15 April 2025

India power sector overview FY 2024–25: Thermal generation growth slowest since COVID

2024 was officially the warmest year ever recorded in India, marked by prolonged and intense heatwaves that placed unprecedented stress on the country's power system. In this context, the Centre for Research on Energy and Clean Air (CREA) analysed electricity data for the period FY 2019–20 to FY 2024–25 to capture key trends in electricity demand, supply, and coal stock position amid rising temperatures and changing consumption patterns.

Peak electricity demand analysis: Slower growth after a high surge year

In FY 2024–25, the peak demand met rose to 250.1 GW, registering a 4.2% increase over the previous year. Interestingly, this figure nearly matched the total peak demand including unmet demand of 250.2 GW, indicating that the gap between demand and supply significantly narrowed, with just 0.1 GW (118 MW) of demand unmet.

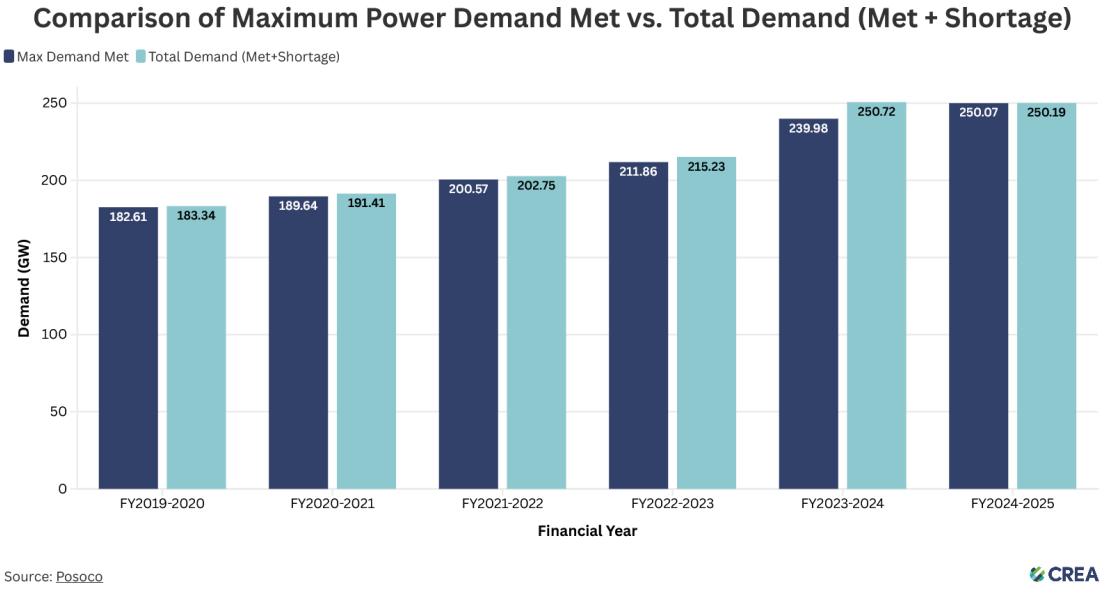


Figure 1 — Comparison of maximum power demand met vs. total demand

In contrast, FY 2023–24 recorded a much higher total peak demand of 250.7 GW, but only 240 GW was actually met, leaving a substantial shortfall of 10.7 GW. The steep rise in demand last year had

put considerable strain on the grid. However, the moderation in peak demand this year could be linked to an overall slowdown in the industrial sector.

On the peak demand day, the share of renewable energy—solar, wind, and biomass—in total gross generation rose from 9% in FY 2023–24 to 15% in FY 2024–25. The shares of coal and lignite remained steady, marginally declining from 71% to 70%, while nuclear and gas-based sources held constant at 2% and 4%, respectively. However, the contribution of hydro power dropped from 14% to 9%. The 14% share reflected generation during September, the monsoon season when reservoir levels are typically high, while the 9% share was recorded in May, when reservoir levels are generally low.

Monthly peak electricity demand data for FY 2024–25 presents a mixed picture. While several months recorded strong year-on-year (YOY) growth, others saw slight or even negative variation. Notably, May and June 2024 saw significant spikes of 13% and 10%, respectively, reflecting increased cooling loads during an intense early-summer heatwave. July also maintained high growth at 9%, continuing the seasonal pattern.

In contrast, August, September, and October 2024 witnessed negative YOY growth of -8%, -4%, and -1%, respectively, possibly due to lower industrial activity, favourable weather, or better demand-side management. The winter months of November through March returned to moderate positive growth, ranging from 1% to 7%.

