# POWERup

Update on India's electricity capacity, generation and investment

Institute for Energy Economics and Financial Analysis

2Q 2023

## 1. Installed Capacity

### Second quarter (2Q) 2023 Update:

India added a total power generating capacity of **5,843MW in 2Q 2023** (April – June), with renewables accounting for **76.7%** of all new capacity additions (Table 1). With these additions, India's cumulative power generation capacity reached 421.9GW by the end of June 2023.

Among renewables, wind and solar recorded the majority of capacity additions, accounting for **19.5% and 56.8%**, respectively, of the total capacity added during the quarter.

India recorded a net coal power capacity addition of **660MW** during 2Q, taking the total installed base of coal power capacity to **212.5GW** or **50.4%** of the total installed power generation capacity.

India also commissioned a **700MW** nuclear power unit at Kakrapar Atomic Power Project (KAPP) in Gujarat in June 2023. This is the first nuclear power unit to be commissioned in the last six years since the commissioning of a **1,000MW** unit in Kudankulam in March 2017. The **700MW** Kakrapar unit is the first depl yment of indigenously developed pressurised heavy water reactors by the Nuclear Power Corporation of India Limited (NPCIL). NPCIL plans to build 16 such **700MW** units across the country.

**Table 1: Installed power generation capacity, by source, 2Q 2023**

| Energy Source | As on 31 March 2023 | As on 30 June 2023 | Change (MW) | % of New Capacity Added |
|---|---|---|---|---|
| Wind Power | 42,633 | 43,773 | 1,140 | 19.5 |
| Solar Power | 66,780 | 70,097 | 3,316 | 56.8 |
| Small Hydro | 4,944 | 4,959 | 15 | 0.3 |
| Biomass | 10,248 | 10,248 | - | 0.0 |
| Waste to Energy (off-grid) | 554 | 566 | 12 | 0.2 |
| Large Hydro | 46,850 | 46,850 | - | 0.0 |
| Nuclear | 6,780 | 7,480 | 700 | 12.0 |
| Coal (+ Lignite) | 211,856 | 212,516 | 660 | 11.3 |
| Gas | 24,824 | 24,824 | - | 0.0 |
| Diesel | 589 | 589 | - | 0.0 |
| **Total** | **416,059** | **421,902** | **5,843** | **100.0** |

*Source: Central Electricity Authority, GoI; IEEFA*

## Year-to-date (YTD) first half (1H) 2023 update:

Capacity installations for the first half of 2023 (January - June) increased by **11.5% to 11,562MW** compared with 1H 2022. Solar, wind, coal and nuclear power capacity additions led to the increase.

While solar power capacity additions accounted for 58.8% of the total capacity additions in 1H 2023, the share has fallen from **80.6%** recorded in 1H 2022. Solar power capacity additions fell by **18.7%** during the period YoY due to policy uncertainty surrounding the Approved List of Models and Manufacturers (ALMM) and its subsequent relaxation in March 2023 and extension of project commissioning deadlines.

However, wind power capacity additions witnessed a strong **(161%) increase** in 1H 2023 over 1H 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 also grew strongly **(138%)** in 1H 2023 over 1H 2022 sparked by the growing electricity demand in the country.

## Capacity additions trend:

India's power capacity additions returned to **~6,000MW** levels in the first two quarters of 2023 after recording slower (~4,000MW or lower) additions in the last three quarters of 2022.

The trend of capacity additions primarily driven by solar, wind, and coal continues except for 700MW nuclear capacity addition in 2Q 2023.

