



1. Installed Capacity

Third quarter (3Q) 2023 Update:











Table 1: Installed power generation capacity, by source, 3Q 2023

India added a total power generating capacity of **3,505MW in 3Q 2023** (July – September), with renewables accounting for **61.1%** of all new capacity additions (Table 1). With these additions, India's cumulative power generation capacity reached **425.4GW** by the end of September 2023.

Among renewables, wind and solar recorded the majority of capacity additions, accounting for **11.7% and 48.0%**, respectively, of the total capacity added during the quarter

India recorded a net coal power capacity addition of **1,151MW** during 3Q, taking the total installed base of coal power capacity to **213.7GW** or **50.2%** of the total installed power generation capacity.

For the first time in many quarters, India recorded an addition of **gas-based power capacity of 214MW** due to the commissioning of Unit-II of the Kashipur combined cycle power plant in Uttarakhand by Sravanthi Energy.

Energy Source	As on 30 June 2023	As on 30 September 2023	Change (MW)	% of New Capacity Added
 Wind Power	43,773	44,185	412	11.7
 Solar Power	70,097	71,781	1,684	48.0
 Small Hydro	4,959	4,983	24	0.7
 Biomass	10,248	10,262	14	0.4
 Waste to Energy (off-grid)	566	573	8	0.2
 Large Hydro	46,850	46,850	0	0.0
 Nuclear	7,480	7,480	0	0.0
 Coal (+ Lignite)	212,516	213,666	1,151	32.8
 Gas	24,824	25,038	214	6.1
 Diesel	589	589	0	0.0
Total	421,902	425,407	3,505	100.0

Source: Central Electricity Authority, GoI; IEEFA

Year-to-date (YTD) - Nine Months (January-September) 2023 update:











Capacity installations for the first nine months of 2023 (January – September) increased by **4.6% to 15,068MW** compared with the nine months in 2022. Solar, coal, wind and nuclear power capacity additions led to the increase.

While solar power capacity additions accounted for 56.3% of the total capacity additions YTD in 2023, the share has fallen from 79.6% recorded during the comparable period in 2022. Solar power capacity additions **fell by 26.1%** year-on-year (YoY) as project commissioning deadlines got extended due to procurement delays because of uncertainty surrounding the Approved List of Models and Manufacturers (ALMM) policy.

However, wind power capacity additions witnessed a **42.4% increase** YTD in 2023 over a comparable period in 2022, driven by rising hybrid (wind + solar) tenders and the Ministry of Power's specification of wind power obligation until 2029-30.

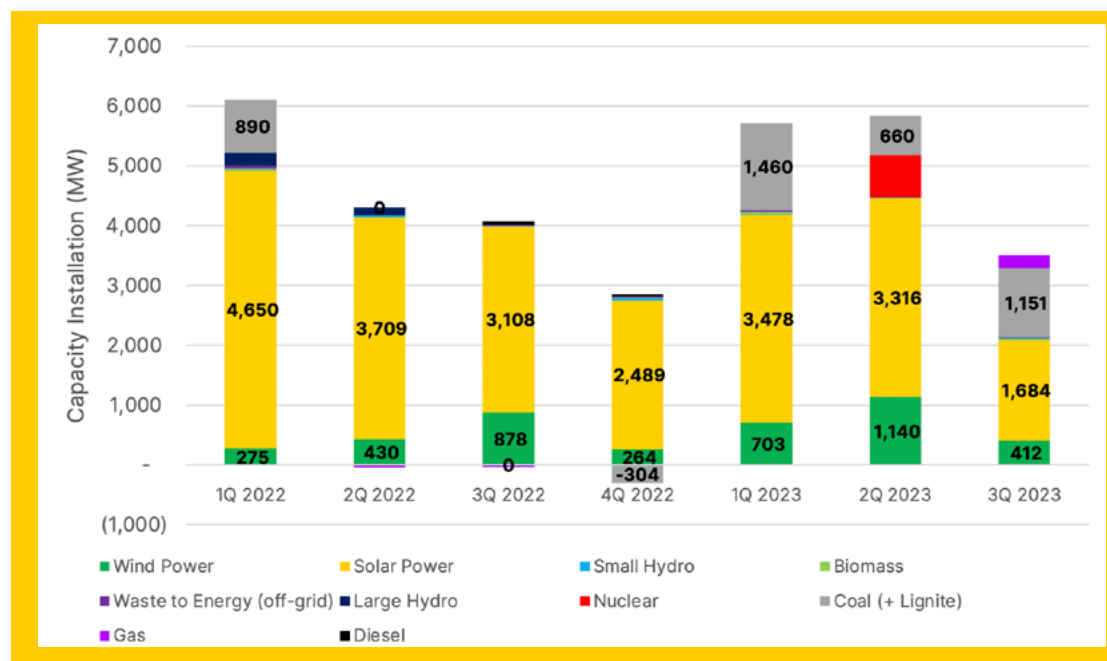
Coal power capacity additions grew strongly (**267.5%**) YTD in 2023 over a comparable period in 2022, sparked by the growing electricity demand in the country.

