CEEW
THE COUNCIL
Centre for Energy Finance

# CEEW-CEF Market Handbook Q1 2022-23

03 August 2022

Image: iStock

# CEEW-CEF Market Handbook

**India is undergoing an energy transition from fossil-based to clean energy. Evidence-based decision-making can accelerate the process.**

**CEEW Centre For Energy Finance's Market Handbook** aims to help key investors, executives and policymakers with evidence-based decision-making by:

- Identifying and analysing trends critical to India's energy transition
- Presenting data-backed evidence based on the most relevant indicators
- Connecting the dots and presenting a short-term market outlook

**The handbook attempts to comment and answer on some critical questions such as:**

1. What is India's generation capacity and energy mix?
2. What are the key trends in renewable energy (RE) tariffs?
3. What is the current situation of the discom payment delay situation?
4. How have the power market reforms progressed?
5. What are key trends in the electric vehicles (EV) and energy storage markets?

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# Contents



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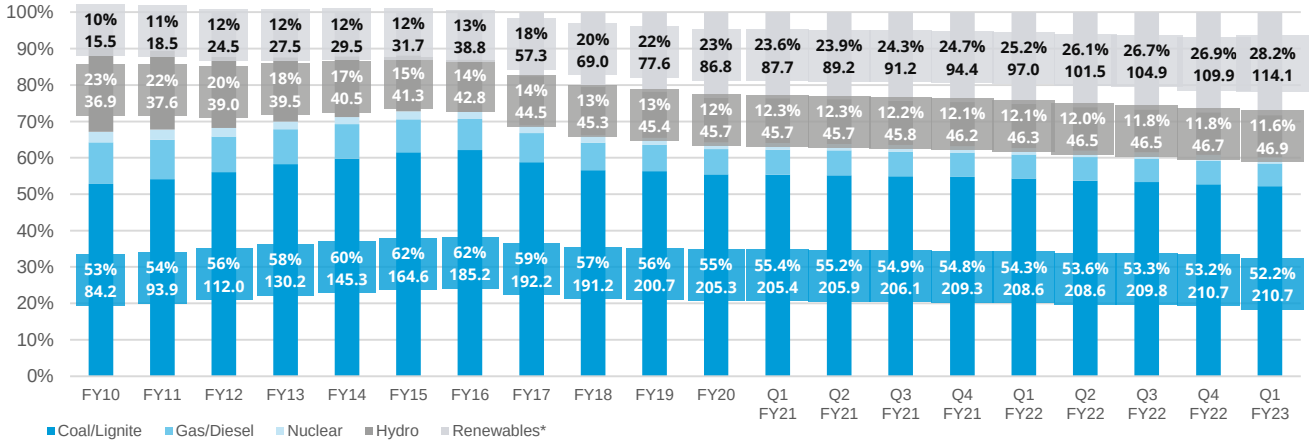
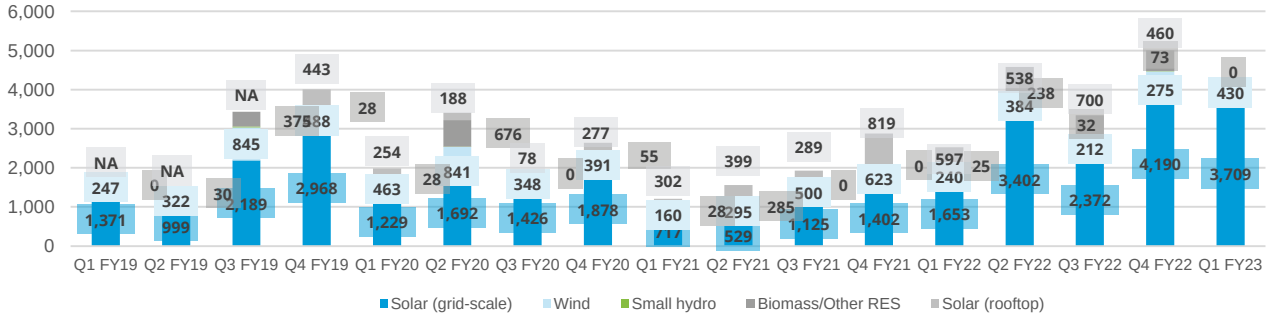
# Generation capacity: total installed generation capacity crossed the 400 GW mark in Q1 FY23; the share of RE stood at 28.2%; no new coal capacity was added in this quarter

## Installed capacity mix (GW)




*Source: Central Electricity Authority (CEA). * Includes solar (rooftop) capacity (6,645.7 MW as of March 2022).*

## RE capacity addition (MW)




*Source: Ministry of New and Renewable Energy. Note: Q1 FY23 onwards solar (rooftop) capacity is not available separately.*

## Takeaways & Outlook

**In Q1 FY23, a net generation capacity of 4.3 GW was added** (versus 2.0 GW in Q1 FY22, including 670 MW of retired coal capacity). **It was primarily dominated by renewable energy (RE) (4.2 GW or 98.0%),** followed by hydro (128 MW or 3%). **No new coal capacity was added in this quarter, and 43.3 MW of gas-based thermal power plants were removed.**

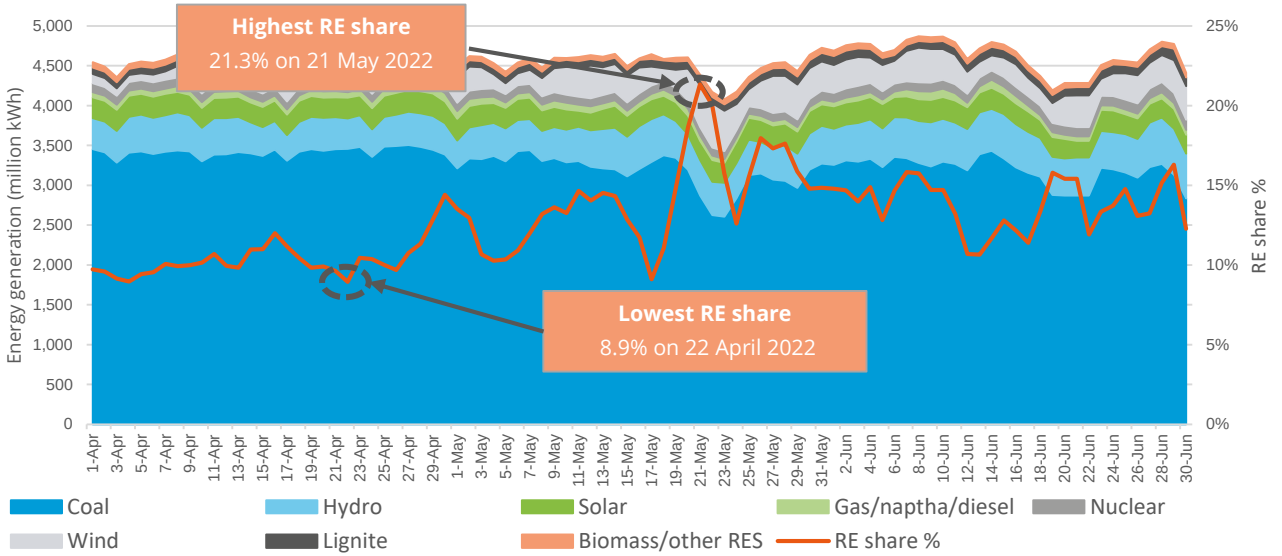
**In RE, solar (grid-scale and rooftop) continued to dominate capacity addition, accounting for 3.71 GW (88.8%) (vs 2.25 GW in Q1 FY22) of total RE addition.** Wind capacity addition remained tepid at 430 MW in Q1 FY23 (versus 240 MW in Q1 FY22).