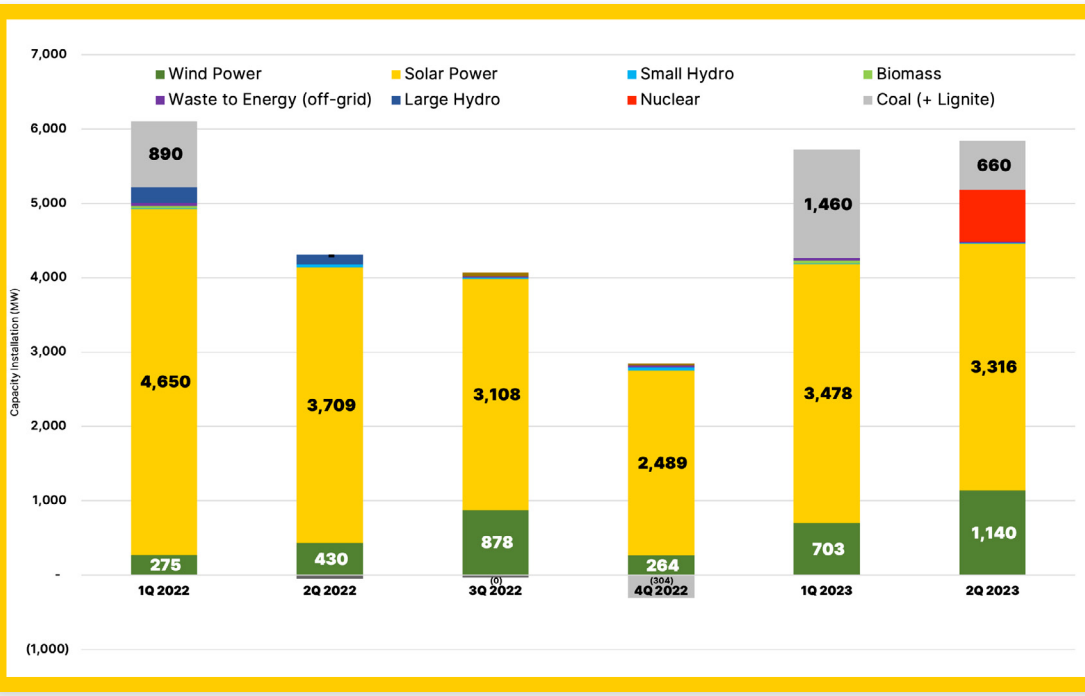
Solar capacity additions in the range of **3,300-3,400MW** are still lower than the peak of **4,650MW** achieved in 1Q 2022.

**Table 2: Power capacity additions by source (MW), 1H 2022 vs. 1H 2023**

| Energy Source | Capacity Addition, 1H 2022 (MW) | % of New Capacity Added, 2022 | Capacity Addition, 1H 2023 (MW) | % of New Capacity Added, 2023 |
|---|---|---|---|---|
| Wind Power | 705 | 6.8 | 1,843 | 15.9 |
| Solar Power | 8,359 | 80.6 | 6,794 | 58.8 |
| Small Hydro | 49 | 0.5 | 23 | 0.2 |
| Biomass | 30 | 0.3 | 38 | 0.3 |
| Waste to Energy (off-grid) | 43 | 0.4 | 43 | 0.4 |
| Large Hydro | 338 | 3.3 | - | 0.0 |
| Nuclear | - | 0.0 | 700 | 6.1 |
| Coal (+ Lignite) | 890 | 8.6 | 2,120 | 18.3 |
| Gas | (43) | -0.4 | - | 0.0 |
| Diesel | - | 0.0 | - | 0.0 |
| **Total** | **10,370** | **100.0** | **11,562** | **100.0** |

*Source: Central Electricity Authority, GoI; IEEFA*

**Figure 1: Share of capacity additions by energy source, FY2018-19 to FY2022-23**




*Source: Central Electricity Authority, MNRE, IEEFA*

Wind power capacity additions crossed the **1,000MW** level to record an installation of **1,140MW** in **2Q 2023** for the first time in six quarters, driven by rising tenders and policy visibility.

India also added coal power capacity of **1,460MW and 660MW** in the first two quarters of 2023, respectively, after recording no coal power capacity additions in the last three quarters of 2022.

The share of renewable energy in total capacity addition **fell under 80%** in 1H 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 1H 2023.