Table 2: Power capacity additions by source (MW), Nine Months, 2022 vs. 2023

Energy Source	Capacity Addition, Nine Months 2022 (MW)	% of New Capacity Added, 2022	Capacity Addition, Nine Months 2023 (MW)	% of New Capacity Added, 2023
 Wind Power	1,583	11.0	2,255	15.0
 Solar Power	11,467	79.6	8,478	56.3
 Small Hydro	60	0.4	47	0.3
 Biomass	30	0.2	52	0.3
 Waste to Energy (off-grid)	61	0.4	51	0.3
 Large Hydro	338	2.3	0	0.0
 Nuclear	0	0.0	700	4.6
 Coal (+ Lignite)	890	6.2	3,271	21.7
 Gas	(75)	-0.5	214	1.4
 Diesel	53	0.4	0	0.0
Total	14,407	100.0	15,068	100.0

Source: Central Electricity Authority, GoI; IEEFA

Figure 1: Share of capacity additions by energy source (MW), 2022 vs. 2023



Source: Central Electricity Authority, MNRE, IEEFA

Capacity additions trend:

India's power capacity additions slowed to 3,500MW level in 3Q 2023 after close to touching 6,000MW levels in the first two quarters of 2023. Solar, wind, and coal continue to drive the growth in capacity additions except for 700MW nuclear capacity addition in 2Q 2023.

Solar capacity additions have significantly fallen from the peak of 4,650MW achieved in 1Q 2022 to register just **1,684MW** in 3Q 2023, the **lowest in the last seven quarters**. Capacity additions

in 2023 are slowing down due to lower auction volumes and supply chain challenges.

After registering 1,140MW of installations in 2Q 2023 (the first time in six quarters), wind power capacity installations also dropped to 412MW in 3Q 2023.

India registered three consecutive quarters of coal power capacity additions totalling 3,271MW in 2023 against a net addition of just 586MW in 2022.

Capacity additions among the top five large states:

Among the top five large states (in terms of installed power generation capacity of nearly 10GW or more), Rajasthan and Gujarat are the main drivers of renewable energy capacity expansion by adding **866MW** and **858MW** on average in the last five quarters.

