

Despite a record year, India needs to double renewables deployment by 2030 to meet energy targets

Key points

- If India replicates last year's annual wind and solar deployment until the end of the decade, the country's renewables fleet would expand around 80% to 378 gigawatts (GW), short of its [500 GW](#) target of non-fossil power capacity by 2030.
- Closing this gap with wind and solar would require annual capacity additions to grow year-on-year at about 15%.
- The capacity of utility-scale solar, and hydropower projects in development — those that have been announced or are in the pre-construction and construction phases — is on track to overtake operating coal capacity within the next two years.

India added nearly 35 gigawatts (GW) of power capacity in 2024, setting a new record for the calendar year. Solar photovoltaic (PV) capacity made up 71% of all additions across the power sector, a record annual capacity addition for any technology in the country.

Global Energy Monitor's latest data from the Global Integrated Power Tracker indicate a robust pipeline of renewables¹ projects set to come online, with the combined capacity of wind, utility-scale solar, and hydropower in development on track to overtake operating coal capacity within the next two years. Utility-scale solar projects comprise nearly half of all renewables in development, with more capacity in the construction phase than for coal projects.

Yet, despite the strong year, renewables only made up around one-fifth of the total increase in power generation in 2024, with fossil power contributing more than two-thirds. Accelerating the rollout of renewable sources is essential to reverse the rise in fossil generation and to meet India's ambitious 500 GW of non-fossil power capacity by 2030, which requires annual deployment to double over the next five years.

¹ "Renewables" for the purposes of this briefing follows the definition of the Central Electricity Authority of India to include solar, wind, large and small-scale hydropower, and bioenergy.

A record year for capacity additions in the Indian power sector

The Indian power sector reached its [highest-ever](#) levels of annual capacity additions in 2024 with 34.7 GW, exceeding the previous record year in 2015 by 3.5 GW. The capacity additions in 2024 comprise mostly renewables, compared to majority coal plant additions a decade ago.

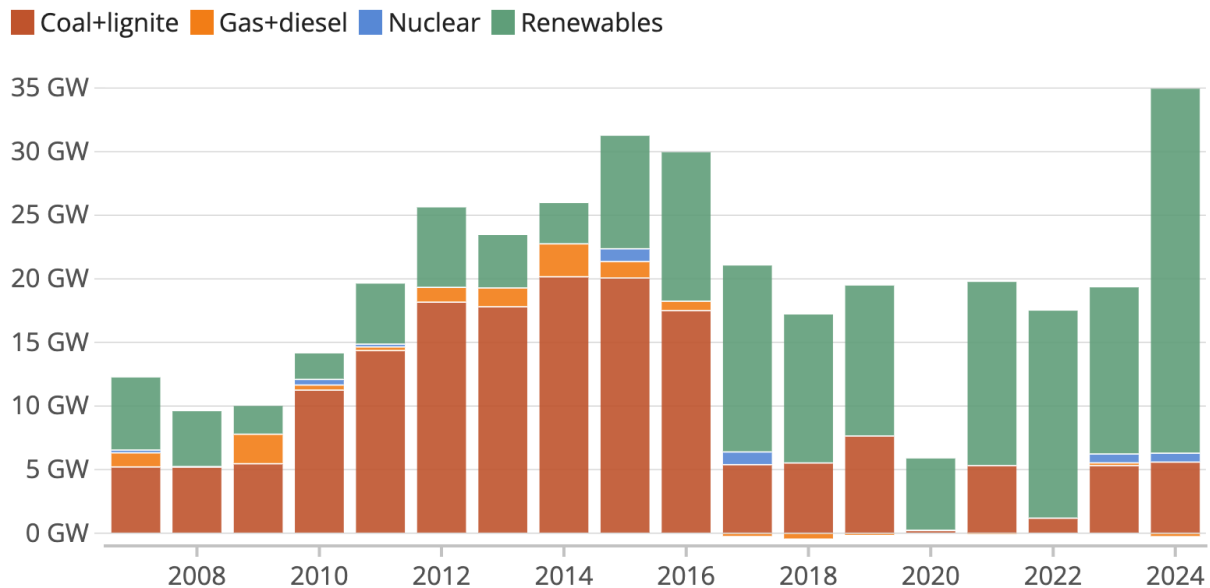
The net fossil capacity additions of 5.6 GW in 2024 were less than one-quarter that of their peak year in 2014. Coal plants made up all of these fossil additions in 2024, with virtually no change in the oil and gas plant fleet. Although down from previous record highs in the mid-2000s, net [coal plant additions](#) in 2024 were the highest since 2019, maintaining a five-year high.