> **The share of renewable energy among total capacity addition fell under 80% in 1H 2023 after staying well above 85% all through 2022.**

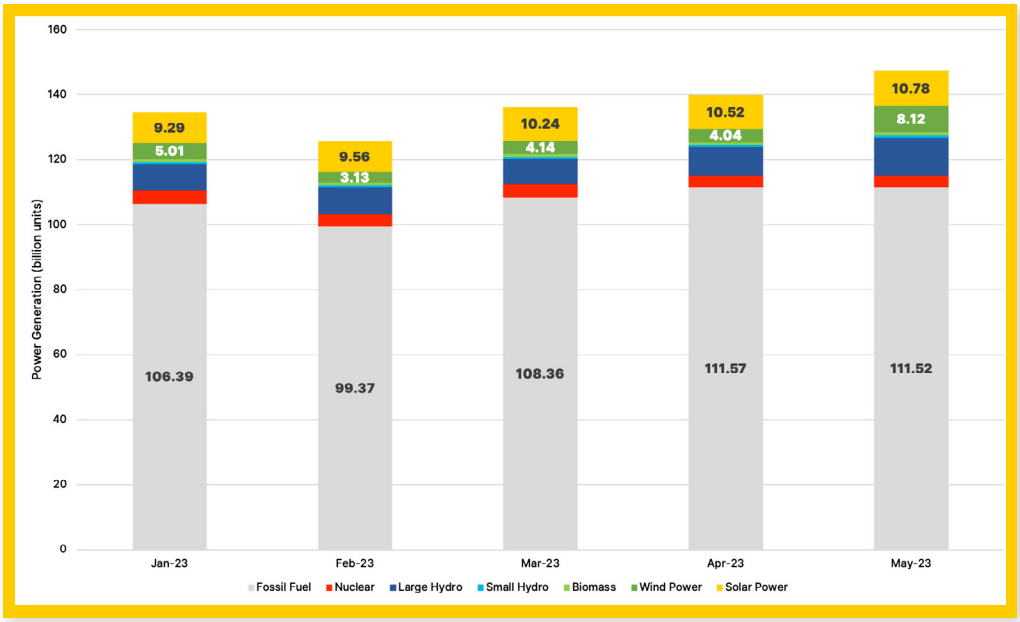
# 2. Generation

Renewable energy generation for the first five months (latest data available) of 2023 increased by **3.7% to 127.2 billion units (BU)** compared with 122.6BU generated during January - May 2022 (Figures 2,3).

Power generation from fossil fuel sources **increased by 3.7%** in the first five months of 2023 to **537.2BU** over a comparable period in 2022 (Figures 2,3).

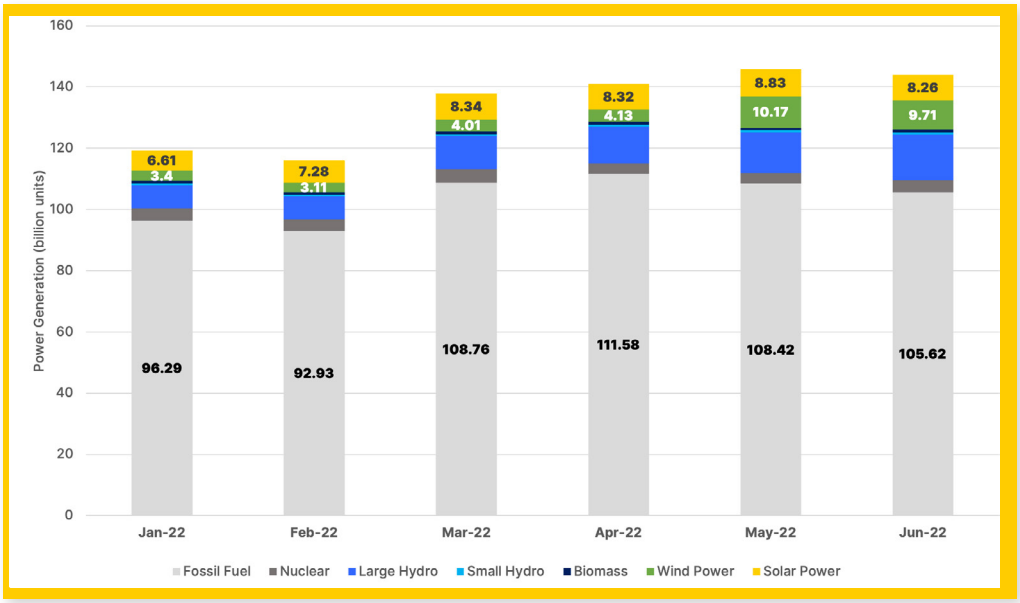
Provisional numbers indicate that total renewable energy generation of 21.44BU was achieved in June 2023, taking the **1H 2023 renewable energy generation to 163.43BU**. This is a **4% growth in renewable energy generation** compared with 1H 2022. Power generation from all sources amounted to 831.96BU in 1H 2023 compared with 803.90BU in 1H 2022, a 3.5% increase.

