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EDITORIAL ANALYSIS

Rising Energy Demand Needs Faster Infrastructure Upgrades

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CURATED & WRITTEN BY

Bharat Choudhary

UPSC Educator & Content Creator

linkedin.com/in/epicbharat

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INTERVIEW ANGLE

"Battery storage manufacturing under PLI has lagged targets despite incentives — what structural fixes would you prescribe to make renewables grid-reliable for night-time peaks?"

EDITORIAL SUMMARY:

Business Standard argues that a developing super El Niño in 2026 is pushing peak electricity demand to record levels, but the Gurugram outages of May 18-20 and May 23, 2026 and the IMD's May 24-30 red-alert heatwave across north-west India have exposed weak grids, slow battery storage scale-up, and over-reliance on thermal power for night-time demand. India must accelerate grid hardening, storage build-out, and renewable firming infrastructure to keep cooling-driven peak demand sustainable.

THE 2026 PEAK DEMAND CONTEXT

The summer of 2026 has arrived with a developing super El Niño and an IMD red alert across north-west India.

INDICATOR	VALUE
IMD severe heatwave alert — Punjab, Haryana, Chandigarh, Delhi	May 25-27, 2026
IMD severe heatwave alert — West Rajasthan	May 24-30, 2026
Delhi maxima forecast	Up to 45°C
All-India peak power demand projection (summer 2026)	250+ GW
FY25 peak demand	~250 GW (June 2025)

Cooling demand is the binding driver of India's summer peak, and the trend line is structurally upward.

THE GURUGRAM OUTAGES — MAY 18-20 AND MAY 23, 2026

Two consecutive blackouts in Gurugram exposed grid infrastructure that has not kept pace with high-temperature induced load. On May 18-20, 2026, a fire at a power grid substation triggered a 36-hour blackout that affected at least 10,000 families across 22 housing societies along the Dwarka Expressway (sectors 99, 102, 103, 107, 108 and 109). On May 23, 2026, underground feeder cables near Dwarka Expressway sectors 99-102 overheated and caught fire, disrupting electricity supply to around 4,500 families for nearly 10 hours and halting Rapid Metro services for over an hour.

The outages are not just incidents — they are signals. AT&C losses remain persistent, distribution-sector weakness, transmission congestion, and the absence of firming storage all converge on the same fault line, with the system caught between a renewables-rich daytime and a thermal-dependent evening.

CAPACITY VS GENERATION: THE STRUCTURAL GAP

India's installed capacity profile is now decisively tilted toward non-fossil sources.

SOURCE	INSTALLED CAPACITY (MARCH 2026)
Coal	~219 GW
Solar	~150 GW
Wind	~56 GW
Hydro (large)	~51 GW
Nuclear	~9 GW
Total Non-Fossil (share)	53.2% of installed (283.46 GW of 532.74 GW total)

But generation share tells a very different story.

SOURCE	GENERATION SHARE (APRIL 2026)
Coal	71.8%
Solar + Wind	~8%
Hydro	~12%
Nuclear	~3%

The arithmetic is unforgiving: capacity is not generation. Intermittency of solar and wind, the absence of firming storage, and the load profile of peak demand together mean that coal still does most of the work — especially after sundown.

THE STORAGE GAP

Battery Energy Storage Systems (BESS)

- **Operational BESS:** ~50-60 MW
- **NEP 2023 target — by 2027:** 35 GWh BESS + 7 GW pumped storage
- **NEP 2023 target — by 2030:** 47 GW BESS + 27 GW pumped storage

PLI for Advanced Chemistry Cells

- **Outlay:** ₹18,100 crore, approved May 2021
- **Phase I beneficiaries:** Reliance New Energy, Ola Cell Technologies, Rajesh Exports
- **Phase II (2024):** Additional 10 GWh capacity

Pumped Storage Hydropower (PSH)

- **Operational:** ~4.7 GW
- **CEA-assessed potential:** ~96 GW
- **Under construction:** 14 projects
- **Policy framework:** CEA tariff guidelines for PSH (2023)

Viability Gap Funding for BESS

- **Approved FY24:** ₹3,760 crore for 4 GWh

The storage gap is the single most consequential bottleneck in India's energy transition. Without firming, every megawatt of renewable capacity is a daytime megawatt only.