**Amidst increasing electricity demand, the total installed generation capacity crossed the 400 GW mark in April 2022 and stood at 403.8 GW at the end of Q1 FY23.**

In Q1 FY23, 3.15 GW of RE capacity was auctioned by central and state agencies. In these auctions, grid-scale solar PV (1.7 GW) remained the dominant technology, followed by solar-wind hybrid technologies (1.1 GW) and floating solar technology (300 MW).

# Energy mix: the share of coal/lignite and RE rose significantly; on the other hand, the share of hydro declined marginally

## Source-wise daily generation (Q1 FY23)




## RE share snapshot

| | Q1 FY21 | | Q1 FY22 | | Q1 FY23 | |
|---|---|---|---|---|---|---|
| | RE share % | Day | RE share % | Day | RE share % | Day |
| Highest | 16.0% | 28 May 2020 | 17.8% | 26 May 2021 | 21.3% | 21 May 2022 |
| Lowest | 8.8% | 30 June 2020 | 7.7% | 13 April 2021 | 8.9% | 22 April 2022 |
| Average (Daily) | 11.8% | NA | 11.5% | NA | 12.9% | NA |

*Source:* POSOCO. *Note:* RE technologies include solar, wind, biomass, waste-to-energy and small hydro and do not include rooftop solar and large hydro (>25 MW) generation.

## Takeaways & Outlook

**The total power generation increased by 16% in Q1 FY23 (411 billion kWh) compared to Q1 FY22** (354 billion kWh) and **13.5% in comparison to Q4 FY22** (362 billion kWh), owing to the higher number of heat wave days and the absence of active western disturbances in April and May 2022.

- **April: Up by 11.6%**
- **May: Up by 23.4%**
- **June: Up by 13.5%**
- **Total Q1 FY23: Up by 16.0%**

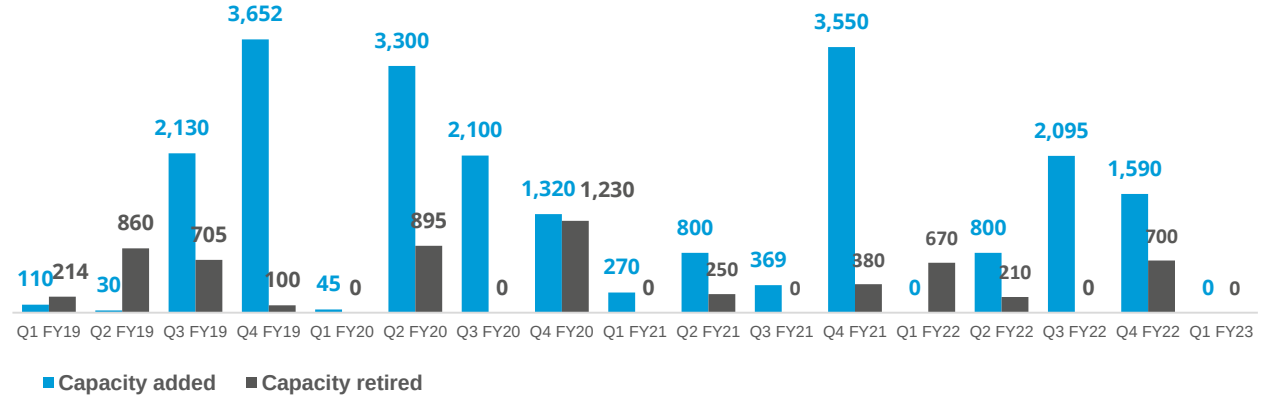
In Q1 FY23, **RE generation increased by 30.6% versus the same quarter in the previous fiscal year (Q1 FY22).** Coal/lignite-based generation was up by 19.7% and hydro by 5.9% for the same period.

From an average daily generation perspective, **the share of RE and coal/lignite increased, whereas hydro share declined in Q1 FY23 compared to Q1 FY22**.

- **RE:** Share up from 11.5% to 12.9%
- **Hydro:** Share down from 11.0% to 10.0%
- **RE + Hydro:** Almost constant from 22.4% to 22.9%
- **Coal/lignite:** Share up from 72.0% to 74.3%

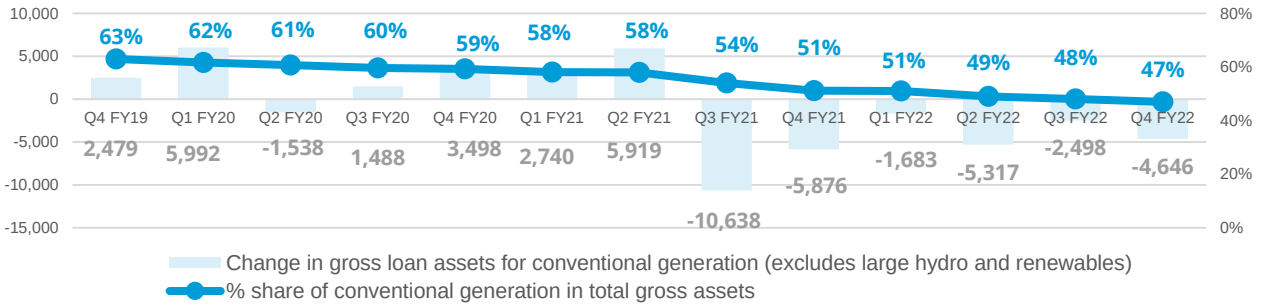
# Coal phase-out: no new coal capacity added or retired in Q1 FY23; share of conventional generation in the PFC/REC loan book continues to decline

## Coal capacity added versus retired (MW)




*Source:* CEA.

## Coal financing by Power Finance Corporation (PFC)/ Rural Electrification Corporation (REC) (INR crore)




*Source:* PFC investor presentations; figures are derived from the same. *Note:* Sector-wise break-up of PFC loan asset data unavailable for Q1 FY23.