**Figure 2: Power generation by source by month, 1H 2023***




*Source: Central Electricity Authority, MNRE, IEEFA* **Latest data available is until May 2023*

**Figure 3: Power generation by source by month, 1H 2022**

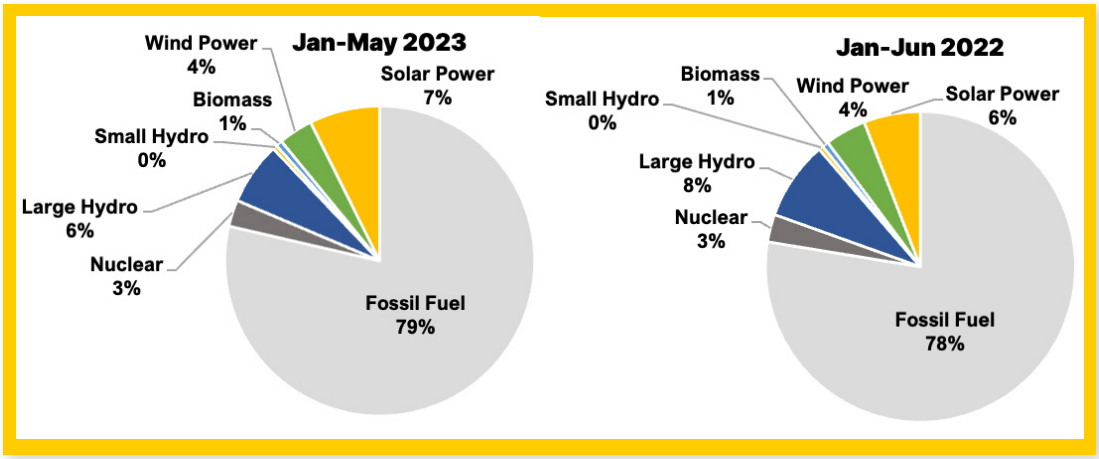



*Source: Central Electricity Authority, MNRE, IEEFA*

With the provisional numbers for June 2023, **the share of renewable energy in total generation** is almost the same at **19.6%** compared with 19.5% in 1H 2022, as generation from fossil fuel sources also increased by 3.5%.

**Fossil fuels continue to be the source of nearly 80% of the power generated** in the country for the first half of the year (Figure 4). Power generation from renewable energy sources is expected to be in the range of **20-22%** for the entire year in 2023.

