



Powering the future: India's shift to clean and smart energy

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Representational Image

From coal to digital, energy evolves

India is undergoing a profound energy transformation, transitioning from traditional coal and thermal power toward a future dominated by clean, sustainable resources such as wind, solar, hydro, and nuclear power. This shift is not just about replacing fuels but fundamentally reshaping how electricity is generated, transmitted, and consumed. Electricity, once a luxury, now powers homes, industries, and innovations that touch every aspect of modern life.

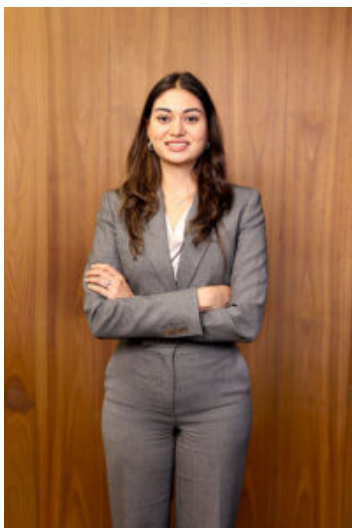
At the core of this transition is a revolution in generation and distribution. Solar and wind have moved from niche roles to mainstream contributors, fostering decentralized energy models like rooftop solar and microgrids. These enable households and businesses to become partly self-sufficient, sometimes feeding extra power back into the grid. This two-way flow represents a critical evolution, demanding a dynamic and flexible grid to manage varying supply and demand.



optimize power delivery, and minimize losses. Grid management now involves advanced automation for balancing loads, unblocking bottlenecks, and enhancing ampacity—the capacity of wires to carry higher currents safely and efficiently—facilitating more power supply and higher generation standards, approaching 5 megavolts (MV). The integration of sensors and IoT devices enables real-time monitoring, improving safety and efficiency by reducing risks such as short circuits or accidental contact with exposed wiring.

By harnessing data at scale, India's energy system can evolve into a more responsive, efficient, and sustainable network. Other key trends shaping India's energy landscape include:

- **Electrification of transport:** Electric vehicles are gaining momentum, reducing dependence on fossil fuels and creating new demand patterns for electricity.
- **Energy storage solutions:** As solar and wind are intermittent, battery storage and pumped hydro are becoming critical to balance supply and demand.
- **Green hydrogen initiatives:** India is exploring hydrogen as a clean energy carrier to decarbonize industries and long-haul transport.
- **Policy-driven acceleration:** Initiatives like the National Solar Mission and Renewable Energy Certificates are incentivizing renewable adoption and grid modernization.
- **Smart cities and IoT integration:** Cities are leveraging sensors and AI to optimize energy consumption in buildings, street lighting, and industrial zones.



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India's ongoing electrification of mobility—from electric trains and buses to personal electric vehicles—reshapes demand patterns, necessitating a responsive charging infrastructure and advances in battery technology. The ampacity game is more critical than ever, requiring wires and equipment rated for higher current capacities while meeting environmental compliance and safety standards.

India's energy capacity has reached 476 GW as of mid-2025, with non-fossil fuel sources accounting for nearly 49% of this total, reflecting a strong shift toward renewables alongside continued reliance on thermal power. Electricity generation soared from about 1,168 billion units in 2015–16 to an estimated 1,824 billion units in 2024–25, while per capita electricity consumption rose by over 45% in the last decade.*



moves toward a clean, resilient, and smart energy future, the convergence of renewables, grid modernization, and digital platforms will ensure reliable power—safely transmitted and efficiently managed—to fuel the nation's progress for decades to come.

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