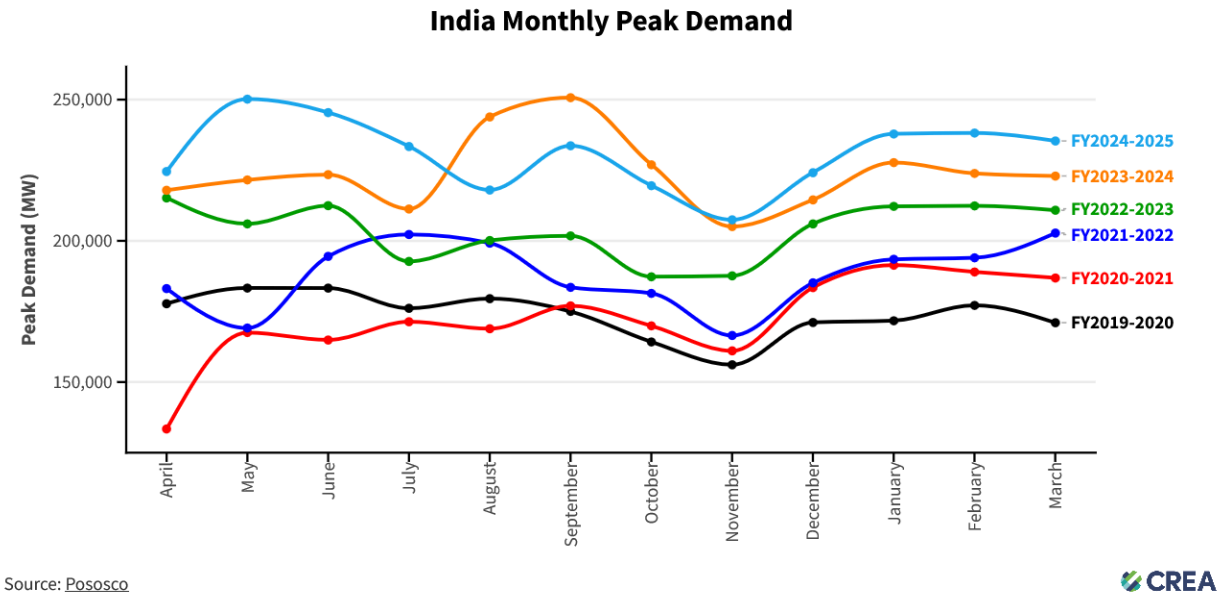


Figure 2 — India's monthly peak demand

Electricity generation: thermal dominant but reduced year-on-year (YOY) growth

India's electricity generation in FY 2024–25 touched a new high of 1,821 billion units (BU) marking a continuation of the upward trajectory since the pandemic slump. This represents a 5% year-on-year growth over the 1,734 BU generated in FY 2023–24. The pace of growth has started to moderate. FY 2023–24 recorded a 7% increase over the previous year, and the year before that a sharp 9% rise.

Table 1 — Annual electricity generation and growth in recent years

Financial year	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
Electricity generated (in billion units, BU)	1484	1618	1734	1821
YOY growth (%)	8	9	7	5

In FY 2024–25, India's electricity generation rose across all sources. Thermal grew by 2.8% (1,326 BU to 1,363 BU), nuclear by 18.4% (48 BU to 57 BU), large hydro by 10.8% (134 BU to 149 BU), and renewables by 11.4% (226 BU to 252 BU).

