Environment & Ecology · GS - III

India's renewable energy transition requires a shift from capacity addition to ensuring grid reliability, energy storage and affordability. Analyse the major challenges and suggest a comprehensive strategy for achieving this transition.

EXAM YEAR	PAPER	SUBJECT
DAILY PRACTICE 17/11/2026	GS - III	Environment & Ecology

MARKS	WORD LIMIT
15	~250 words

Answer Hint

Renewable energy targets, intermittency, grid integration, battery storage, pumped-storage hydropower, domestic manufacturing, DISCOM reforms, coal dependence, energy security.

Model Answer

Introduction

India's renewable energy capacity has expanded rapidly, reaching approximately 299 GW by September 2026, according to the supplied report. However, achieving long-term clean-energy targets requires transforming the entire electricity ecosystem rather than merely increasing installed capacity.

Major Challenges

1. **Intermittency:** Solar and wind generation fluctuate with weather conditions, creating supply-demand mismatches.

2. **Grid infrastructure:** Inadequate transmission networks and congestion can restrict evacuation of renewable electricity from resource-rich regions.

3. **Energy storage:** High battery costs and limited storage capacity constrain round-the-clock renewable power availability.

4. **Coal dependence:** Conventional power remains important for baseload supply and balancing, complicating rapid decarbonisation.

5. **Manufacturing dependence:** Import dependence for solar cells, batteries and critical minerals creates supply-chain vulnerabilities.

6. **Financial constraints:** Weak DISCOM finances and delayed payments discourage investment in electricity infrastructure.

Comprehensive Strategy

- Expand battery energy storage and pumped-storage hydropower.
- Modernise transmission networks through smart grids and flexible power systems.
- Promote domestic manufacturing, research and recycling of critical materials.
- Improve DISCOM financial viability and electricity-market reforms.
- Encourage hybrid solar-wind projects and decentralised renewable generation.
- Develop a gradual transition strategy for coal-dependent regions and workers.

Conclusion

India's energy transition must combine clean-energy expansion with reliability, affordability and energy security. A coordinated approach involving technology, infrastructure, financial reforms and just-transition measures is essential for sustainable decarbonisation.

BECOME IAS
AI POWERED UPSC PREP