# POWERup

Update on India's electricity capacity, generation and investment

**1Q** 2025

Institute for Energy Economics and Financial Analysis

## **1. Installed Capacity** First Quarter (1Q) 2025 Update:

India added total power generating capacity of **13,495 megawatts (MW) in 1Q 2025** (January– March), with renewables accounting for **78.9%** of all new capacity additions (**Table 1**). With gas capacity retirement of 285MW, the net capacity added was 13,210MW. With these additions, India's total cumulative power generation capacity reached **475.2 gigawatts (GW)** at the end of March 2025.

Solar, coal and wind recorded the majority of capacity additions, accounting for **57.7%**, **21.1% and 13.9%**, respectively, of the total capacity added.

Solar power capacity reached a new milestone as it crossed 100GW of installed capacity in January 2025. Solar installed capacity grew at a <u>remarkable rate</u> over a decade, from 2.82GW in 2014 to 100GW in 2025. Wind power capacity also crossed a key milestone of 50GW during the quarter.

India recorded net coal power capacity addition of **2,843MW** during 1Q, taking the total installed base of coal power capacity to **221.8GW**. However, the share of coal capacity in total installed power capacity continues to drop (**46.7%** as of 31 March 2025) as the share of renewables in new capacity additions increases. New coal capacity additions in the quarter came largely from state undertakings that include:

- The commissioning of Unit 1 (660MW) of THDC India Limited's 1,320MW Khurja Super Thermal Power Plant in Uttar Pradesh.
- The commissioning of Unit 2 (**800MW**) of TSGENCO's 4,000MW Yadadri Thermal Power Station in Telangana, which will be one of the largest coal power plants at a single location in India.
- The commissioning of Unit 6 (**660MW**) of MAHAGENCO's Bhusawal Thermal Power Station in Maharashtra, taking the operational capacity of the power station to 1,870MW.
- The commissioning of Unit 1 (660MW) of UPRUVNL's Panki Thermal Power Station extension project in Uttar Pradesh.

Solar and wind installed capacity crossed key milestones of 100GW and 50GW, respectively, as total non-fossil fuel power capacity reached 228GW in 1Q 2025

#### Table 1: Installed Power Generation Capacity (MW), by Source, 1Q 2025

Energy Source		As on 31 Dec 2024	As on 31 Mar 2025	Change (MW)	% of New Capacity Added#
岙	Wind Power	48,163	50,038	1,875	13.9
<i>4</i>	Solar Power*	97,865	105,646	7,782	57.7
	Small Hydro	5,101	5,101	-	0.0
	Biomass	10,728	10,743	15	0.1
\$	Waste to Energy*	620	840	220	1.6
	Large Hydro	46,968	47,728	760	5.6
	Nuclear	8,180	8,180	0	0.0
<u>[0=0]</u>	Coal (+ Lignite)	218,970	221,813	2,843	21.1
Ì	Gas	24,818	24,533	-285	-2.1
ß	Diesel	589	589	0	0.0
Total		462,002	475,212	13,210 (Net capacity added)	-

\*Includes grid and off-grid capacities Source: Central Electricity Authority, Gol; IEEFA #As a % of total new capacity added: **13,495MW** 

Several hydropower stations were commissioned during the quarter (**760MW**) in Himachal Pradesh and Kerala by NHPC Ltd., Beas Valley Power Corporation Limited (BVPCL) and the Kerala State Electricity Board (KSEB).

## **Capacity Additions Trend:**

India's solar capacity addition fell by 8.4% year-over-year (YoY) from the record high achieved in 1Q 2024 to 7,782MW in 1Q 2025 (Table 2). However, despite the reduction, it is the second-highest capacity installation achieved in the last 13 quarters, the period of our observation. Quarter-onquarter (QoQ) installations increased by 9.6% from 4Q 2024.

At 1,875MW in 1Q 2025, **wind power** capacity additions were the highest in the last 13 quarters.

Increased solar and wind capacity additions are driven by higher offered capacities through various tenders—solar, wind, solar + wind hybrids, and energy storage since 2018. While total tendered capacity increased to ~40GW in 2018 and 2019 (and dipped during COVID-19 years), it crossed 50GW in 2023 and 2024.