India's power capacity additions aim to meet growing domestic electricity demand, which has burgeoned in the economic rebound following Covid lockdowns and intense summer [heat waves](#) that drive cooling-related demand. Although electricity demand growth attenuated in the second half of 2024, largely due to weakening industrial performance, projections for 2025 foresee a return to [5–7%](#) growth, [double](#) the global average.

The Indian Government's pursuit of new power capacity is all encompassing. In fossil-powered sectors, the Indian government has redoubled [support](#) and [fast-tracked](#) the development of large coal plants, with the pipeline of coal plant proposals growing 45% in 2024 to reach 111 GW total capacity in development. For renewables, capacity additions have been bolstered by ambitious renewables [purchase obligations](#) for power distribution companies and tenders targeting [50 GW](#) of new capacity per year.

India registers record capacity additions in 2024

Annual net additions of power capacity in India, in gigawatts (GW)



Source: Global Integrated Power Tracker (coal, oil+gas net additions), Central Electricity Authority (renewables + nuclear net additions) • "Renewables" for the purposes of this briefing follows the definition of the Central Electricity Authority to include solar, wind, large and small-scale hydropower, and bioenergy.



Figure 1

Solar power propels capacity growth

India's record year for capacity additions was propelled by solar photovoltaic technologies, which accounted for 71% of total capacity additions across the power sector and 86% of the [28.6 GW](#) of renewable capacity additions in 2024.

Solar PV additions in 2024 ([24.5 GW](#)) are more than those in 2022 and 2023 combined and [mainly comprise](#) ground-mounted utility-scale solar (75%). However, small-scale distributed solar also made impressive gains, spurred by a new government subsidy scheme for households that has seen [700,000](#) installations since its launch.

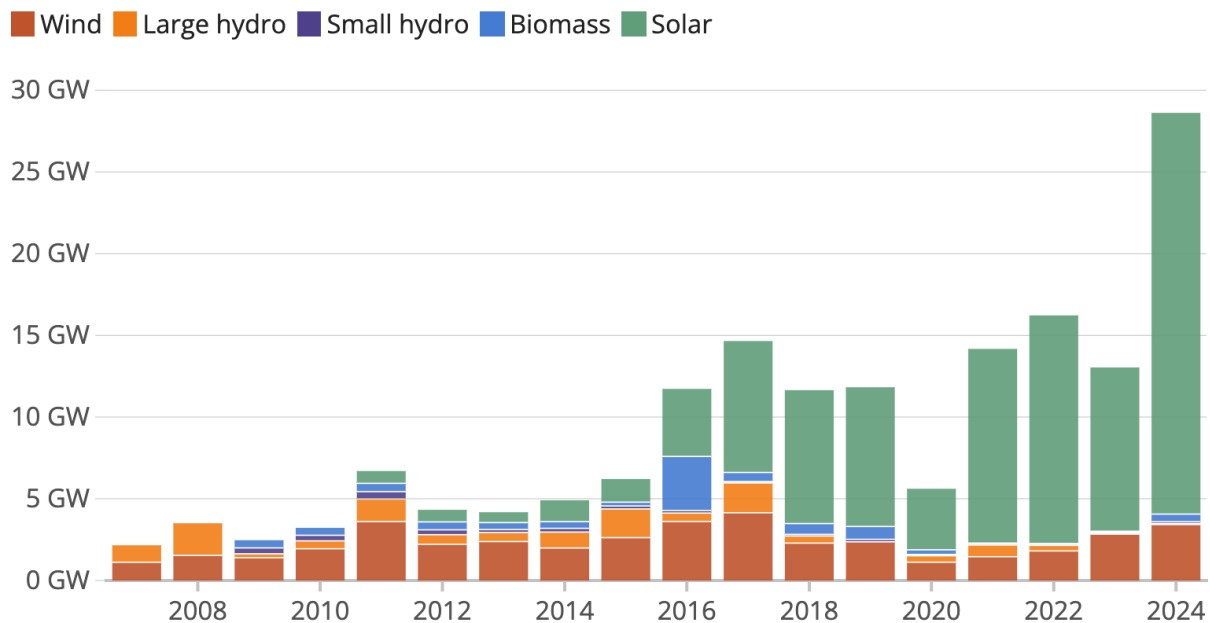
Wind capacity additions of [3.4 GW](#) in 2024 were about a third higher than the average annual deployment over the last decade. But they fell below the record annual

deployments of 2016 and 2017. A combination of factors has [slowed](#) the wind sector in recent years, including supply chain constraints, land acquisition and rights issues, and an unsustainable tariff system. Still, the steady pace of wind deployment saw cumulative operating wind capacity reach 48 GW by the end of 2024, overtaking large-scale hydropower to become India's third-largest power source by operating capacity, behind solar and coal.