## Takeaways & Outlook

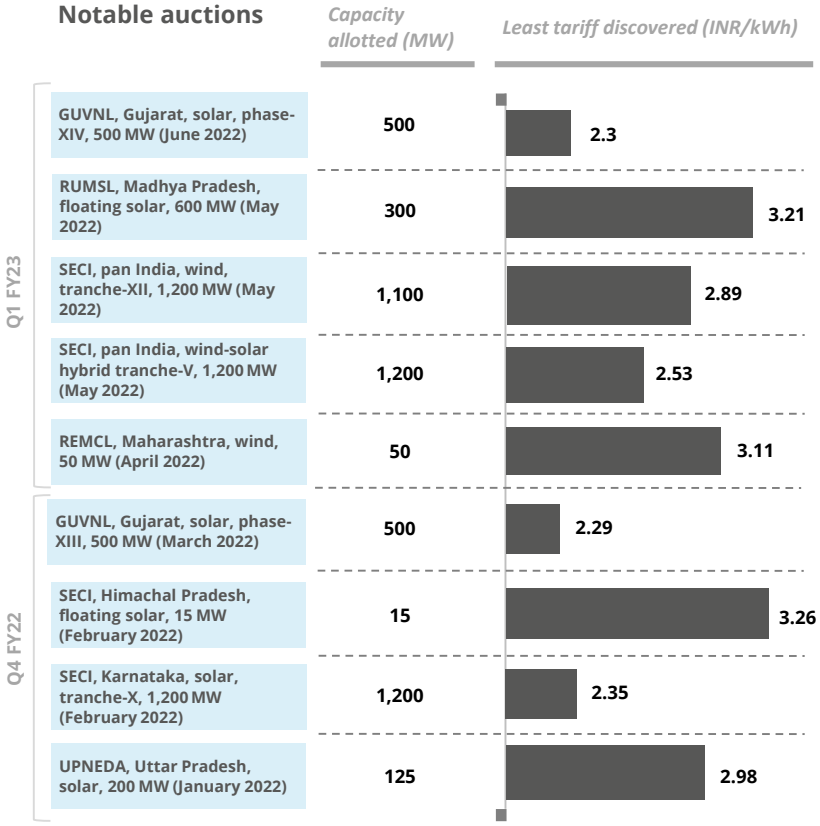
**In Q1 FY23, no new coal capacity was either added or retired. In addition, amidst increasing power demand, the Ministry of Power (MoP) directed generating companies under Section 11 of the Electricity Act, 2003 to operate and generate electricity to their full capacity.** Although, later in May 2022, the MoP issued a trajectory to replace thermal energy (58 billion kWh) with RE by 2025-2026 by bringing the technical minimum plant load factor (PLF) to 40% (from 55%) for 81 identified thermal power plants belonging to the central, state and private sectors.

PFC/REC, one of India's largest power sector financiers, continues to reduce its exposure to coal power generation. The share of conventional generation in PFC/REC's loan book is trending downward and has declined from 51% in Q4 FY21 to 47% in Q4 FY22 and 48% in Q3 FY22.

**To compensate, PFC/REC has shifted its focus to transmission and distribution (T&D) and RE generation projects (including large hydro). This accounts for around 42% (INR 1,58,507 crore) and 10% (INR 36,777 crore) of its total loan book as of Q4 FY22 versus 38% (INR 1,41,644 crore) and 10.1% (INR 37,475 crore) in Q4 FY21, respectively.**

# RE auctions: Pace of auctioning picks up after slow a slow quarter; RUMSL concluded the auction of one of the largest floating solar projects

## Notable auctions




## Bid spotlight: RUMSL, Madhya Pradesh, floating solar, 600 MW

### Tariff and winner

- **Tariff discovered:** 3.21 INR/kWh
- **Winners:** Amp Energy, NHDC and SJVN

### Key provisions

- **Identification of injection point:** RUMSL will provide the power evacuation infrastructure connected at the STU/PGCIL substations.
- **Project location:** The six units of 100 MW each will be developed at the Omkareshwar reservoir in Madhya Pradesh.
- **Power off-take:** MPPMCL will purchase power from the units on behalf of state discoms.

### Comments

- Floating solar technology addresses the issue of land availability and can be installed on water masses like lakes, reservoirs, water canals or embankments.
- Additionally, it facilitates water conservation and induces the cooling in solar panels resulting in increased power generation.
- In the previous quarter, SECI also concluded an auction of a 15 MW floating solar power plant.

## Takeaways & Outlook

**Auctioned RE capacity stood at 3.15 GW in Q1 FY23, including SECI's 1.2 GW wind-solar hybrid tranche-V, 1.2 GW wind tranche-XII (1.1 GW awarded), RUMSL's 600 MW (300 MW awarded) floating solar, GUVNL's 500 MW solar phase-XIV and REMCL's 50 MW wind auctions. In the total auction mix, 48% (1.5 GW) came from innovative technologies.**

After a slower quarter (Q4 FY22; 1.84 GW), the auctioned capacity increased in Q1 FY23 to 3.15 GW.

- **Q2 FY22: 10.12 GW**
- **Q3 FY22: 5.09 GW**
- **Q4 FY22: 1.84 GW**
- **Q1 FY23: 3.15 GW**

Solar module (global) prices continued to trend upward, but the cumulative impact of rising solar module prices in solar tariff discovery remained muted.

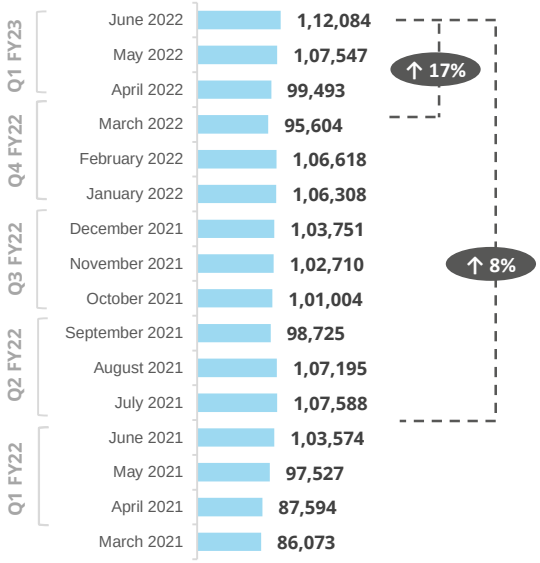
**On the other hand, the wind discovered tariff (SECI 1.2 GW wind, tranche-XII) has increased by 7.4% compared to the previous auction (SECI 1.2 GW wind, tranche-XI).**

*Source: SECI and state renewable agencies.*
*SECI = Solar Energy Corporation of India; GUVNL = Gujarat Urja Vikas Nigam Limited; UPNEDA = Uttar Pradesh New & Renewable Energy Development Agency; RUMSL = Rewa Ultra Mega Solar Limited; REMCL = REMCL = Railway Energy Management Company Limited; NHDC = Narmada Hydroelectric Development Corporation.*

# Discom payables: amount overdue by discoms increased by 8% in Q1 FY23 compared to Q1 FY22

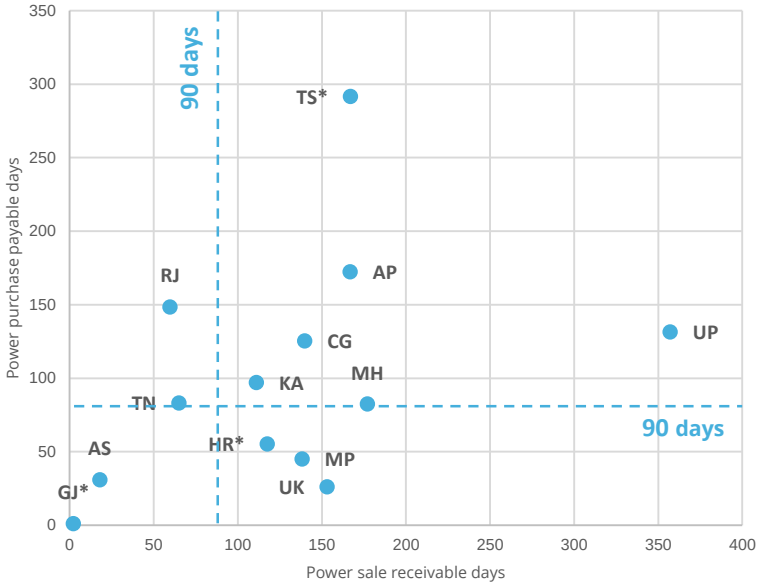


**Amount overdue by discoms to power producers (INR crore)**




*Source: PRAAPTI portal (Based on voluntary disclosures from power producers).*

**Discom payable and receivable days for RE-rich states**




*Source: UDAY portal (based on data disclosed by discoms as of 31 March 2022). *Data not available for these states; values derived from 2019–20/ 2020–21 financial reports.*

## Takeaways & Outlook

**The overdue amount payable by discoms to power producers increased by 17% in Q1 FY23 (INR 1,12,084 crore) compared to Q4 FY22 (INR 95,605 crore)** and increased by 8% compared to Q1 FY22 (INR 1,03,574 crore).