**Figure 4: Percentage share by energy source in total power generation, 1H 2023 vs. 1H 2022**



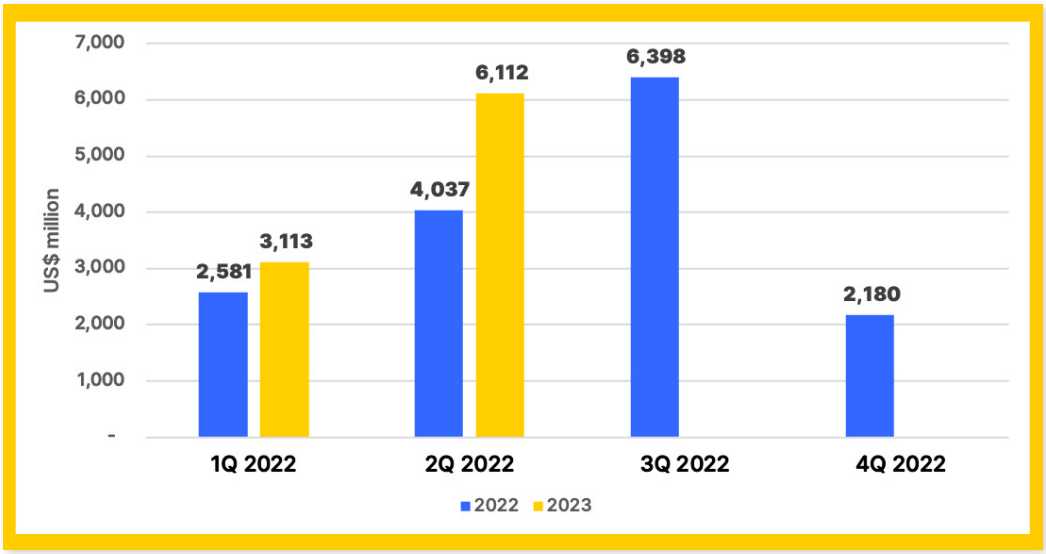

*Source: Central Electricity Authority, MNRE, IEEFA*

# 3. Investments

Investments in the renewable energy sector grew by **51%** in 2Q 2023 to **US$6,112 million from US$4,037 million** in 2Q 2022. Investments until 1H 2023 grew **39%** to reach **US$9,225 million** in 2023 compared with the first half of 2022 (Figure 5).

1H 2023 investments in the renewable energy sector already account for **61%** of the full-year investment of **US$15,196 million** achieved in 2022. The government of India is expecting the full-year investments in 2023 to reach **US$25 billion,** driven by the country's ambitious plans to boost renewable energy capacity deployment (at least 25GW per year), transmission infrastructure buildout, and the government's push for building supply chain in green hydrogen/ammonia and solar PV modules.

**Figure 5: India renewable energy sector investments (US$ million)**




*Source: News reports, JMK Research*

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

| | |
|---|---|
| **Oil and Natural Gas Corporation (ONGC)** | Announced that it would **invest ~US$12 billion (Rs1 trillion) by 2030** to achieve its net zero target by 2038. The company plans to invest in renewable power generation capacity (solar and offshore wind), a green ammonia plant of 1F million tonnes in Mangalore, and other green initiatives. |
| **Avaada Group** | An integrated clean energy company with interests in green hydrogen and derivatives, solar PV supply chain, and renewable power generation, closed a **finance deal of US$1.3 billion (Rs107.6 billion)** from Brookfield Renewables and Global Power Synergy Public Co. Ltd. The company announced this funding round to be the largest equity round ever raised by a green energy company in Asia. |
| **ACME Group** | Secured **US$488.9 million (Rs40 billion)** from public sector lender Rural Electrification Corporation (REC) for building the first phase of 100,000-tonne green ammonia plant in Oman. This plant will be further expanded to produce 1.2 million tonnes of ammonia per year, supported with 3.5GW of electrolyser capacity. The Group also announced that it signed an MoU with REC to raise an **additional US$2.55 billion (Rs210 billion)** to fund round-the-clock renewable power capacity of 380MW, green ammonia projects in Odisha and Tamil Nadu, and 600MWh of pumped hydro storage project. |
| **ReNew Energy** | Raised **US$400 million (Rs 33.1 billion)** via an issue of green bonds through its subsidiary to refinance existing debt and finance new growth initiatives. The newly issued bonds carry a US$ coupon rate of 7.95% and have received a Ba3 rating and BB- rating from Moody's and Fitch, respectively. |
| **CleanMax Solar and Serentica Renewables** | Have each raised **US$360 million (Rs 30 billion) and US$250 million (Rs 20.7 billion)** from Brookfield Renewables and KKR respectively, for setting up 5GW and 2.5GW of renewable energy capacity. |
| **Amp Energy** | Closed funding of **US$250 million (Rs 20.7 billion)** from Sumitomo Mitsui Banking Corp. (SMBC), Intermediate Capital Group, and Asian Infrastructure Investment Bank (AIIB) to fund its growth initiatives. |
| **The World Bank** | Approved a loan of **US$200 million (Rs16.5 billion)** to the Government of Himachal Pradesh to enhance the utilisation of existing renewable energy resources, including hydropower, and diversify into other renewable energy resources. |
| **Narmada Hydroelectric Development Corp (NHDC)** | Said that it would invest **US$509 million (Rs42 billion)** to construct a 525MW pumped hydro storage project near Indira Sagar Dam, Khandwa, Madhya Pradesh. |

## 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 ene gy economy. www.ieefa.org

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