from each RE plant.
- Centralized forecasting/QCA level forecasting at State level (Virtual pool) as recommended by FOR model regulation.
- Maintain zero DSM accounts & Harmonizing DSM Regulation across states and Centre
- DSM Charges to be linked to tariff.
- Rationalizing permissible deviation band based on Forecasting Technology, capabilities and weather data available.
- Mandatory maintenance of minimum smoothing storage reserves, ensuring output is maintained within a stipulated band of 15-30 min. moving average.

Schedule & Dispatch Code



- Removal of restrictions on revisions as is allowed for thermal generators.
- Exemption from DSM penalties in case of grid outages, curtailment and backdowns.
- QCA to have the control only with respect to scheduling.
- Generators to be incentivized for supporting grid.

Optimal Grid Operation

Energy Storage Resources

- ❖ **As per emerging trends, there is an increasing demand for Flexible generation- to meet increasing intra-day and seasonal demand variability.**
 - As storage systems are being increasingly seen as important element of power transmission system, the Grid Code may be amended to define storage resources as non-generating resources and allowed non-discriminatory access to the use of the transmission system like a generating company.
 - This would open the market for grid side applications and storage-as-a-service merchant models.
- ❖ **SECI's recommendations:**
 - Standardized, non-discriminatory rules for grid interconnection will encourage emerging storage technologies that are deemed necessary to keep up with our targets
 - Suggested definition for Energy Storage Resource to be included in IGC:
A resource capable of receiving energy from a generating unit or grid, storing it for later injection of electric energy back to the grid that is both designed as well as configured to do so and is contractually permitted to do so.
 - Further, enabling provisions for the purpose of interconnecting a storage resource to the grid, on the generation and transmission side may also be added.

Project Commissioning Guidelines

- ❖ **Current Guidelines as issued by CERC, pertain to commissioning of conventional energy projects. Till date, RE Projects are being commissioned based on procedures as finalized by bidding agencies and SNAs.**
 - With RE capacity being added predominantly in the coming years, especially those connected to the ISTS network, it is important to devise a standard commissioning procedure for RE Projects.
 - It would enable easier integration of RE Projects with ISTS network. RLDCs' role is currently limited to ensure grid safety and allow for commencement of scheduling.
 - ❖ **SECI's recommendations:**
 - Standardized commissioning procedure to be devised for RE projects, based on source of generation, making the RLDCs and GSS entities stakeholders in the process.
 - A Project may ideally be declared as having been commissioned, provided the rated cumulative capacity of modules/wind turbines/inverters, etc., equaling to the Contracted Capacity, has been installed and measurable energy flows from the Project into the grid.
 - SCADA integration at inverter level/turbine level may be made a pre-requisite for commissioning under standard procedure. However, delay in commissioning of installed capacity on account of lapses in SCADA integration needs to be examined.
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Thank You

