

# FIRED UP AND PLUGGED IN – DRIVING INDIA'S ENERGY SECURITY AND DECARBONISATION THIS DECADE

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As India throttles to become the fastest-growing economy in the coming years, it will have to grow in the wake of a global agreement at COP-28 to phase down unabated coal. In this critical decade, the spotlight will be on how India decarbonises its power sector while ensuring economic development and energy security.

As the seventh most-vulnerable country to the impacts of climate change, India has been at the forefront of climate action — it has reduced overall fossil fuel subsidies by 76% between FY14 and FY22 and is priming the domestic industry to nearly triple its installed renewable power generation capacity by 2030. Despite significant climate action and ambition, coal-based power plants continue to provide the base power load support of over 100 GW on most days of the year. Coal is especially indispensable during non-solar hours and the post-monsoon season — when hydro availability is low — catering to over 80% of the peak demand in the evening and night. Due to rapidly increasing electricity demand, any predictions of India's reliance on coal are laden with uncertainty. The country has affirmed that while it continues to rapidly expand renewable energy, coal will remain a vital energy source till it reaches the status of a developed country in a geopolitically turbulent world.

But to keep the economy powered while decarbonising, the country will have to use its existing assets better to cater to growing demand, while simultaneously limiting exposure to new coal assets and investing in energy storage capabilities to integrate a higher share of renewable energy in the power grid. Four steps are critical for this.

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First, managing thermal plant outages better during peak demand periods. In 2023, ~38 GW of coal-based power plants across India witnessed unplanned outages or were not called on to generate power during the top 10% peak demand days. Improved availability and utilisation of existing plants, including the gas fleet, can mitigate the need for investments in new(er) thermal assets to meet peak power demand in the medium term. This will require power utilities to forecast demand better to anticipate outages, plan maintenance and keep plants online during peak days. This must be aided by regulations that incentivise plants' availability during peak

periods and/or allow idle plants to participate in the market.

Second, increasing the flexibility of the existing coal fleet. To seamlessly integrate more renewable energy (RE) into the grid, thermal plants that typically produce a steady load of power must learn to follow the vagaries of the wind and the sun. This can be done by making our existing coal plants more flexible — reducing their minimum power load and improving ramp rate capabilities. The Central Electricity Authority of India has already proposed modifying/retrofitting ~92% of the current coal and lignite-based capacity to enable it. Such a phased plan for retrofitting must be premised on minimising grid emissions and RE curtailment for maintaining demand-supply balance. Further, such flexible services must be adequately compensated. For instance, the Central Electricity Regulatory Commission and regulators in States such as Haryana and Uttar Pradesh have devised payment mechanisms to remunerate power plant owners for one-time retrofitting costs and the escalation in operation and maintenance costs associated with flexible operations. Other States must follow suit, thereby resulting in a wider pool of plants available to help reduce the burden on a handful of plants today.

Third, incentivising payment for storage services beyond the supply of energy units. In a scenario where RE has to contribute significantly to our demand, energy storage systems will have to support the power grid during hours when renewables are not available. This is the reason for many new 'round-the-clock' bids that combine RE and storage, where surplus generation of renewable energy is stored in a battery. However, standalone battery energy storage systems (BESS) will also be needed but they add a significant cost to each unit of electricity supplied. Entities that deploy batteries must then be compensated by utilities for the value they bring to grid operation. For example, numerous studies indicate that BESS increases RE integration into the grid and reduces operational stress on the thermal fleet. Additional revenues can go to battery storage systems through existing mechanisms by providing a host of critical grid support services, including inertia, black start, voltage stabilisation and reactive power supply.

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Fourth, indigenising supply chains for battery storage and RE technologies. While being the lifeline of the power system, the coal economy is an important source of domestic value addition, job creation and furthering India's '*atmanirbhar*' aspirations. In FY22, India produced coal worth ~INR 1.5 lakh crore, providing much-needed revenues to Central and State governments and an additional ~INR 27,000 crore to the Indian Railways. At the current pace of solar installation, a mere INR 7,000 crore is the domestic value added to manufacture solar modules. The PLI scheme has given fresh life to indigenisation efforts and committed ~INR 19,000 crore to solar manufacturing. In this decade, these investments can support exports and domestic value additions over INR 75,000 crore (at current prices). Boosting domestic value and job creation in clean energy would strongly mitigate concerns associated with disruptions in the global supply chain and loss of livelihoods in the economy. Addressing the availability of critical raw materials and incentivising R&D in advanced technologies in the manufacture of batteries, which are essential in furthering the next wave of renewable energy deployment, must also be the immediate priority of policymakers.

While the attention on the global stage focuses solely on decarbonisation, domestic energy security — especially because of rapidly growing power demand in the short term — will drive policymaker focus and investments in India. With falling renewable energy and storage prices, decision-makers need a transparent assessment of the long-term opportunity costs of locking ourselves into conventional power sources to meet near-term power needs. They must prioritise low-cost and affordable electricity for all segments of the economy as this is a prerequisite for a

flourishing economy and improving standards of living. This will then become the plank for more aggressive decarbonisation commitments in the years ahead.

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