Tendered capacity has been increasing since 2023 driven by India's ambition to add about 50GW of non-fossil fuel power capacity every year from 2023 to achieve 500GW of the said capacity by 2030. However, delays in signing power supply agreements and in receiving permits and approvals, and hurdles in gaining grid connectivity continue to hinder capacity installations. Capacity installations in 1Q 2025 surged back to the record highs (~13GW) achieved in 1Q 2024 driven by contributions from solar, coal and wind power capacity additions

Table 3: Power Capacity Additions by Energy Source (MW), Last Five Quarters

Energy Source		1Q 2024	2Q 2024	3Q 2024	4Q 2024	1Q 2025
岙	Wind Power	1,150	770	707	800	1,875
4	Solar Power	8,495	3,661	5,288	7,103	7,782
	Small Hydro	17	2	71	25	-
	Biomass	94	-	369	4	15
\$	Waste to Energy (off-grid)	3	8	11	15	220
	Large Hydro	18	-	-	40	760
	Nuclear	700	-	-	-	-
	Coal (+ Lignite)	3,193	1	60	1,320	2,843
$\bigcirc$	Gas	-	(220)	-	-	(285)
ß	Diesel	-	_	-	_	-
Total		13,669	4,221	6,505	9,307	13,210

Source: Central Electricity Authority, JMK Research, MNRE, IEEFA

While solar and wind are the main drivers of non-fossil fuel capacity, India has also witnessed contributions from hydro, biomass, waste-to-energy and nuclear power over the years.

**Coal power capacity** additions have also increased since 1Q 2023 as plants under construction were expedited to meet growing electricity demand in the country. At 2,843MW, coal capacity additions were the **second highest in the last 13 quarters.** 

### **Capacity Additions Among Large States:**

# Rajasthan, Gujarat, Maharashtra and Karnataka led renewable energy capacity installations in 1Q 2025

Among large states (in terms of installed renewables power generation capacity of 10GW or more), **Rajasthan** and **Gujarat** led renewable energy capacity expansion by adding 1,973MW and 1,910MW, respectively, in 1Q 2025 (**Table 3**).

Other notable capacity additions in 1Q 2025 happened in **Maharashtra** (1,780MW) and **Karnataka** (1,316MW).

For the first time in several quarters, **Andhra Pradesh** experienced an uptick in renewable energy capacity installations (940MW) in 1Q 2025. Andhra Pradesh is witnessing renewed interest from renewable energy investors with the implementation of its new <u>Integrated</u> <u>Clean Energy Policy</u> in October 2024, which aims to install 160GW of clean energy and energy storage capacities over five years.

#### Table 4: Renewable Energy Capacity Installations (MW), Large States<sup>1</sup>

	1Q 2024	2Q 2024	3Q 2024	4Q 2024	1Q 2025
Rajasthan	2,576	1,068	1,809	2,266	1,973
Gujarat	3,495	944	1,119	1,958	1,910
Madhya Pradesh	825	81	74	823	516
Maharashtra	1,219	350	1,251	1,491	1,780
Andhra Pradesh	27	38	25	82	940
Karnataka	523	725	211	224	1,316
Tamil Nadu	1,026	592	906	615	967

<sup>1</sup>States with an installed renewables capacity of close to 10GW or more.

Source: Central Electricity Authority, MNRE, IEEFA Institute for Energy Economics and Financial Analysis

## 2. Generation

Renewable energy and nuclear energy generation grew by more than 16%, while fossil fuel-based power generation increased marginally by 0.46% in 1Q 2025

**Total electricity generation** from all sources increased by **3.6%** from 429.85 billion units (BUs) in 1Q 2024 to **445.49 BUs** in 1Q 2025 (January–March).

Solar and wind power generation significantly increased by 16.6% from 72.68 BUs in 1Q 2024 to 84.78 BUs in 1Q 2025 (Figure 1). In the same period, fossil fuelbased thermal power generation increased marginally by 0.46% from 345.5 BUs in 1Q 2024 to 347.09 BUs in 1Q 2025.

Nuclear power generation also grew significantly by 16.7% from 11.67 BUs in 1Q 2024 to 13.62 BUs in 1Q 2025.

Renewables and nuclear power replaced a portion of fossil fuel-based power generation this quarter (1Q 2025), in a moderate electricity demand growth scenario. The share of fossil fuel-based power generation fell to **77.9%** in 1Q 2025 compared with 80.38% in 1Q 2024. However, this transition will be tested in the peak summer electricity demand growth scenario next quarter (April–June).

## 3. Investments

Investments in the renewable energy sector increased **7.7 times YoY** from US\$1,279 million in 1Q 2024 to **US\$9,840 million in 1Q 2025 (Figure 2)**. QoQ investments increased 2.6 times in 1Q 2025 compared with 4Q 2024. Investments in 1Q 2025 were the highest in any quarter in the last three years.

