GOVERNMENT OF INDIA
MINISTRY OF POWER

RAJYA SABHA
UNSTARRED QUESTION NO.1106
ANSWERED ON 09.02.2026

COST OF RENEWABLE ENERGY INTEGRATION INTO NATIONAL GRID

1106 SHRI RAJINDER GUPTA:

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

(a) the average system-level cost per unit (₹/kWh) for integrating renewable energy into the national grid, including transmission, balancing and storage;

(b) the year-wise trend in such costs since 2020;

(c) the variation in integration costs across renewable-rich States;

(d) whether any benchmarks have been prescribed for these costs; and

(e) the measures taken or proposed to reduce renewable energy integration costs over time?

A N S W E R

THE MINISTER OF STATE IN THE MINISTRY OF POWER

(SHRI SHRIPAD NAIK)

(a) to (d): Renewable Energy (RE) is inherently variable and uncertain, with diurnal and seasonal generation, therefore, support from other sources is required to ensure continuous and reliable power supply to consumers. RE integration cost involves multiple components such as transmission charges (Inter-state and Intra-state), balancing and ancillary services, grid operation, forecasting, scheduling and flexibility resources, which are embedded within the overall costs of generation, transmission and system operation.

These costs are highly system-specific and depend on several factors including the level of RE penetration, geographic distribution of renewable resources (reactive power support, short circuit, requirement of inertia and balancing reserves), demand patterns, availability of flexible generation, existing transmission infrastructure and regional grid conditions. Consequently, year-wise trends since 2020 and variations across renewable-rich States are not maintained in a disaggregated or uniform manner at the national level.

……..2.

(e): The Central Government has taken following measures to reduce RE integration costs over time:

(i) The Central Government is funding the transmission projects through Green Energy Corridor (GEC) scheme of Ministry of New Renewable Energy (MNRE) for integration of RE. The projects mostly focus on development of Intra-state transmission system for integration of RE to meet the demand within the state.

(ii) Advance and coordinated transmission planning is undertaken in the National Electricity Plan (NEP) to avoid congestion, minimize curtailment and reduce the need for unwanted network augmentation.

(iii) Development of RE Zones and pooling stations, enabling optimal evacuation of large renewable capacities through shared infrastructure;

(iv) Competitive procurement of energy storage systems, including Battery Energy Storage Systems (BESS), through tariff-based bidding and Viability Gap Funding, leading to cost discovery and declining tariffs over successive bids;

(v) Strengthening of grid operations, including improved forecasting, scheduling, real-time dispatch and ancillary services, to reduce balancing costs; and

(vi) Market reforms, such as real-time electricity markets and flexibility mechanisms, allowing better utilization of existing resources and lower system integration costs.

(vii) As per the Third Amendment to the Central Electricity Regulatory Commission (CERC) General Network Access (GNA) Regulations, 2022, connectivity is granted separately for solar and non-solar hours by assessing available margins at RE pooling stations and granting connectivity, accordingly, ensuring better utilisation of existing transmission assets and lowering overall system costs.

(viii) Connectivity quantum is assessed for hybrid projects to optimise the overall RE quantum, thereby, facilitating efficient grid utilization.

****