DRAFT NEP 2026

Building an Adaptive Electricity System

India must move beyond capacity targets to a grid that is planned continuously and operated intelligently, observes ***Atanu Mukherjee,*** **CEO Dastur Energy**

India's reported curtailment and restriction of 8,133 GWh of solar power during April–June 2026—attributed to grid-security needs and mismatched commissioning of transmission and renewable projects—is more than a transmission shortfall. Renewable electricity was available, yet the system could not fully absorb and deliver it because generation, network readiness and grid-security requirements had not evolved together. This episode demonstrates a fundamental point that the world is gradually realizing today - that adding capacity without coordinated system planning does not automatically create affordable, reliable and low-carbon electricity at the consumer's meter.

Electricity policy should aim for a balanced system delivering abundant, reliable and affordable retail power with the lowest practicable carbon footprint, despite uncertain demand and generation. This requires the right generation mix, adequate transmission, storage, firming capacity and ancillary services, an understanding of evolving loads, and markets that reward dependable performance.

The Draft National Electricity Policy (NEP) 2026 recognises these elements—resource adequacy, flexible transmission, storage, capacity markets, ancillary services, demand response, interoperable data and artificial intelligence. Its opportunity is to bring them together within a coherent planning and operating framework in which each reinforces the others.

The distinction between low-cost generation and affordable delivered electricity is fundamental. A solar or wind tariff does not capture transmission, congestion, reserves, storage, curtailment, ramping, frequency support or firm capacity during weak renewable output. Unless generation, networks and flexibility are planned together under uncertainty, the grid can become more fragile—exposed to sharper imbalances, congestion, frequency and voltage excursions, and a greater dependence on emergency interventions. Consumers may then pay simultaneously for curtailed renewable energy, underutilised firm capacity, emergency balancing, stability services and delayed network reinforcement. These costs can substantially erode the apparent savings from low generation tariffs and materially increase the retail price of electricity.

Planning and managing under uncertainty is the defining challenge of the future grid. Conventional planning does account for uncertainty through probabilistic assumptions, sensitivity cases, reserve margins and representative operating periods but is limited by the complexity it can capture. Demand is no longer a stable extension of historical consumption patterns. Hyperscalers, electric mobility, industrial electrification, and digitally controlled loads are changing its scale, location and behaviour. Large blocks of demand can switch on, ramp rapidly, shift across hours or respond simultaneously to prices and operating signals, creating sharper and less predictable changes in net load. At the same time, planning models often compress the supply side into central forecasts, representative hours or days, and average renewable profiles. This can understate prolonged renewable droughts, correlations among solar, wind, hydro and demand, forced outages, transmission contingencies and extreme weather. A system may therefore appear adequate under average assumptions yet lack capacity, reserves, network headroom or flexibility when several stresses occur together.

This creates a disconnect between planning and dispatch. Investment plans assume a future, while operations face changing weather, demand, fuel prices, outages and network constraints. India should plan around a continuously updated range of conditions and use operating outcomes to revise forecasts, adequacy assessments and investments. This can be framed as belief-aware hybrid planning: linking long-term capacity and network planning continuously with scheduling and real-time dispatch, under evolving likelihoods of different system conditions.

Essentially, the grid cannot remain planned episodically and operated reactively. It must be planned continuously and operated intelligently. This transforms it from a static, asset-centric system into adaptive infrastructure that continually recalibrates to changing demand, supply and operating conditions.

The same logic must govern the generation portfolio. The question is not renewables versus non-renewables, but what combination of solar, wind, hydro, nuclear, flexible thermal generation, storage and demand response can serve demand reliably and cost-effectively, with the lowest practicable emissions, across plausible futures. Each resource should be valued by its contribution to energy supply, dependable capacity, flexibility, location and essential grid services—not merely nameplate capacity or standalone tariff.

Adaptive planning must similarly shape transmission. Data centres, hyperscale computing campuses and industrial clusters—including clean-hydrogen facilities and coal-gasification-based industrial clusters—can create concentrated, volatile, and lumpy increments of demand faster than conventional transmission planning cycles can accommodate. For example, the IEA projects global data-centre electricity consumption alone to double to about 950 TWh by 2030—illustrating how rapidly large new concentrations of demand could emerge and outpace the addition of transmission capacity.

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India should therefore complement its national grid with modular but interconnected grid corridors around major clusters. A modular corridor would be an expandable grid zone combining scalable network capacity, local generation where appropriate, storage, flexible supply, demand response and power-quality support through a defined interface with the wider grid. Interconnection would preserve diversity and mutual support, while the corridor could manage more of its local imbalances, help contain disturbances and present the wider grid with a more controllable net-load profile. Capacity could be added as demand materialises, reducing delays and premature overbuilding.

Electrical and commercial boundaries would make cost causation visible. Dedicated connection, reinforcement, balancing, backup and enhanced-reliability costs could be assigned to the loads that primarily cause them, rather than indiscriminately socialised across consumers. Costs that create system-wide benefits should remain shared.

Markets must reinforce this architecture. Capacity available during stressed periods, fast ramping, ancillary services, storage duration, responsive demand and locational value should be compensated according to measurable need. The Draft Policy's proposals—phased exploration of capacity markets, competitive ancillary services, aggregation and demand response—provide a useful foundation, but should reward dependable performance and system value rather than technology labels.

In an adaptive grid, artificial intelligence is the essential enabling decision layer, not the objective. AI can combine weather, demand, plant, sensor, network and market data to generate probabilistic forecasts, evaluate diverse scenarios, identify adequacy and congestion risks, and recommend robust actions for planning, dispatch, reserves, storage and demand response. These systems must remain physics-constrained, explainable and under operator control.

The final policy should require integrated generation-and-network planning under multiple uncertainty scenarios; rolling resource-adequacy assessments linked to operating outcomes; modular-corridor and cost-causation frameworks for major load clusters; and interoperable data and AI-enabled decision systems across CEA, Grid-India, CTU, STUs, load despatch centres and distribution utilities.

India's electricity transformation will not be judged by gigawatts installed, but by whether power at the consumer's meter becomes more abundant, reliable, affordable and progressively lower in carbon. The Draft National Electricity Policy 2026 has the opportunity to provide the blueprint for that adaptive transformation. ■

About the author: Atanu Mukherjee is the **CEO & President** of **Dastur Energy INC** and **MD, Dastur & Co,** a global technology, engineering, and advisory firm driving energy transformation across the energy, industrial, and power sectors. Atanu provides strategic leadership to enterprises, governments, and international institutions on transformation of chemical and materials industry value chains, industrial decarbonization, and next-generation power infrastructure.

He has envisioned and led major projects and policy initiatives with global industrial enterprises, the U.S. Department of Energy, the G20 Presidency, NITI Aayog, and the Government of India on innovation, policy, and technology strategies for clean steel, clean chemicals, gasification, carbon capture, low-carbon fuels, renewable integration, and grid modernization.