GRID MODERNISATION INITIATIVES

PROGRAMME	YEAR	FUNCTION
Smart Grid Mission	2015	Smart grid pilots and standards
National Smart Grid Mission (NSGM)	2015	Implementation framework
Time-of-Day (ToD) tariffs	Notified June 2023	Price signal for off-peak shifting
RDSS — Reforms-based & Results-linked Distribution Sector Scheme	FY22-26, ₹3.03 lakh crore	Discom reform
Green Energy Open Access Rules	2022	Enable RE consumer access

Power Sector Pain Points

- **Discom AT&C losses:** ~15-16% (FY25)
- **Inter-state transmission (ISTS) congestion**
- **Frequency stability** with rising RE penetration
- **Reactive power management** challenges

COOLING DEMAND: THE BINDING DRIVER

The India Cooling Action Plan (ICAP, March 2019) was the country's first national cooling plan, and its core projection has aged sharply with the climate trajectory.

- **AC penetration:** ~8% of households; rising rapidly
- **Cooling demand growth projection (ICAP):** Up to 8x by 2038
- **Cooling load share** of peak demand on heatwave days: Rising fast in urban centres

Cooling is no longer a discretionary load — for heat-sensitive populations, it is a survival load. The grid must be designed around it.

INTERNATIONAL COMPARISON

COUNTRY	BESS OPERATIONAL	GENERATION MIX HIGHLIGHT
China	60+ GW	Coal still ~60% of generation
United States	26 GW	Gas 40%, coal 16%, RE 22%
United Kingdom	Substantial	Closed last coal plant 30 September 2024 (Ratcliffe-on-Soar)
Germany	Substantial	RE 50%+ of generation

The UK's coal exit, Germany's renewables majority, and China's BESS build-out all illustrate the same lesson: firming infrastructure and demand-side reform are the binding constraints, not headline capacity.

WAY FORWARD

1. **Accelerate Viability Gap Funding** for battery storage build-out (₹3,760 crore for 4 GWh is a start, not a destination)
2. **Fast-track pumped storage** projects — Sharavathi, Pinnapuram, Upper Indravati and the wider 14-project pipeline
3. **Complete smart meter rollout** — about 12 crore deployed, target 25 crore
4. **Operationalise demand response programmes** at scale
5. **Strengthen cooling efficiency standards** under ICAP
6. **Design a just transition framework** for coal-dependent states aligned with the 500 GW non-fossil 2030 target
7. **National time-of-day tariffs** to flatten the evening peak
8. **Resolve inter-state transmission congestion** through ISTS capacity expansion

UPSC MAINS ANALYSIS

GS Paper 3 — Economy, Energy and Environment

- Energy security: capacity vs generation, firming infrastructure, BESS, pumped storage
- Climate change adaptation: cooling demand, ICAP, heatwave resilience
- Infrastructure: distribution-sector reform, smart grid, RDSS, ToD tariffs
- Just transition: coal-dependent states, NEP 2023 trajectory

Keywords: Super El Niño 2026, IMD red alert, peak demand 250 GW, NEP 2023, BESS 47 GW by 2030, pumped storage 96 GW potential, PLI ACC ₹18,100 crore, VGF ₹3,760 crore, RDSS ₹3.03 lakh crore, ToD tariffs June 2023, ICAP March 2019, Green Energy Open Access Rules 2022, Ratcliffe-on-Soar coal exit 30 September 2024.

> *India's energy transition is no longer a debate about installed capacity — that battle is largely won. It is now a debate about firming storage, distribution reform, and demand-side substitution. The Gurugram outage and the May 2026 heatwave are not anomalies; they are previews of every summer for the next two decades, sharpened by El Niño cycles and a steadily warming baseline. Capacity is not generation, and generation is not reliability. The 500 GW non-fossil target by 2030 will deliver megawatts. Whether those megawatts deliver reliability depends on whether 47 GW of BESS, 27 GW of pumped storage, and a hardened distribution grid arrive on schedule — and whether discoms are reformed before storage scales, not after.*

Sources: Business Standard, Ministry of Power, MNRE

KEY ARGUMENTS AT A GLANCE

A developing super El Niño in 2026 has pushed peak electricity demand to record levels, but the Gurugram outage and the IMD's May 25-30 red alert across north-west India have exposed weak grids, slow battery storage scale-up, and over-reliance on thermal power for night-time demand; India must accelerate grid hardening, storage build-out, and renewable firming infrastructure to keep cooling-driven peak demand sustainable.

✓ SUPPORTING

- The IMD has issued a severe heatwave alert for Punjab, Haryana, Chandigarh and Delhi between May 25-27 and West Rajasthan between May 24-30, with Delhi maxima forecast to touch 45 degrees Celsius; all-India peak power demand is projected to exceed 250 GW in summer 2026 against the FY25 peak of around 250 GW touched in June.
- India's installed capacity is now 53.2% non-fossil (283.46 GW out of 532.74 GW as on March 31, 2026), but coal still accounts for roughly 72% of actual generation in April 2026, while solar-plus-wind generation share remains under 10% — reflecting the intermittency of renewables and the absence of firming storage.