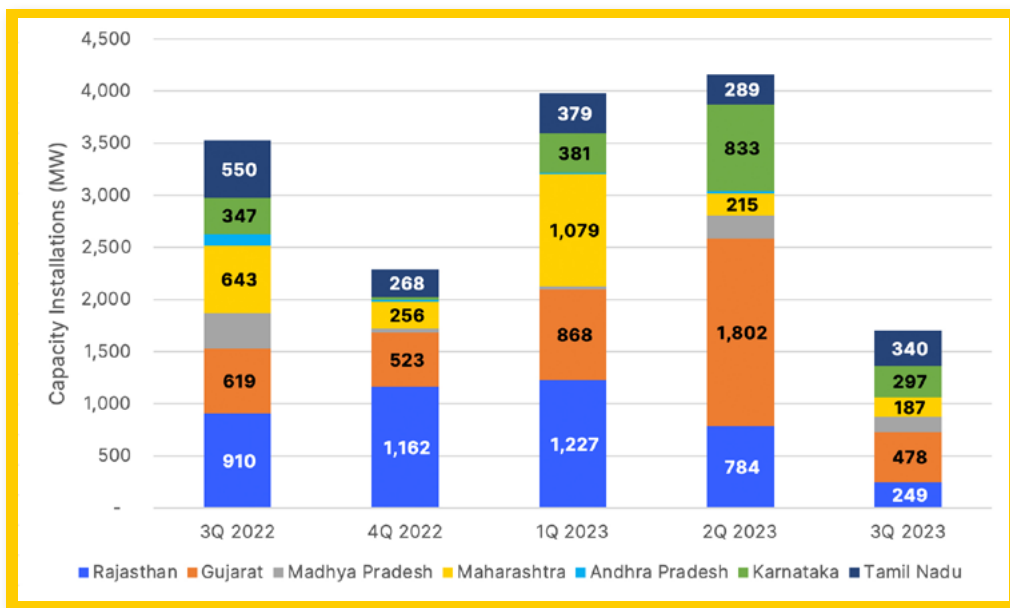
Maharashtra and Karnataka follow next with average capacity additions of **476MW** and **377MW** per quarter. Tamil Nadu is a steady performer adding renewable energy capacities in the range of 250-550MW every quarter at an average of 365MW per quarter.

Andhra Pradesh is the weakest performer in this group adding only 33MW, on average, of renewable energy capacity in the last five quarters.

The share of renewable energy in total capacity addition **fell to 61%** in 3Q 2023 after staying well above 85% throughout 2022. This was due to a slowdown in solar capacity additions and an increase in coal power capacity additions in 2023.

“ Solar capacity additions fell to just 1,684MW in 3Q 2023, the lowest in the last seven quarters.

