GOVERNMENT OF INDIA
MINISTRY OF POWER

RAJYA SABHA
UNSTARRED QUESTION NO.1749
ANSWERED ON 04.08.2025

GRID INSTABILITY AND CONGESTION

1749 SHRI RAGHAV CHADHA:

Will the Minister of **POWER** be pleased to state:

(a) whether Government is aware of the fact that grid instability and congestion issues arising because of large-scale integration of renewable energy sources like solar and wind;

(b) if so, the steps being taken to enhance grid resilience and ensure smooth evacuation of renewable power;

(c) whether Government is considering to strengthen regional load dispatch centres and grid forecasting mechanisms to address intermittency; and

(d) the timeline and investment planned under such initiatives?

A N S W E R

THE MINISTER OF STATE IN THE MINISTRY OF POWER

(SHRI SHRIPAD NAIK)

(a) & (b): The integration of renewable energy sources into the grid presents several challenges for ensuring smooth and reliable grid operation. In order to enhance Grid resilience and to ensure smooth evacuation of renewable power, the Government of India has taken following steps:

(i) Development of inter and intra-State transmission network is being planned to keep pace with RE capacity addition. Strong inter connection of transmission networks to ensure better reliability in terms of anchoring voltage stability, angular stability, losses reduction etc. is being done.

(ii) Central Financial Assistance (CFA) is being provided to the States for setting up Transmission infrastructure for RE integration within their State under the Green Energy Corridor Scheme.

(iii) Encouraging setting up of RE projects with storage facilities for optimal utilisation of transmission facilities.

(iv) Flexibilization of Thermal generation is mandated to address the variability of RE generation.

(v) CEA (Technical Standards for Connectivity to the Grid) Regulations lay down the minimum technical requirements for the RE generating plants to ensure the safe, secure and reliable operation of the grid. The compliances to the said regulations by RE plants are verified jointly by Central Transmission Utility (CTUIL) and Grid-India/RLDCs before granting connectivity/interconnection to the national grid.

(vi) Indian Electricity Grid Code mandates that RE plants participate in the primary and secondary frequency control in case of contingencies. Hybrid RE power plants, Energy Storage Systems such as BESS (Battery Energy Storage System) and PSP (Pump Storage Project) are being promoted for mitigating variability in RE generation and provide adequate frequency support to the grid.

(vii) The grid stability in case of voltage fluctuations is dependent on the adequate reactive power support from generators. The requirements w.r.t to the dynamic reactive power support from the Generators is covered in the CEA (Technical Standards for connectivity to the Grid) Regulations. Power equipment like STATCOM (Static Synchronous Compensator) and Synchronous Condensers are being planned for dynamically varying reactance support in the grid.

(c) & (d): Under Green Energy Corridor scheme, 12 number of Renewable Energy Management Centre (REMCs) and one EMC at South Andaman were established in different parts of the country mainly to forecast, schedule and monitor the wind and solar Variable Renewable Energy (VRE) resources. These REMCs are co-located with the existing RLDCs/SLDCs. Two more REMCs are under implementation at UP and Ladakh.

Ministry of Power (MoP) and Ministry of Earth Sciences (MoES) have been interacting very closely to ensure sharing of accurate weather data with stakeholders for RE generation forecasting. As a result of close coordination between the two Ministries, India Meteorological Department (IMD), National Centre for Medium Range Weather Forecasting (NCMRWF) and Indian Space Research Organisation (ISRO) are sharing weather forecast data with various stakeholders which is being utilised for Renewable Energy (RE) and demand forecasting. Further, Weather data of all Inter State Transmission System (ISTS) connected RE Plants is being shared by Grid-India with NCMRWF four times a day through secure API (Application Programming Interface) for improving weather forecast.

Further, guidelines have been issued for installation of Automatic Weather Station (AWS) in RE Plants for using the recorded weather data for data assimilation and validation for further improving the weather forecast.

In addition, IIT Bombay has been engaged for development of indigenous RE Forecasting Tool. In this regard, Memorandum of Understanding (MoU) has been signed by Grid India with IIT, Bombay in December, 2024 for development of Forecasting Tool at a total cost of Rs. 4.09 crore. RE generation forecasts model for the Northern Region is targeted to be completed by 2026.

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