- Operational battery energy storage stands at only around 50-60 MW against the National Electricity Plan 2023 target of 47 GW BESS by 2030; pumped storage hydropower stands at 4.7 GW against an assessed potential of around 96 GW, with 14 PSH projects under construction.
- Distribution-sector reform under the Reforms-based and Results-linked Distribution Sector Scheme (RDSS, ₹3.03 lakh crore for FY22-26) is underway, but discom AT&C losses remain around 15-16% in FY25 and inter-state transmission congestion limits effective use of stranded renewable capacity.

⚠ COUNTER

Rapid retirement of coal capacity before firming storage matures would risk grid frequency stability and undermine baseload security during peak heat events; the transition must be carefully sequenced rather than abrupt, and coal-dependent states require a credible just transition framework.

→ WAY FORWARD

Accelerate Viability Gap Funding for battery storage (₹3,760 crore approved FY24 for 4 GWh); fast-track pumped storage projects like Sharavathi, Pinnapuram and Upper Indravati; complete smart meter rollout (target 25 crore); operationalise time-of-day tariffs nationally; expand the India Cooling Action Plan target trajectory; and design a just transition pathway for coal-dependent states aligned with NEP 2023's 500 GW non-fossil target by 2030.

PRACTICE TODAY'S QUIZ

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✍ MAINS ANSWER FRAMEWORK

QUESTION

"India's non-fossil installed capacity has crossed 53% of the total mix, but generation share remains skewed toward coal, and battery and pumped storage scale-up has lagged the National Electricity Plan's targets." Examine the structural bottlenecks in grid hardening and storage build-out and suggest a policy framework for keeping cooling-driven peak demand sustainable. (250 words)

INTRODUCTION

Business Standard argues that the developing super El Niño in 2026, the IMD's red-alert heatwave across north-west India between May 24-30, and the May 18-20 Gurugram 36-hour blackout (followed by a second outage on May 23, 2026 near Dwarka Expressway sectors 99-102) have together exposed a power system that is capacity-rich on paper but generation-poor in practice — and that grid hardening, storage build-out, and renewable firming infrastructure must accelerate.

BODY

India's installed capacity has crossed 53% non-fossil (283.46 GW out of 532.74 GW), with solar at around 150 GW and wind at around 56 GW, against coal at 219 GW. But generation share tells a different story: coal still delivers about 72% of actual generation in April 2026, while solar and wind together account for under 10%. The gap is firming storage.

Operational battery energy storage stands at only 50-60 MW against the National Electricity Plan 2023 target of 47 GW BESS by 2030 and 35 GWh of BESS plus 7 GW of pumped storage by 2027. Pumped storage hydropower is at 4.7 GW against an assessed potential of around 96 GW, with 14 PSH projects under construction.

The PLI ACC scheme (₹18,100 crore, approved May 2021) with first-phase beneficiaries Reliance New Energy, Ola Cell Technologies and Rajesh Exports, plus the 2024 PLI Phase II for an additional 10 GWh, are the structural levers, and the Viability Gap Funding window (₹3,760 crore for 4 GWh) is the immediate accelerator. Distribution-sector weakness compounds the problem: RDSS (₹3.03 lakh crore for FY22-26) is underway, but discom AT&C losses remain at 15-16% in FY25, and inter-state transmission congestion limits effective use of stranded renewable capacity.

Cooling demand is the binding driver — AC penetration is still around 8% of households but rising rapidly, and the India Cooling Action Plan (March 2019) projects an eight-fold demand increase by 2038. Comparable systems show the path: the UK closed its last coal plant on 30 September 2024 (Ratcliffe-on-Soar), Germany now runs above 50% renewables in generation, and China has built over 60 GW of BESS.

CONCLUSION

The way forward is sequencing, not slogan. Accelerate VGF for storage, fast-track pumped storage at Sharavathi, Pinnapuram and Upper Indravati, complete smart-meter rollout to 25 crore, operationalise time-of-day tariffs nationally, and design a credible just transition framework for coal-dependent states. Capacity is not generation. Without storage and grid hardening, the 500 GW non-fossil target by 2030 will deliver megawatts without reliability — and the next Gurugram-style outage will arrive on schedule.

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linkedin.com/in/epicbharat

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