**According to the MoP's Ujwal DISCOM Assurance Yojana (UDAY) platform,** discoms in Karnataka, Gujarat, Haryana, Andhra Pradesh and Kerala topped the latest quarterly performance assessment*.

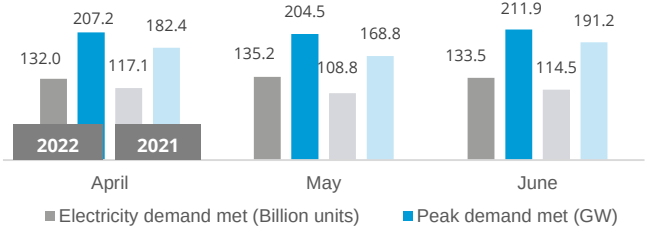
From a payment delay standpoint, discoms in **Gujarat, Assam, Madhya Pradesh and Uttarakhand cleared their power purchase dues within 45 days** (as of March 2022)**.** On the other hand, discoms in **Telangana, Andhra Pradesh, Uttar Pradesh, Rajasthan and Chhattisgarh took more than 120 days to clear their dues**.

*Reforms-based and results-linked, revamped distribution sector scheme* (RDSS), approved in June 2021, aims to **reduce AT&C losses at pan-India levels to 12-15% by 2024-25, reduce ACS-ARR gap to zero by 2024-25, and develop institutional capabilities for modern discoms.**

** As of March 2022.*

# Power markets: Q1 FY23 witnessed a steep rise in electricity demand similar to that seen in Q2 FY22; real-time market volumes hiked

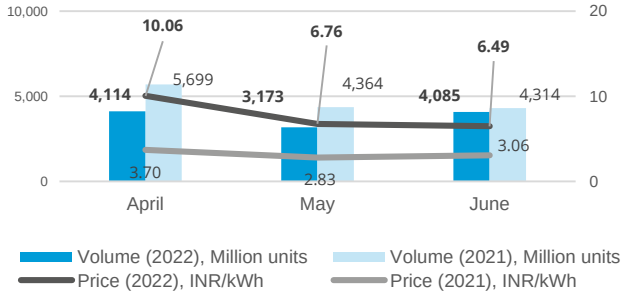
## Power supply position (Peak and electricity demand)




*Source: CEA.*

**Peak demand met in Q1 FY23** consistently surpassed Q1 FY22 and Q1 FY21 levels. Subdued rainfall and longer heatwave spells topped with rising humidity levels contributed to increased peak demand. In energy terms, the demand saw an uptick of 18% in Q1 FY23 (vs Q1 FY22).

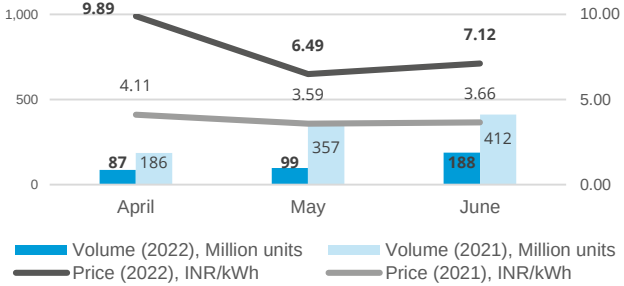
## Day-ahead spot market snapshot (IEX)




*Source: IEX.*

Power supply-side constraints are reflected across market segments leading to an increased market clearing price (MCP). The overall market volume demand **in the day-ahead market (DAM)** declined by 21% (vs Q1 FY22). In April 2022, MCP saw an uptick of 172% (vs April 2021).

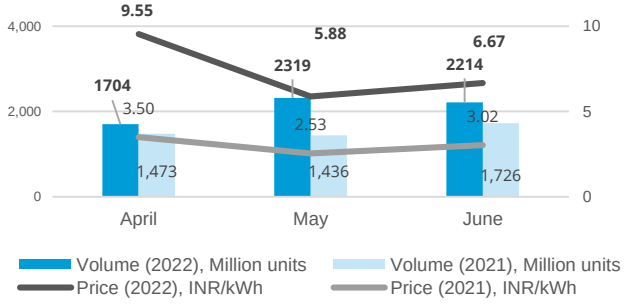
## Green term-ahead market* snapshot (IEX)




*Source: Indian Energy Exchange (IEX). *Day-ahead contingency.*

The **Green term–ahead market (GTAM)** also observed a decline in the available quantum for sale. The RE-rich states consumed the RE generation internally amidst increased demand. This resulted in a significant increase in the MCP.

## Real-time market snapshot (IEX)




*Source: IEX.*

With a reduced cap on MCP (at INR 12/ kWh), the **real-time market (RTM)** continued to witness an increase in traded volumes. Since its inception, discoms have been tapping the RTM for power demand-supply balancing in real-time.

## Takeaways & Outlook

Peak power demand continued to soar in Q1 FY23. **Peak power demand (met) reached a new high of 211.9 GW in June 2022** and consistently crossed the 200 GW mark in each month of this quarter. In energy terms, the average monthly electricity demand (met) saw an uptick of 18% in Q1 FY23 (vs Q1 FY22).

In April, against the backdrop of a surge in the average MCP on IEX in Q4 FY22 (to the highest level since April 2009), **CERC directed power exchanges to cap the price range at INR 12/kWh.**

**In June 2022, CERC approved the introduction of term ahead contracts and green term ahead contracts beyond T+11** (longer duration contracts (LDC)) on IEX. Power Exchange India Limited (PXIL) also received the approval to introduce month(s) ahead contracts.

After its resumption on 24 November 2021, renewable energy certificates (REC) trading grew significantly. **In total, 131,587 solar and 267,448 non-solar RECs were traded at an average price of 1.967 INR/kWh and 1.0 INR/kWh in Q1 FY23 on IEX, respectively.**

# Policy and regulatory developments: MoP notified the green open access rules, 2022; NITI Aayog released the draft battery swapping policy

## Karnataka notified RE policy 2022 – 27

- In April 2022, the Karnataka government notified the *renewable energy policy 2022 – 27*. It aims to facilitate 10 GW of additional RE projects, including 1 GW of solar rooftop projects. It has a cumulative installed capacity of 15.6 GW.
- Along with wind and solar projects, through this policy, the Karnataka government will promote solar-wind hybrid projects, energy storage, and mini/small hydro projects.
- The RE policy also outlined the applicable timelines, fees and charges for RE projects, including open access projects.

## GERC permits net metering for rooftop solar systems of 1 kW to 1 MW

- In May 2022, GERC notified the Net Metering Rooftop Solar PV Grid-interactive Systems (Third Amendment) Regulations, 2022.
- Net metering shall be provided to projects up to 1 MW.
- No banking charges will be levied on residential consumers.