The steep rise in investments was due to big-ticket acquisitions, such as JSW Neo Energy's acquisition of O2 Power Pooling Pte. Ltd for US\$1.47 billion and ONGC NTPC Green Pvt. Ltd's acquisition of Ayana Renewable Power for US\$2.3 billion. The quarter also witnessed large debt raising, including Adani Green's US\$1.06 billion debt financing from Power Finance Corporation (PFC) and Juniper Green Energy's US\$1 billion debt financing from a consortium of lenders, including PFC, DBS Bank, HSBC Bank and Indian Renewable Energy Development Agency.

Renewed investor interest was driven by overall positive policy outlook and sustained energy demand growth in the country. Long-term renewable energy capacity installation goals, combined with incentives for manufacturing equipment, rooftop solar (PM Surya Ghar) and solarisation of agriculture (PM KUSUM), helped in establishing a positive policy framework. Further, rising energy demand (especially the summer peak) is increasingly driving private sector investment, primarily in the commercial and industrial segments.



Figure 1: Power Generation by Source (BU), Monthly, 2024-25\*

## Investments in renewable energy were the highest in the last three years in 1Q 2025

## Figure 2: Investments in India's Renewable Energy Sector (US\$ million)



Source: JMK Research, News Reports

Source: Central Electricity Authority, MNRE, JMK Research, IEEFA \*Data for March 2025 are provisional

## Other major investments and deals announced during the quarter are:

National Thermal Power Corporation (NTPC)	National Thermal Power Corporation (NTPC) and its subsidiary NTPC Green Energy Ltd (NGEL) have signed multiple agreements with the Madhya Pradesh government, committing over Rs2 trillion ( <u>US\$23.4 billion</u> ) for renewable energy projects in the state. This includes an agreement with Madhya Pradesh Power Generating Company Limited to develop 20GW of clean energy projects, at an estimated investment of Rs1.2 trillion (US\$14 billion). NTPC and NGEL have signed agreements with the Government of Chhattisgarh to invest about Rs960 billion (US\$11.2 billion) in a range of clean energy projects, including nuclear, pumped hydro, solar, wind and hybrid sources.
Hindustan Petro- leum Corporation Ltd (HPCL)	Hindustan Petroleum Corporation Ltd (HPCL) plans to invest up to Rs500 billion (US\$5.8 billion) via its subsidiary, HPCL Renewable & Green Energy Limited, to expand its renewable energy capacity to 10GW by 2030. The company is targeting 1GW by 2025–26 and is focusing on solar power, biofuels and EV charging infrastructure, which now covers 3,603 retail outlets.
Sun Petrochemicals	Sun Petrochemicals has signed a Memorandum of Understanding (MoU) with the Telangana gov- ernment to invest Rs450 billion ( <u>US\$5.2 billion</u> ) in large-scale pumped storage hydropower projects across Nagar Kurnool, Mancherial and Mulugu districts.
Avaada Group	Avaada Group has signed an MoU with the Government of Odisha, committing an investment of Rs207 billion ( <u>US\$2.4 billion</u> ) to develop 1.5GW of floating solar projects, two 1GW pumped storage projects and green energy equipment manufacturing facilities.
Emmvee Group	Emmvee Group has announced an investment of Rs150 billion ( <u>US\$1.7 billion</u> ) to build a solar PV manufacturing plant in Karnataka. Initially, Rs50 billion (US\$585 million) will be used to establish a 5GW facility, possibly in Bengaluru's IT Investment Region.
Welspun New Energy	Welspun New Energy has signed an agreement with the Odisha government to invest Rs135 billion ( <u>US\$1.58 billion</u> ) in two major clean energy projects—a 1,200MW pumped hydro storage project and a 1,000MW floating solar power project.
Reliance NU Suntech	Reliance NU Suntech plans to invest over Rs100 billion ( <u>US\$1.2 billion</u> ) in a 930MW solar power plant with 1,860MWh battery storage capacity and an integrated solar manufacturing facility in Kurnool, Andhra Pradesh. The project will likely be Asia's largest single-site solar and storage facility.
Jakson Green	Jakson Green plans to invest up to Rs85.3 billion ( <u>US\$1 billion</u> ) over the next four years to build a 5GW portfolio across solar, wind, battery storage, and firm and dispatchable renewable energy starting from FY2027, according to a senior company official.
Jupiter International	Jupiter International will invest Rs65 billion ( <u>US\$761 million</u> ) over the next three years to build a fully integrated solar manufacturing ecosystem. The company plans to scale up to 3GW of wafer production, 9.4GW of solar cell manufacturing and 6GW of module assembly.
Inox Solar Limited	Inox Solar Limited is set to invest Rs40 billion ( <u>US\$470 million</u> ) in a solar cell and module manufacturing facility in Dhenkanal, Odisha. The project will have a production capacity of 4.8GW for both solar cells and modules.

### **About IEEFA**

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