

Major Renewable Sector Grid Disturbances

Prelims: Current events of national and international importance | Energy

Why in News?

Between January 2022 and June 2025, India reported 68 renewable grid disturbances, causing 1-7 GW losses, mainly in Rajasthan and Gujarat, exposing renewable integration challenges.

Causes of Disturbances

- **Variable Renewable Output** - Solar and wind generation changes rapidly with weather, creating sudden supply fluctuations.
- **Technical Non-Compliance** - Some generators failed to meet **Low Voltage Ride Through (LVRT)** and **High Voltage Ride Through (HVRT)** standards.

LVRT and HVRT - Standards to keep generators connected during voltage disturbances.

- **System Frequency Issues** - Sudden changes in renewable output affected grid stability.
- **Need for Technology** - Solutions like **STATCOMs (Static Synchronous Compensators)** can provide rapid voltage support.

Renewable Growth

- **Installed Capacity** - India reached **548 GW** by July 2026.
- **Renewables** - Solar capacity at **162 GW**, wind at **47 GW**; over **200% growth in a decade**.
- **Distributed Solar** - Of 44.61 GW added in FY 2026, **16.3 GW was distributed solar** (PM-KUSUM and rooftop).

Transmission and Storage

- **Transmission Planning** - Government planning transmission for **500 GW non-fossil capacity by 2030**.
- **Government Measures** - Interstate charge waivers and renewable purchase obligations support expansion.
- **Storage** - Essential for balancing supply and demand; investment needed to manage variability.
- **Energy storage requirement** - USD 1.15 trillion (2025-2050), USD 3.3 trillion (2051-2070).

Demand Growth

- **Peak Demand** - Rose from **242.77 GW (June 2025)** to **270.8 GW (May 2026)**.
- **Future Projection** - CEA (Central Electricity Authority) projects **459 GW by 2034-35**; global estimates suggest **700 GW by 2047**.
- **New Loads** - EVs may account for 6-9% of consumption by 2035; data centres could require 14-30 GW by early 2030s.

Reference

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