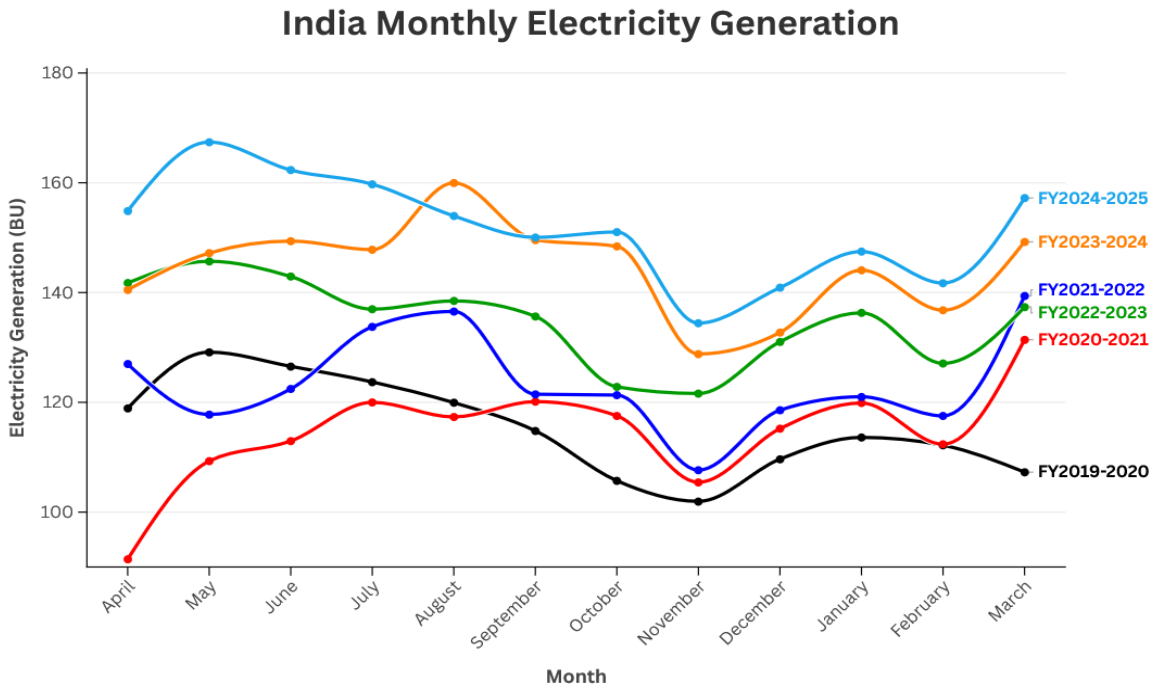


Figure 3 — India's monthly electricity generation

Table 2 — Source wise year-on-year change in electricity generation					
YOY % Change	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
Thermal	-0.98	7.96	8.2	9.9	2.8
Nuclear	-7.5	9.6	-2.7	4.3	18.4
Large hydro	-3.5	0.9	6.9	-17.4	10.8
Renewable energy	6.4	16.1	19.1	10.9	11.4

In FY 2024–25, thermal power generation recorded the lowest year-on-year growth among all major electricity sources, rising by just 2.8%. This marks a significant slowdown compared to the previous three years, where thermal power saw steady increases of 8.2%, 9.9%, and 7.96%, respectively. In contrast, nuclear power surged by 18.4%, while large hydro and renewable energy grew by 10.8% and 11.4%, respectively. Thus, except thermal, all other generation sources saw stronger growth compared to previous year.

Coal stock and production trends at the start of FY 2025–26

At the start of FY 2025–26, coal stock at thermal power plants stood at 58.1 million tonnes, reflecting a 15% increase over the 50.5 million tonnes recorded at the beginning of FY 2024–25. This continues a trend of higher opening stocks in recent years, compared to 36.9 million tonnes in April 2023 and 25.4 million tonnes in April 2022, suggesting an emphasis on pre-season stock accumulation amid rising power demand.

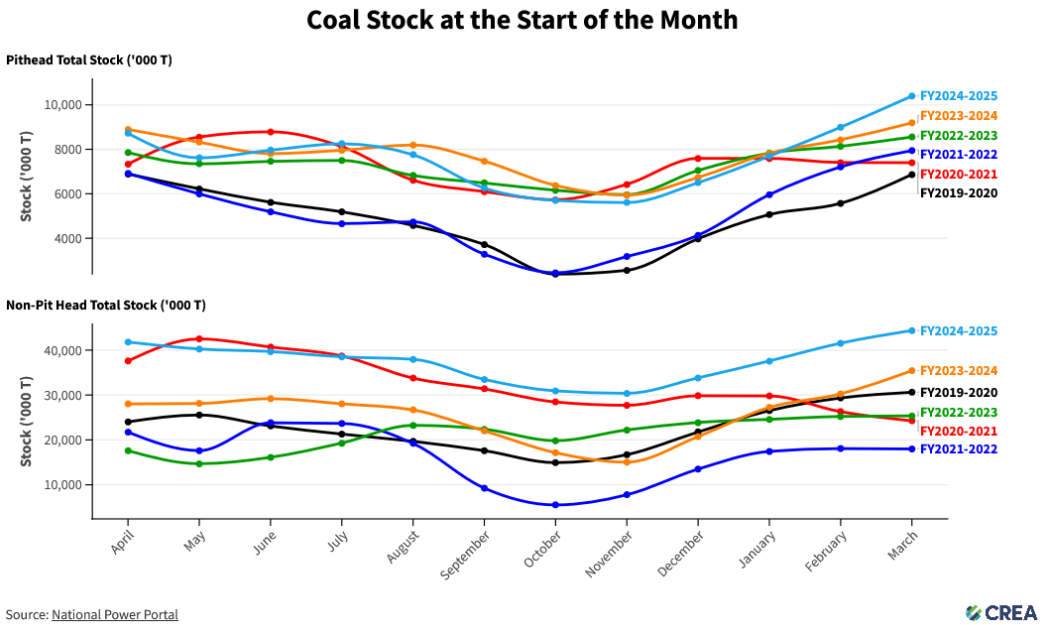


Figure 4 — Coal stock at the start of the month

Conclusion

Coal-based power generation recorded its slowest year-on-year growth of 2.8% in FY 2024–25 since the COVID-19 period (FY2020-21), even as overall electricity generation continued to rise. While peak electricity demand remained nearly unchanged over the past two years, the peak demand met increased from 240 GW to 250 GW in FY 2024–25. Notably, this increased demand was met largely with renewable energy.

According to a recent analysis, India ranked third globally in renewable energy generation in 2024. The new battery storage guidelines mandating storage for upcoming renewable projects signal progress toward a more flexible grid, paving the way for meeting future peak demand reliably.

About CREA

The Centre for Research on Energy and Clean Air (CREA) is an independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions, to air pollution. The organisation's work is funded through philanthropic grants and revenue from commissioned research. www.energyandcleanair.org.