Figure 2: Renewable Energy Capacity Installations (MW), Top Five States



Source: Central Electricity Authority, MNRE, IEEFA

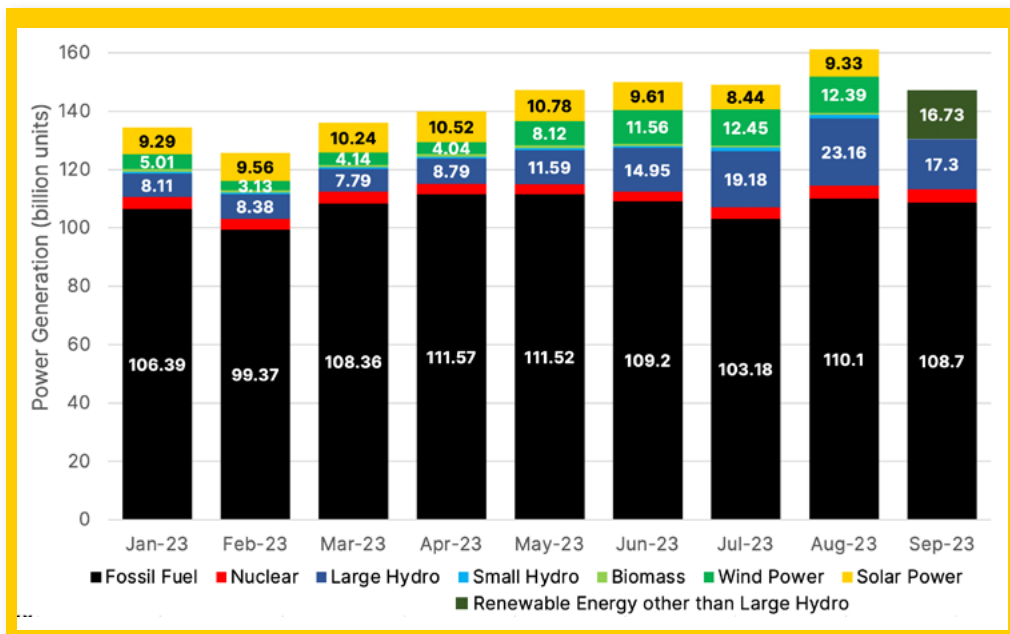
2. Generation

Renewable energy generation in the nine months (January - September) of 2023 increased by **2.4% to 287.45 billion units (BU)** compared with 280.82BU generated during January - September 2022 (Figures 3 and 4).

Power generation from fossil fuel sources **increased faster at 7%** in the nine months of 2023 to **968.36BU** over a comparable period in 2022 (Figures 3 and 4).

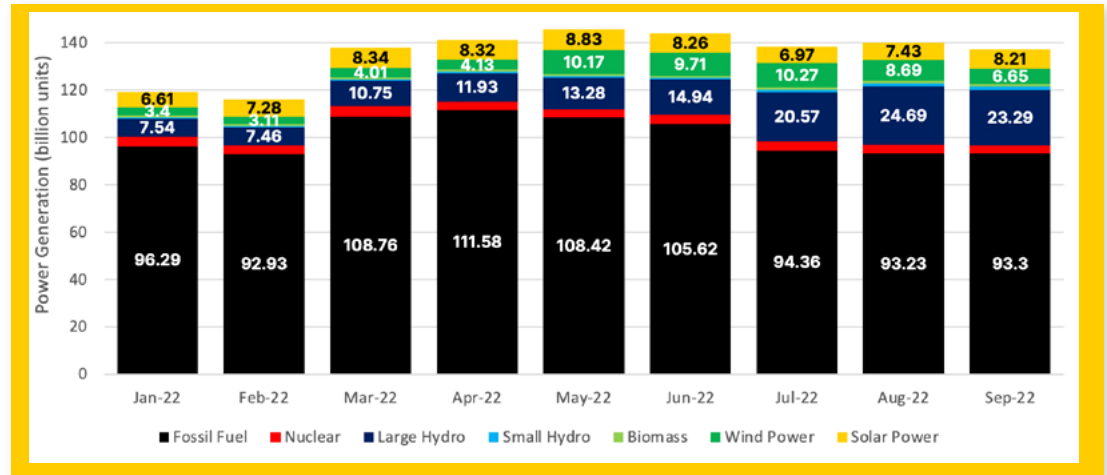
The rise in fossil fuel-based power generation is due to a government directive to operate imported coal-based power plants at full capacity

Figure 3: Power generation by source by month, Nine Months, 2023*



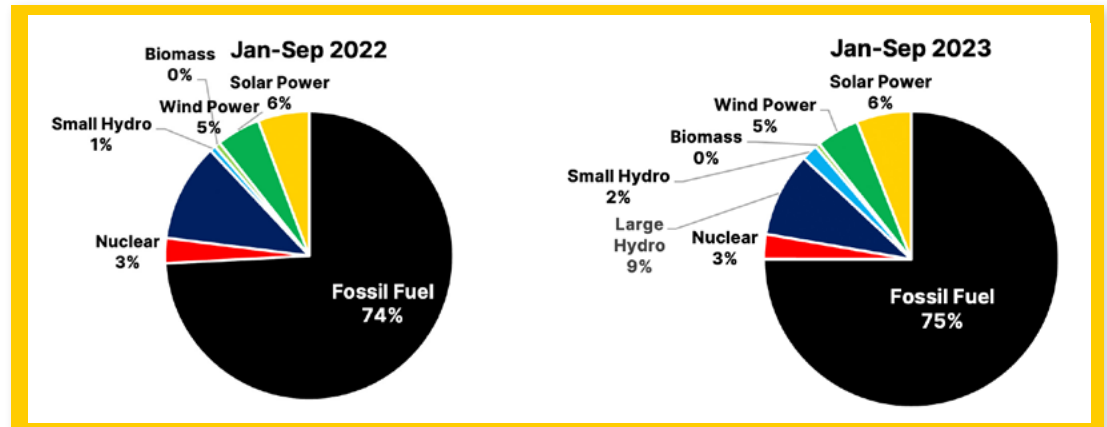
Source: Central Electricity Authority, MNRE, JMK Research, IEEFA
* Data for September 2023 is provisional.