Capacity additions in 2024 for hydropower and bioenergy were [0.7 GW](#), or less than 2% of the year's total renewable additions.

Solar made up 90% of India's 2024 renewable capacity additions

Annual net additions of renewable power capacity in India, in gigawatts (GW)



Source: Central Electricity Authority of India • "Renewables" include solar, wind, large and small-scale hydropower, and bioenergy



Figure 2

Indian states chart their own paths on renewables expansion

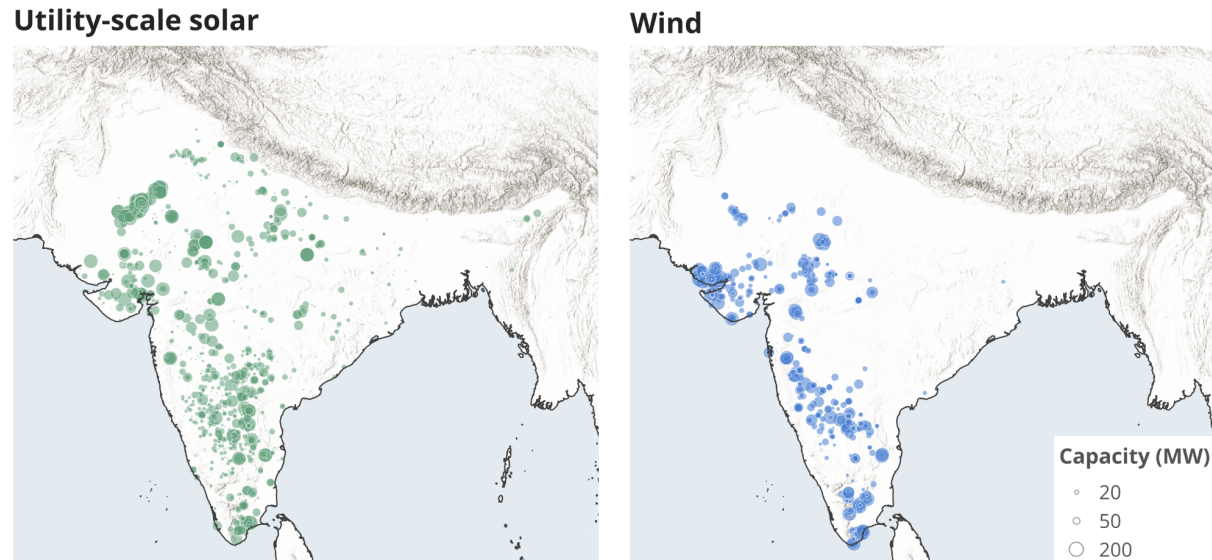
The locations of solar and wind installations operating in India largely reflect the country's varied physical resources and differing [state-level support](#) policies. This is particularly apparent for the country's wind farms, which cluster almost exclusively within the so-called seven “windy states” on the western side of the country. Half of the operating wind capacity nationwide is found in two of India's states: Gujarat in the northwest ([12.5 GW](#)), with favorable low-lying coastal land, and Tamil Nadu in the South ([11.4 GW](#)), where wind farms cluster around mountain passes of the Western Ghats range.

Utility-scale solar farms are more widespread than wind farms, clustering around the best solar resources in the northwest. The northwestern state of Rajasthan hosts a considerable grouping, some 27% ([26.5 GW](#)) of the total India solar PV fleet. The vast expanse of the Thar desert holds around three-quarters of the state total, including the 2.7 GW [Bhadla complex](#), one of the largest solar PV sites in the world.

Wind and solar installations are notably less prevalent in India's far north and northeast. The mountainous terrain, lower wind speeds, and fewer sunshine days may limit the large-scale deployment of wind and solar technologies in these regions. However, hydropower is a significant power source within the Himalayan foothills, accounting for over 80% of total capacity in five northern states.