## CERC issued terms and conditions for REC for RE generation regulations, 2022

- In May 2022, CERC Terms and Conditions for Renewable Energy Certificates (REC) for Renewable Energy Generation) Regulations, 2022.
- NLDC is designated as the nodal agency and is directed to accept/reject the REC application within 15 days from receiving the application.
- CERC also introduced the certificated multiplier. Onshore wind and solar are set at 1 and biomass/biofuels received the highest at 2.5 for three years based on levelised tariff range.

## CERC approved introduction of term-ahead contracts beyond T+11 days

- In June 2022, CERC approved the introduction of the term-ahead contracts and green term-ahead contracts beyond T+11 on IEX.
- Further, in June 2022, PXIL also received approval to introduce month(s)-ahead contracts.

## MoP notified *the Green Open Access Rules*, 2022

- In June 2022, the MoP notified the *Electricity (promoting renewable energy through Green Energy Open Access) Rules, 2022*.
- Consumers with a sanctioned load of 100 kW and above are eligible to participate in green energy open access (OA).
- The rules mandated a 15 days timeline for approval/rejection of OA application.
- It also directed the states to allow at least one month of energy banking.
- Additional surcharge has been removed from OA charges if the consumer pays fixed charges.

## NITI Aayog released the draft battery swapping policy

- In April 2022, NITI Aayog released the *draft Battery Swapping Policy*.
- It aims to promote the adoption of battery swapping technology using the battery as a service business model *BaaS).

## Takeaways & Outlook

Karnataka has released its RE policy (2022-27) and set a target of 10 GW additional RE capacity. It also emphasised the installation of rooftop solar projects. **In addition, the latest green OA rule, 2022, has brought new avenues for consumers with a contracted capacity of 100 kW and above.**

**In Q1 FY23, the ALMM (solar) was updated to include 58 domestic module manufacturers.** Later in June 2022, the MoF imposed an anti-dumping duty (USD 762 – 908/ metric tonne) on Fluoro back sheets imported from China (used in solar module manufacturing). **The latest version of the RLMM (revised time-to-time) now includes 14 manufacturers with 32 wind turbine models.**

**In the electric vehicle (EV) segment, the draft battery swapping policy proposes to use the BaaS business model** to reduce the upfront cost and downtime of EVs and the space requirement for charging. It underlines the importance of re-use of end-of-first-life swappable batteries and recycling end-of-life batteries. **In addition, Tripura and Haryana notified their EV policies, and Rajasthan announced financial incentives.**

*Source: CEEW-CEF Compilation. GERC = Gujarat Electricity Regulatory Commission; NLDC = National Load Despatch Center; ALMM = Approved List of Models and Manufacturers; MNRE = Ministry of New and Renewable Energy; RLMM = Revised List of Models and Manufacturers of Wind Turbines.*

# Renewable energy finance: market concentration in RE auctions declined in Q1 FY23 compared to previous quarters

## Notable deals (Q1 FY23)

**June 2022**

**Equity investment**

**Target:** Continuum Green Energy (148.5 MW wind project)
**Acquirer:** GE Energy
**Amount:** INR 237.2 crore (~USD 30 million)

**June 2022**

**Acquisition**

**Target:** SolarArise (234 MW operational)
**Acquirer:** ThomasLloyd Energy
**Amount:** INR 304.4 crore (~USD 39 million)

**May 2022**

**Acquisition**

**Target:** Mytrah Energy India Pvt. Ltd (2.3 GW wind and solar)
**Acquirer:** JSW Energy
**Amount:** INR 15,813.1 crore (~USD 2 billion)

**May 2022**

**Asset acquisition**

**Target:** Rays Power (solar asset)
**Acquirer:** Two Global Investors (NA)
**Amount:** INR 713.9 crore (~USD 90 million)

**April 2022**

**Asset acquisition**

**Target:** SkyPower Group (solar asset 50 MW)
**Acquirer:** Torrent Power
**Amount:** INR 429.9 crore (~USD 54 million)

**April 2022**

**Acquisition**

**Target:** Sprng Energy (2.1 GW solar and wind)
**Acquirer:** Shell Plc (to be closed by end of 2022)
**Amount:** : INR 1,225.5 crore ~(USD 155 million)

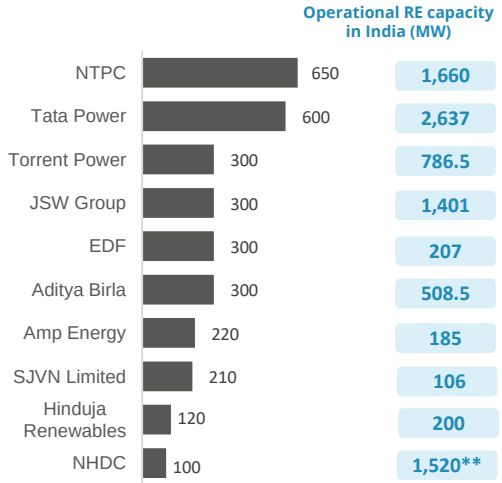
*Source: CEEW-CEF Compilation.*

**68%** Q1 FY23

**Market concentration in auctioned RE capacity**

*Note: Market concentration is calculated as the ratio of the top five RE capacities auctioned to the total RE capacity auctioned*

**Developer-wise* RE capacity auctioned during Q1 FY23 (3,150 MW)**




*Source: CEEW-CEF Compilation. *Note: Includes only top 10 developers in terms of auctioned capacity. ** Hydro capacity.*

## Takeaways & Outlook

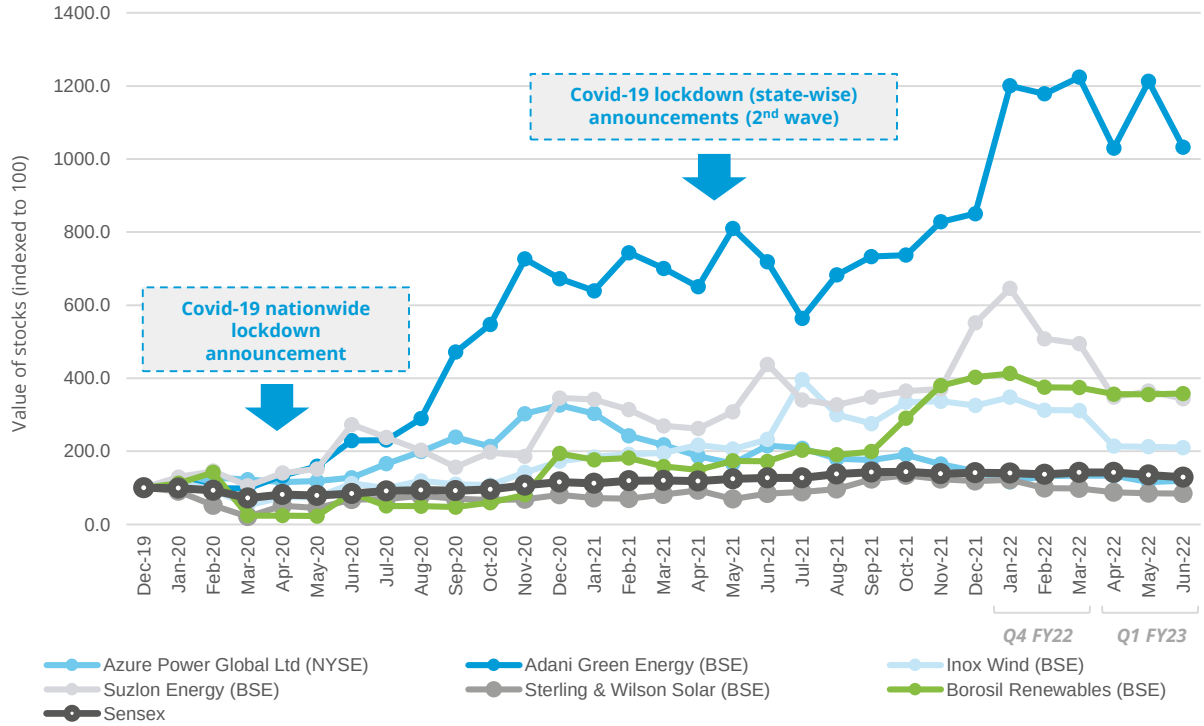
**In Q1 FY23, 3.15 GW of RE capacity was auctioned.** Public sector undertakings (PSU) such as NTPC, SJVN, and NHDC were among the developers that captured capacity this quarter. Private-sector developers such as Tata Power, Torrent Power, JSW Group, Amp Energy, Hinduja Renewables, and Aditya Birla Renewables were among the winning bidders. **A new entrant, EDF, through its subsidiary Halvad Renewables won wind capacities in SECI's 1.2 GW wind tranche-XII bid.**