Figure 4: Power generation by source by month, Nine Months, 2022



Source: Central Electricity Authority, MNRE, IEEFA

Figure 5: Percentage share by energy source in total power generation, Nine months (January-September), 2023 vs. 2022



Source: Central Electricity Authority, MNRE, IEEFA

from February until October 2023 to meet the rising power demand.

Overall power generation from all sources **increased by 5.8%** to 1,290.8BU in the nine months in 2023 from 1219.5BU in 2022.

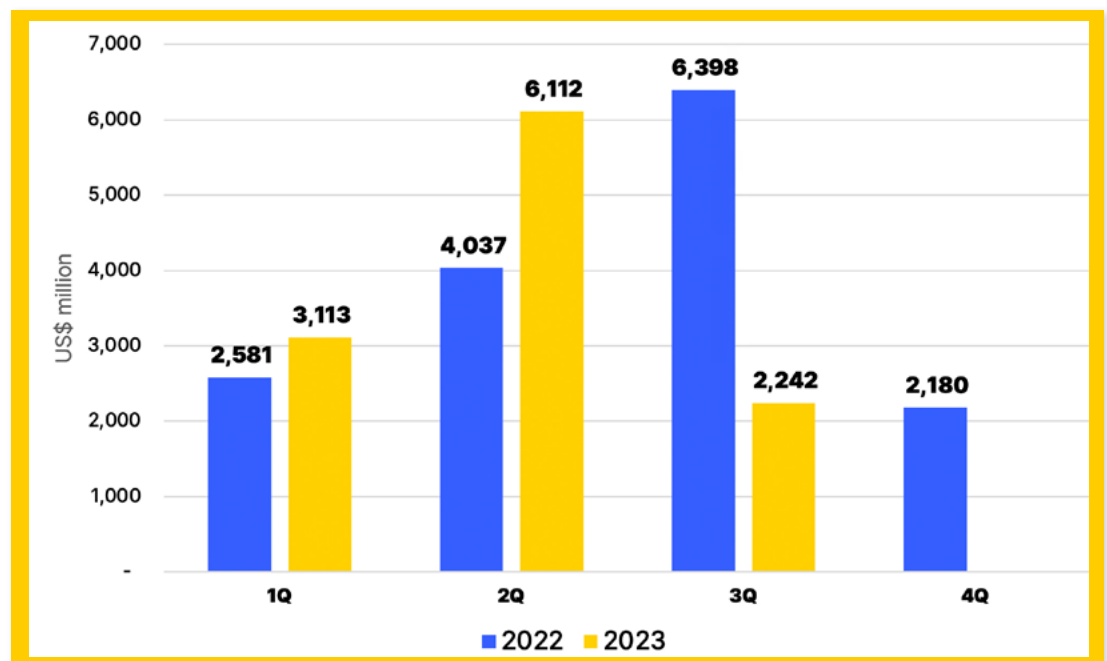
Fossil fuels continue to be the source of nearly 75% of the power generated in the country for the first nine months of the year (Figure 5).

Power generation from renewable energy sources is expected to be in the range of **20-22%** for the entire year in 2023.