Wind farms in India cluster in the windier western and southern states, while utility-scale solar is more widespread

Locations of operating utility-scale solar & wind power in India, capacity in megawatts (MW)



Note: Data include solar project phases with a capacity of 1 megawatt (MW) or more and wind project phases with a capacity of 10 MW or more

Source: Global Solar Power Tracker, Global Wind Power Tracker, Solar Asset Mapper

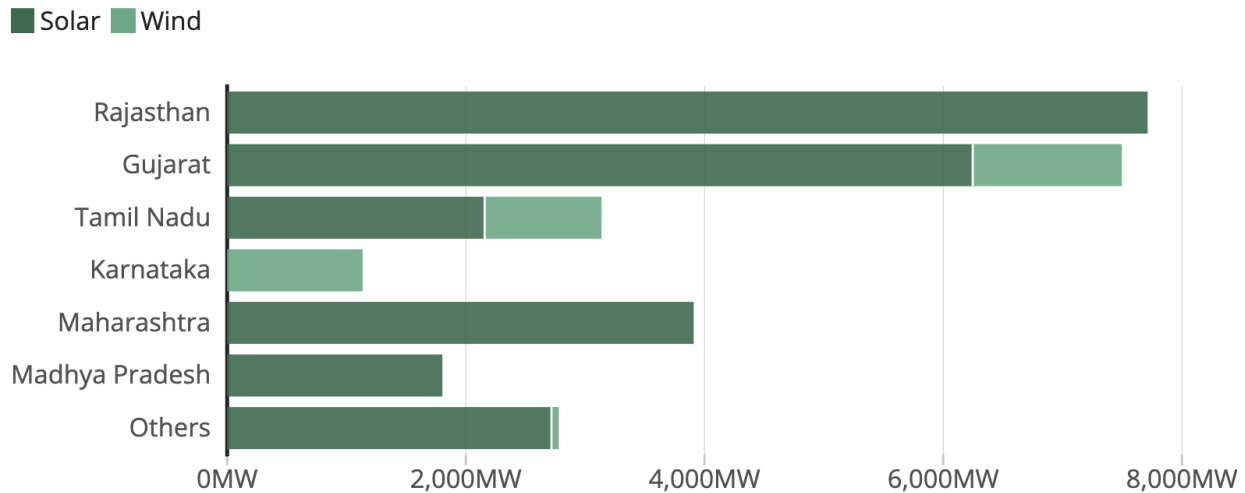


Figure 3

In 2024, the leading states for wind and solar deployment further extended their precedence. Specifically, six states accounted for 89% of the 2024 wind and solar additions (Rajasthan, Gujarat, Maharashtra, Tamil Nadu, Madhya Pradesh, and Karnataka) and together now account for two-thirds of all renewable energy capacity nationwide. Several of these leading states also registered impressive gains for renewable generation — notably Rajasthan, where solar added more generation than any other source in 2024.

Six Indian states account for nearly 90% of all wind and solar capacity added nationwide in 2024

Power capacity additions in 2024 by source and state, in megawatts (MW)



Source: Ministry of New and Renewable Energy



Figure 4

However, the gains of the frontrunner states are not enough to change the fossil-dominated picture nationwide. Data from the [Central Electricity Authority](#) show fossil sources covering two-thirds of the year-on-year increase in electricity generation, maintaining a 75% share of the total. These gains were primarily due to the increasing deployment of the existing coal fleet, with utilization rates averaging close to [70%](#) throughout the year, their highest in a decade. Solar energy covered approximately one-fifth of the 2024 increase in electricity generation in 2024. Wind generation was nearly the same as last year, despite new wind farms increasing India's operating wind fleet by ~8% over levels in 2023, likely due to particularly [weak monsoon](#) winds during August 2024.

Doubling wind and solar annual deployment necessary to hit renewables targets by 2030

GEM's [Global Integrated Power Tracker](#) shows power projects in development — those that have been announced or are in the pre-construction and construction phases — spanning a wide range of sources in India. Coal leads the pack, with 111 GW of capacity in development, 29.5 GW of which is under construction, which corresponds with the Ministry of Power's plans for an additional [80 GW](#) of coal power in the fiscal year 2031–32.

