



# Strengthening Transmission Infrastructure for a Renewable Future

Strengthening transmission is not only about adding capacity but also about modernising the entire high-voltage ecosystem to ensure grid stability and operational resilience, writes **Keyur Shah, Chairman & Managing Director, Yash Highvoltage Limited.**

India's energy transition has moved from ambition to execution. Renewable capacity is scaling rapidly, with larger solar parks, wind corridors, and hybrid projects coming online across geographies. As this growth accelerates, the focus must shift from generation alone to an infrastructure that enables clean power to reach demand centres reliably and efficiently. That infrastructure is transmission.

Renewable resources are often located far from consumption hubs. This geographical mismatch makes a robust, high-capacity transmission network

essential. Without adequate evacuation corridors and grid readiness, clean energy risks are being curtailed, undermining both project viability and national sustainability goals.

## Transmission as the Enabler of Renewable Integration

Unlike conventional power, renewable generation is variable, decentralised and increasingly bidirectional. This introduces new technical challenges for the grid, including voltage fluctuations,

dynamic load patterns, and higher switching frequencies. Legacy transmission systems were not designed for these operating conditions.

To support higher renewable penetration, India requires:

- Extra high voltage (HV) transmission corridors for bulk power transfer.
- Faster grid connectivity for renewable projects.
- Advanced substations capable of handling dynamic operating environments.
- Equipment designed for reliability under fluctuating loads.

Strengthening transmission is therefore not only about adding capacity but also about modernising the entire HV ecosystem to ensure grid stability and operational resilience.

### HV Infrastructure and Grid Reliability

HV equipment forms the backbone of a dependable power system. Transformers, instrument transformers, switchgear, and insulation systems must perform consistently despite thermal stress, harmonics, and ramping associated with renewable energy (RE).

In renewable heavy networks, the margin for failure is significantly lower. Equipment must be engineered for long servicing life, minimal maintenance, and superior dielectric performance. Reliability at the component level directly influences system availability and reduces the risk of outages.

As India expands inter-regional transmission and green energy corridors, the demand for technologically advanced HV solutions will continue to grow. Local manufacturing capability, stringent testing protocols, and alignment with global standards will be critical to meeting this demand.

### The Strategic Importance of Bushings

Within this HV ecosystem, bushings play a vital yet often understated role. They provide the insulated interface that allows current to pass safely between transformers, reactors, and the grid while maintaining electrical insulation to grounded structures.

With the shift towards higher voltage and more dynamic grid conditions, the performance expectation for bushings have evolved. They must deliver:

- High dielectric strength for extra high voltage (EHV) applications.
- Thermal stability under variable loading profiles.
- Partial discharge free and resistance to ageing.

Advanced bushing technologies enhance transformer reliability, extend asset life, and reduce or eliminate the probability of catastrophic failures. In a renewable grid where equipment is subjected

to frequent load variations, their role becomes even more critical.

### Building a Future- Ready Transmission Network

India's transmission expansion plans are aligned with its renewable targets, but infrastructure development must be accompanied by deeper technological capability. Indigenous manufacturing of HV components, lifecycle-based asset management, and digital condition monitoring will be key enablers.

A future ready grid will be characterised by:

- High capacity, low loss transmission systems.
- Smart substations with real-time diagnostics.
- Standardised, high-quality components.
- Strong domestic supply chains for critical equipment.

Such an approach not only strengthens grid resilience but also supports the broader goal of energy security.

### Powering the Renewable Economy

Transmission is the silent force that converts renewable potential into delivered energy. Every unit of clean power that reaches industries, cities, and households depends on the strength and reliability of the HV network behind it.

By investing in modern transmission infrastructure and high-performance components such as bushings, India can ensure that its renewable expansion is matched by grid readiness. This will reduce curtailment, improve efficiency, and enable round-the-clock availability of green power.

A sustainable energy future will be built not only on megawatts of renewable capacity but on the robustness of the systems that carry that power across the country. Strengthening transmission today is essential to unlocking India's renewable energy grid for tomorrow.

### ABOUT THE AUTHOR



**Keyur Shah, Chairman and Managing Director, Yash Highvoltage Limited,**

is a first-generation entrepreneur who has built a strong reputation in India's power industry. With more than 25 years of experience, he has combined vision, conviction,

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