The share of renewable energy in total energy generated marginally **decreased to 22.3%** in the nine months in 2023 from 23.0% recorded in 2022 due to a fall in generation from large hydro projects.

3. Investments

Figure 6: India Renewable Energy Sector Investments (US\$ million)



Investments in the renewable energy sector **reduced by 65%** in 3Q 2023 to **US\$2.2 billion** from **US\$6.4 billion** in 3Q 2022.

Investments YTD amounted to US\$11.5 billion against US\$13 billion in the comparable period in 2022, an 11.9% decrease (Figure 6). Globally, fund flows to clean energy projects have reduced in the quarter due to concerns over profitability in the backdrop of rising interest rates and material costs.

Investments in the first nine months of 2023 in the renewable energy sector account for about 75% of the full-year investment of **US\$15.2 billion** achieved in 2022, leaving a long distance to cover in the last quarter of 2023. The investments

achieved so far also fall short by US\$13.5 billion of the government's expectation of achieving full-year investments of **US\$25 billion** in the clean energy sector.

Source: News reports, JMK Research



Some of the major investments and deals made during the quarter are:

Indian Government	The Indian government intends to procure US\$2.2 billion (Rs200 billion) through the issuance of sovereign green bonds during the second half of the fiscal year 2023-2024. Approximately 50% of the funds are anticipated to be allocated towards railway initiatives, with the remaining portions earmarked for new and renewable energy projects, housing and urban affairs, as well as environmental and climate change endeavours.
TotalEnergies	TotalEnergies is establishing a joint venture with Adani Green Energy on an equitable 50:50 basis. This collaborative venture will encompass a total of 1,050MW of wind and solar energy assets. The deal is valued at US\$300 million (Rs24 billion).
Rural Electrification Corporation Limited (RECL)	The Rural Electrification Corporation Limited (RECL) has approved an investment of US\$730.8 million (Rs60.75 billion) to Greenko to develop a stand-alone pumped storage project with a total capacity of 1,440MW. RECL is also in discussions with Greenko for extending finance for multiple clean energy projects.
Serentica Renewables	The RECL also approved debt funding over US\$370.6 million (Rs30.8 billion) to Serentica Renewables for a 560MW peak greenfield solar-wind hybrid project located in the Gadag district of Karnataka. Serentica also tied up debt funding of US\$312 million (Rs26 billion) from Power Finance Corporation for various renewable energy projects in Karnataka.
Tata Power Renewable Energy Limited	Tata Power Renewable Energy Limited has successfully obtained US\$425 million (Rs35 billion) in financing from the U.S. International Development Finance Corporation to support the establishment of a 4.3GW greenfield solar cell and module manufacturing facility situated in Tamil Nadu.
Juniper Green	Renewable power producer Juniper Green has secured a US\$350 million (Rs29 billion) investment by Singapore-based AT Capital Group and Dutch commodities trading firm Vitol . The investment will be utilised in reaching the company's target to triple its operational capacity to 2.5GW by 2026.
Qatar Investment Authority	INQ Holding LLC, a wholly-owned subsidiary of Qatar Investment Authority , has acquired a 2.7% stake in Adani Green Energy for a total amount of US\$473 million (Rs39.2 billion).
ReNew Power	ReNew Power has secured a project loan of US\$324 million (Rs27 billion) from the State Bank of India for its 403 MW peak renewable power project.
Adani New Industries	Adani New Industries has secured US\$394 million (Rs32.31 billion) from Barclays and Deutsche Bank to meet the working capital needs of their integrated solar module manufacturing facility in Gujarat.
World Bank	The World Bank has approved US\$1.5 billion (Rs124 billion) in financing for India's plan to scale up renewable energy, develop green hydrogen infrastructure, and stimulate climate finance toward low-carbon energy projects.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

Analysis by:

Charith Konda, Energy Analyst
ckonda@ieefa.org

Kaira Rakehja, Intern
krakehja@ieefa.org