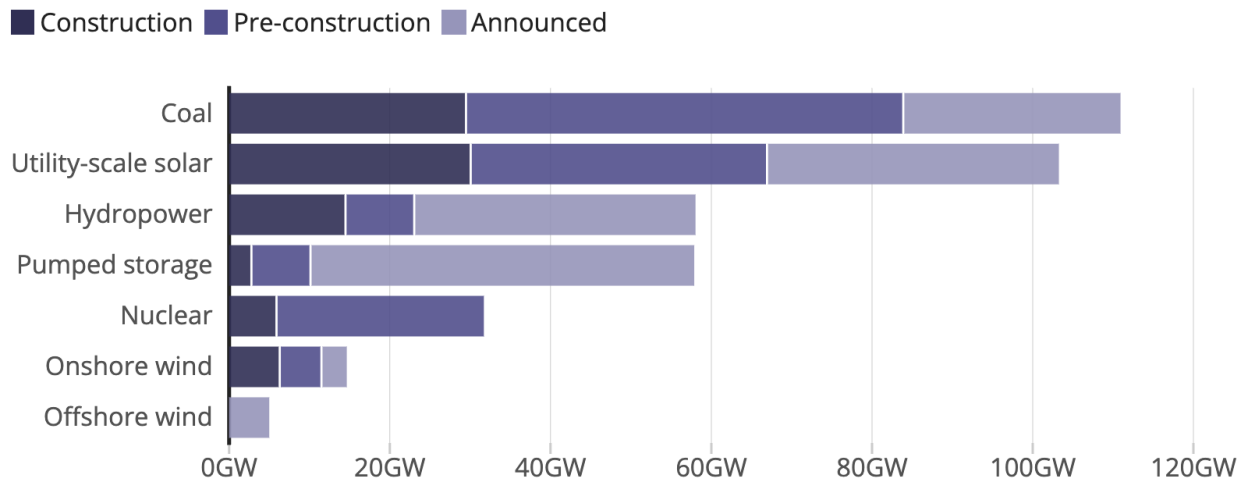
The capacity of utility-scale solar projects in development closely follows coal (103 GW), with more capacity in the construction phase (30 GW). Wind capacity in development (20 GW) is notably lower than for utility-scale solar but projects slated for commissioning in 2025 would constitute an increase over last year's new capacity if built on time.

According to GEM data, the proportion of in-development wind and utility-scale solar projects that have reached the construction phase exceeds 30%, among the highest values globally. The relatively high construction rate and large project pipelines for utility-scale wind is indicative of continued capacity growth and tallies [industry projections](#) showing growing solar and wind additions over the next two years.

GEM data also show that, by 2030, 17 GW of hydropower and pumped storage capacity currently under construction will come online, over three-quarters of which is located in north and northeastern regions. Pumped storage is increasingly looked to as an energy storage option to facilitate the integration of massive wind and solar additions and ensure grid stability. Current plans for new nuclear power plants target an additional 11 GW capacity by 2030, providing an annual generation equivalent to about two years of new solar capacity additions (60 GW).

More utility-scale solar capacity under construction than any other power source in India

Power capacity in development by source and status, in gigawatts (GW)



Source: Global Integrated Power Tracker, February 2025, Global Energy Monitor

Data include phases/units equal to or greater than specific thresholds: solar 20MW; wind 10MW; hydropower/pumped storage 75MW; bioenergy and coal 30MW; oil and gas 50MW.



Figure 5

In 2024, coal's share of total power capacity fell [below 50%](#) for the first time since the 1960s. Renewables alone will likely eclipse operational coal capacity within the next two years, if wind and solar capacity additions replicate similar record levels of deployment (~30 GW), and under-construction hydropower projects come online to schedule (~5 GW). At similar levels to the 2024 deployment, solar will likely overtake hydropower to become the second-largest power source next year after coal.