**Market concentration saw a decline in Q1 FY23 to 68%** (versus 91% in Q4 FY22 and 76% in Q3 FY22)**, with a diverse set of public and private sector developers participating in the auctions** (a total of 11 in Q1 FY23).

In Q1 FY23, the deal activity **primarily consisted of solar and wind asset acquisitions.** Sprng Energy's acquisition will provide Shell Plc. a stronghold in the Indian RE sector and facilitate building an integrated energy transition business in India. In addition, JSW Energy signed a deal to acquire Mytrah Energy's 2.3 GW RE portfolio. Through this deal, JSW Group aims to increase its renewables footprint.

# Renewable energy finance: most RE stocks edged further downwards in Q1 FY23

## Change in key renewable energy stock prices (indexed to 100)




*Source:* Money Control.
*Note:* Share prices are the last traded value in each month.

## Takeaways & Outlook

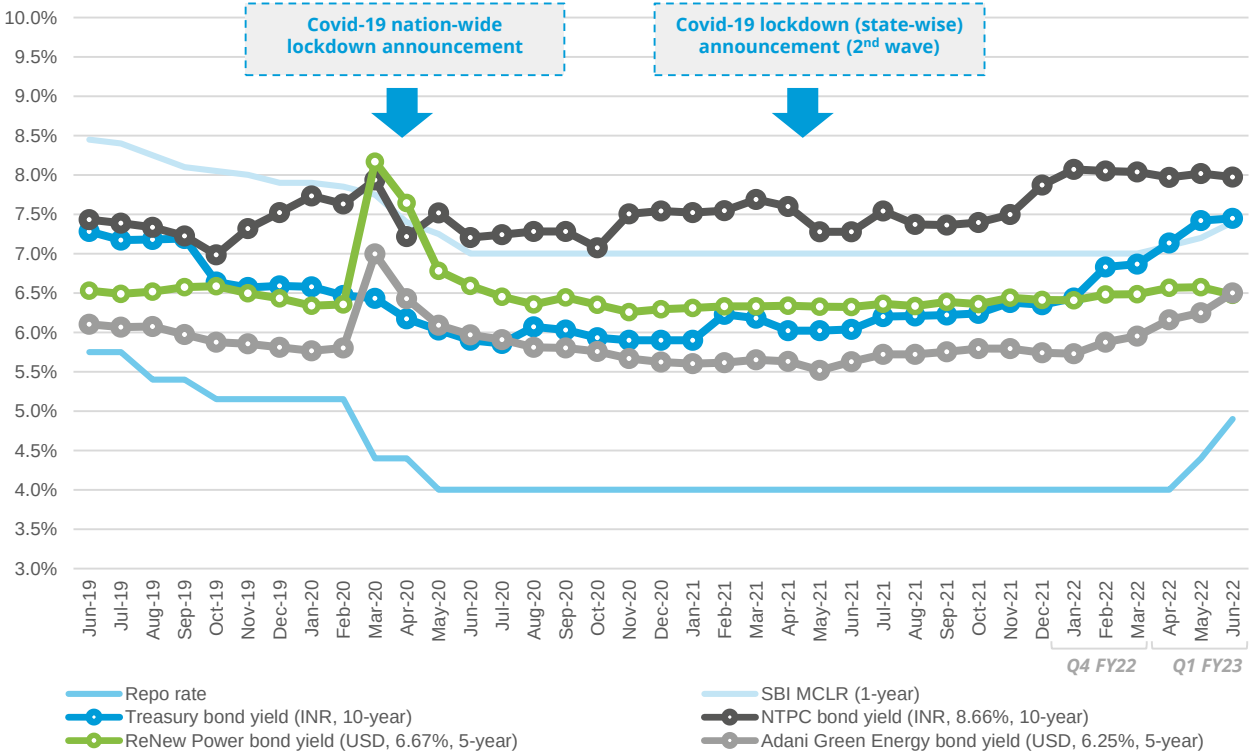
**In Q1 FY23, most of the listed RE stocks (including the NYSE listed solar project developer Azure Power) edged further downwards after enjoying an upward movement in most of the FY22.**

The share price of the pure-play RE developer, **Adani Green Energy, was down by 16% as of June 2022 (vs March 2022)**, although compared to June 2021, the share price was up by 44%. Similarly, the share price of Borosil Renewables, which holds a near monopoly position in India's solar panel glass manufacturing, **was down by 4% as of June 2022 (vs March 2022).** Although, it was up by 108% compared to June 2021.

The stock prices of wind developer–manufacturers **Inox Wind and Suzlon Energy were down by 10% and 21% in June 2022 (vs June 2021) and 33% and 30% (vs March 2022), respectively,** perhaps reflecting subdued capacity additions in the wind sector as a whole.

# Renewable energy finance: key bond yields saw a spike in Q1 FY23 as a result of successive repo rate hikes in the quarter

## Bond yields* and key financial rates




*Source:* *Reserve Bank of India, State Bank of India, Trading Economics, Money Control and BondEvalue.*
*Note:* *Bond prices are the last traded value in each month; * Current yield. ** SLBs are issued with specific sustainability performance targets that include predefined key performance indicators (KPIs) and allow a diverse set of issuers to obtain financing via this route.*

## Takeaways & Outlook

**In Q1 FY23, no new green and sustainability-linked bonds (SLB)** were issued.** However, the previous quarter was moderate, with issuances of green bonds by ReNew Power (USD 400 million at a 4.50% interest rate for five years) and Greenko (USD 750 million at 5.50% for three years). **In addition, Avaada Energy issued domestic green bonds worth INR 1,440 crore (USD 192 million).**

**In May 2022, the Reserve Bank of India (RBI) increased the policy repo rate from 4% to 4.4%, and again in June 2022, increased it by 0.5% to 4.9%.**

Key bond yields in India, including the 10-year Treasury bond yield, saw an uptick in Q1 FY23, against the backdrop of rising interest rates and coinciding with the rupee falling to its record low.