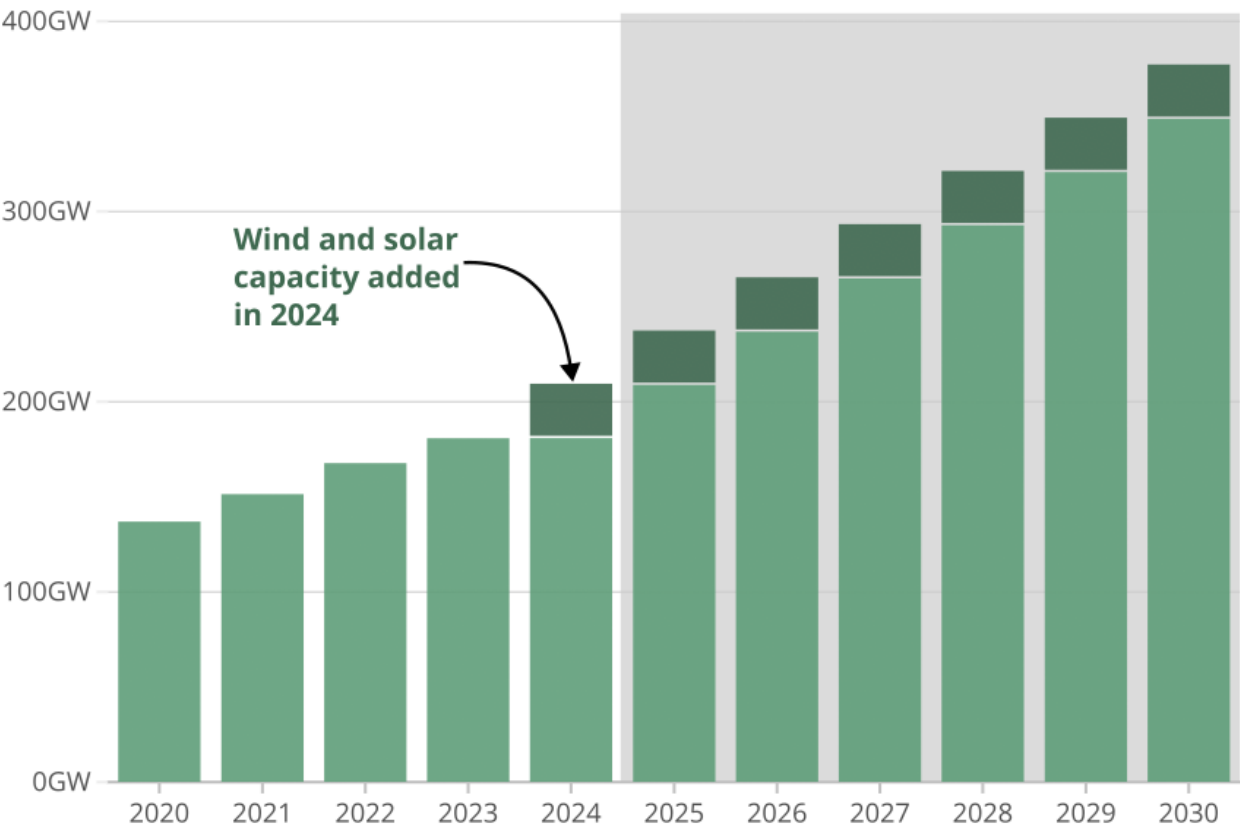
However, a significant uptick in renewables deployment is required for these sources to expand upon their current one-fifth share of total generation and to eat into coal's dominance. This is because renewables tend to generate less readily than fossil sources: Wind and solar have an average utilization rate of [17–22%](#) across the year, compared to coal's [70%](#).

Replicating 2024's annual wind and solar deployment to 2030 would expand India's renewables fleet by around 80% to 378 GW. GEM's Global Integrated Power Tracker shows an additional 24 GW of hydropower capacity slated to come online by 2030. That would leave about a 100 GW shortfall to India's target of reaching [500 GW](#) of non-fossil power capacity by 2030. Closing this gap with wind and solar would require annual capacity additions to average 60% higher than the additions in 2024 or grow year-on-year at about 15%. Post-pandemic wind and solar growth rates have tracked slightly above this level, suggesting that renewables expansion in line with the 500 GW target is attainable if the recent pace of growth can be maintained. Such growth would see annual wind and solar additions more than double the record levels in 2024 by 2030.

Realizing this level of renewables expansion will require navigating numerous [challenges](#). Infrastructure challenges include lacking electricity [transmission](#) and energy storage capacity. Regulatory and finance challenges chiefly involve tackling widespread [non-compliance](#) with renewables purchasing obligations and the [high financing](#) costs to project developers in India. There are additional challenges related to just transition, encompassing [conflicts](#) over farmers' and local community's rights to access land, as well as [livelihood impacts](#) on those employed in coal-related industries.

India on pace to increase renewables 80% by 2030

Renewable power capacity in India if wind and solar capacity additions continue at same rate as 2024 every year from 2025 to 2030



Source: Ministry of New and Renewable Energy (historical capacity and 2024 additions)



Figure 6

About the Global Integrated Power Tracker

The [Global Integrated Power Tracker \(GIPT\)](#) is a free-to-use Creative Commons database of over 116,000 power units globally, that draws from GEM trackers for coal, gas, oil, hydropower, utility-scale solar, wind, nuclear, bioenergy, and geothermal, as well as energy ownership. Footnoted wiki pages accompany all power facilities included in the GIPT, updated biannually. For more information on the data collection process that underpins GEM's power sector trackers, please refer to the Global Integrated Power Tracker [methodology](#) page.

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