# Energy storage: standalone BESS tenders issued by SECI and NTPC; JSW energy signed MoUs for pumped hydro storage projects with state governments

## Integrated renewable energy storage project, Andhra Pradesh

**Integrated Renewable Energy Storage Project (IRESP) (May 2022), Andhra Pradesh, India.**

- In May 2022, construction of the Integrated renewable energy storage project began at Pinnapuram, Kurnool District in Andhra Pradesh.
- In February 2018, a memorandum of understanding (MoU) was signed between Greenko and the Government of Andhra Pradesh, where Greenko proposed to develop a hybrid solar-wind-pumped storage project.
- This is a first-of-its-kind single-location energy storage project comprised of wind (550 MW) and solar (3,000 MW) capacities with pumped hydro storage (10,800 MWh of daily storage).
- An investment of USD 3 billion is estimated for the implementation of this project and is scheduled to commission by the end of 2023.
- Greenko has signed contracts with industrial and utility off-takers to provide round-the-clock renewable power, for example, Ayana Renewable Power, Adani Group and ArcelorMittal.

*Source: Greenko Group; CEEW-CEF Compilation from news articles.*

## India's recent energy storage tenders

| Project location & tender issue date | Application & technology | Details |
|---|---|---|
| Gujarat (GUVNL), June 2022 | 500 MW RE/ 250 MWh ESS phase XV | RfS released in Q1 FY23 |
| Rajasthan (SECI), April 2022 | 500 MW/1000 MWh standalone BESS (ESS-I) | RfS released in Q1 FY23 |
| Rajasthan (NTPC), April 2022 | 250 MW/ 500 MWh BESS | RfS released in Q1 FY23 |
| Pan India (NTPC), January 2022 | 500 MW wind/solar with 3000 MWh BESS | Bid conclusion expected in Q2 FY23 |
| Pan India (REMCL), November 2021 | 150 MW RE, thermal, hydro and gas with ESS in RTC manner | Bid conclusion expected in Q2 FY23 |
| Uttar Pradesh (NTPC), June 2021 | 4 MW solar with 1 MW/1 MWh BESS | Results expected in Q2 FY23 |
| Maharashtra (REMCL*), June 2021 | 15 MW solar with 7 MW/14 MWh BESS | Results expected in Q2 FY23 |
| Tamil Nadu (TANGEDCO), February 2021 | 1 MW solar with 3 MWh BESS | Results expected in Q2 FY23 |
| Leh & Kargil (SECI), January 2020 | 14 MW solar with 42 MWh BESS | Postponed for indefinite period |

*Source: SECI and state renewable agencies. RfS = request for selection.*

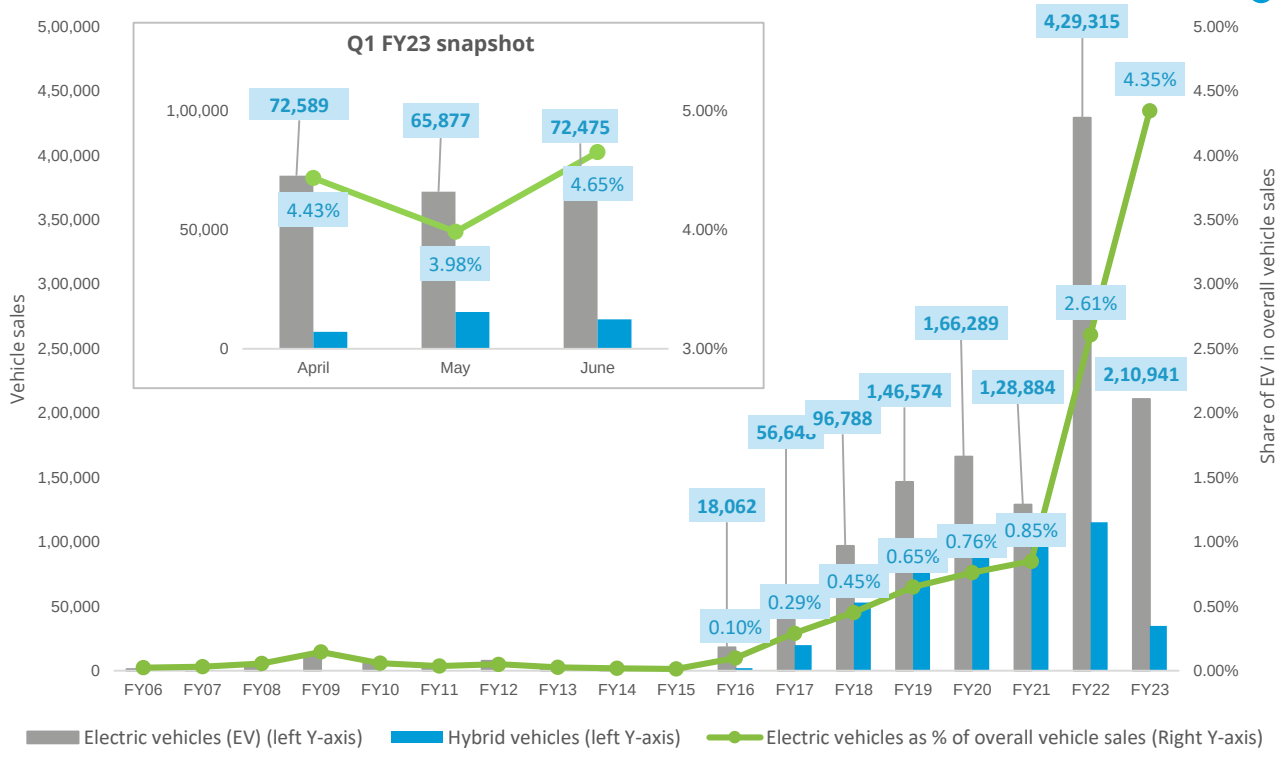
## Takeaways & Outlook

**Multiple energy storage tenders were announced in Q1 FY23.** This includes **GUVNL's 500 MW RE with 250 MWh energy storage, SECI's 500 MW/1000 MWh standalone battery energy storage system (BESS) and NTPC's 250 MW/500 MWh BESS.** In addition, NTPC issued an engineering, procurement and construction (EPC) tender for 10 MW/40 MWh BESS in Ramagundam, Telangana, and Dakshin Haryana Bijli Vitran Nigam (DHBVN) invited expression of interest (EoI) for setting up grid-scale BESS with a capacity of up to 10 MWh. Many BESS tenders from the previous quarters are yet to be concluded owing to multiple deadline extensions.

**In Q1 FY23, Greenko began the construction of an integrated renewable energy storage project located in Andhra Pradesh;** it has wind and solar capacities coupled with pumped hydro storage (PHS). **In April 2022, JSW Energy signed an MoU with the Government of Telangana to set up a 1,500 MW PHS project.** Cumulatively, JSW Energy has signed MoUs with state governments (in Maharashtra, Chhattisgarh, Telangana, and Rajasthan) for 5 GW PHS projects.

# Electric mobility: despite safety concerns EV sales increased by 18% in Q1 FY23 versus Q4 FY22; the 2W segment continues to dominate EV sales in Q1 FY23

## Electric vehicle sales in India




## Takeaways & Outlook

**EV sales continued to grow in Q1 FY23 with an increase of 18% vs Q4 FY22 and a gain of 636% compared to the same quarter of the previous fiscal year** (affected by the COVID-19 second wave). Due to various fire incidents, EV sales dipped slightly in May 2022. As a share of overall vehicle sales, EV sales stood at 4.35% in Q1 FY23 (vs 0.97% in Q1 FY22 and 4.02% in Q4 FY22).

**In April 2022, NITI Aayog issued a draft battery swapping policy** and invited stakeholders' comments. **In addition, in June 2022, the Bureau of Indian Standards (BIS) issued performance standards for EV batteries**. The standard IS 17855: 2022 has been drafted for the lithium-ion battery packs and systems of EVs and is harmonised with ISO 12405-4: 2018.

**OEMs with the highest EV sales* in Q1 FY23 were:**

- **2W:** OLA ELECTRIC (27,841), Okinawa (27,294) and Ampere (18,920)
- **3W:** Y.C. Electric (6,315), Saera Electric (3,973) and Mahindra Electric (REVA) (3,339)
- **4W:** Tata Motors (5,575), MG Motors (725) and Hyundai Motors (101)

*Source: Vahan Sewa dashboard (includes only registered vehicles, unregistered vehicles include low-speed vehicles (< 25 km/hr), e-rickshaws (three-wheelers) and electric two-wheelers), Electric Mobility Dashboard (2021), CEEW Centre for Energy Finance. * Based on sales data up to Q1 FY23.*

# Thank you

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# Annexure I: Green bond issuances

| Date | Company | Size (USD million) | Sector | Coupon rate (%) | Rating | Tenor (Years) | Purpose |
|---|---|---|---|---|---|---|---|
| **March 2022** | **Avaada Energy** | 192 | Solar | 6.75 | AAA (CRISIL, India Ratings) | 3 | Refinancing of existing debt |
| **March 2022** | **Greenko** | 750 | Energy storage | 5.50% | Ba1 (Moody's) | 3 | Refinance existing debt and fund the capital expenditures at asset level |
| **January 2022** | **ReNew Power** | 400 | Solar and wind | 4.50% | BB- (Fitch) | 5.25 | Refinance existing debt and fund capital expenditure |
| **September 2021** | **Adani Green Energy** | 750 | Solar and wind | 4.375% | Ba3 (Moody's) | 3 | Fund equity portion of capital expenditure for under-construction projects |
| **August 2021** | **Azure Power** | 414 | Solar | 3.575% | Not available | 5 | Refinance existing higher cost green bond debt |
| **July 2021** | **Acme Solar** | 334 | Solar | 4.70% | Not available | 5 | Refinancing of existing debt |
| **July 2021** | **Vector Green Energy** | 165 | Solar | 6.49% | AAA (CRISIL, India Ratings) | 3 | Refinance existing high-cost debt of solar projects |
| **May 2021** | **JSW Hydro** | 707 | Hydro | 4.50% | BB+ (EXP) (Fitch) | 10 | Repayment of existing green project-related rupee-denominated debt |
| **April 2021** | **ReNew Power** | 585 | Solar and wind | 4.50% | BB- (Fitch) | 7.25 | Refinancing of existing debt |
| **March 2021** | **Greenko** | 940 | Solar and wind | 3.85% | BB (Fitch) | 5 | Redemption of previous fund raise |
| **March 2021** | **Hero Future Energies** | 363 | Solar and wind | 4.25% | BB- (Fitch) | 6 | Refinancing of existing debt |
| **February 2021** | **ReNew Power** | 460 | Solar and wind | 4.00% | BB- (Fitch) | 6 | Refinancing of existing debt |

*Source: Climate Bonds Initiative and company press releases.*

# Annexure I: Green bond issuances

| Date | Company | Size (USD million) | Sector | Coupon rate (%) | Rating | Tenor (Years) | Purpose |
|---|---|---|---|---|---|---|---|
| **February 2021** | **Continuum Green Energy** | 561 | Solar and wind | 4.50% | BB+ (Fitch) | 6 | Refinancing of existing debt |
| **October 2020** | **CLP Wind Farms** | 40 | Wind | Not available | AA (India Ratings) | 2 to 3 | Refinancing of existing debt |
| **October 2020** | **ReNew Power** | 325 | Solar and wind | 5.375% | BB- (Fitch) | 3.5 | Refinancing high-cost local debt |
| **January 2020** | **ReNew Power** | 450 | Solar and wind | 5.875% | BB-/Stable (Fitch) | 5 | Refinancing of maturing debt |
| **October 2019** | **Adani Green Energy** | 362.5 | Solar and wind | 4.625% | BBB- (Fitch) | 20 | Repaying foreign currency loans and rupee borrowings |
| **September 2019** | **ReNew Power** | 90 | Solar and wind | 6.67% | BB (Fitch) | 4.5 | Refinancing of existing debt |
| **September 2019** | **Greenko** | 85 | Solar and wind | 5.95% | BB- (Fitch) | 6.75 | Refinancing of existing debt |
| **September 2019** | **Azure power** | 350 | Solar | 5.65% | BB (Fitch) | 5 | Refinancing of existing debt |
| **September 2019** | **ReNew Power** | 300 | Solar and wind | 6.45% | Ba2 (Moody's) | 5 | Capacity expansion and repaying high cost debt |
| **August 2019** | **Greenko** | 85 | Solar and wind | 6.25% | Ba1 (Moody's) | 3.5 | Refinancing of solar and wind projects |
| **August 2019** | **Greenko** | 350 | Solar and wind | 6.25% | Ba1 (Moody's) | 3.5 | Refinancing of solar and wind projects |
| **July 2019** | **Greenko** | 450 | Solar and wind | 5.95% | BB (Fitch) | 7 | Refinancing of solar and wind projects |

*Source: Climate Bonds Initiative and company press releases.*

**30.71%**

FAME-II target met

*As of Q1 FY23*

***Note:*** *Target of selling 1,562,000 EVs (2W, 3W, 4W and buses) under FAME-II scheme by FY22*

**434**

Number of EV OEMs in India

*As of Q1 FY23*

**128**

Total FAME II approved models

*As of Q1 FY23*

## Recent electric vehicle launches

### MG ZE EV Facelift

**Price:** INR 21,99,800 onwards
**Range:** 461 km
**Battery capacity:** 50.3 kWh

### Okinawa OKHI-90

**Price:** INR 1,21,866 onwards
**Range:** 160 km
**Battery capacity:** 3.6 kWh

### iVOOMi S1

**Price:** INR 84,000 onwards
**Range:** 115 km
**Battery capacity:** 2 kWh

### AMO Jaunty Plus

**Price:** INR 1,10,000 onwards
**Range:** 120 km
**Battery capacity:** 60V/40Ah

## EV penetration

*In Q1 FY23*

**3.7%**

2W sold were EV

**54.9%**

3W sold were EV

**12,77,564**

EVs sold

*As of Q1 FY23*

**19***

18 States notified EV policies, *Rajasthan announced financial incentives

*As of Q1 FY23*

*For more updates visit [CEEW-CEF Electric Mobility Dashboard]*

*Source: Vahan Sewa dashboard, CEEW Centre for Energy Finance Electric Mobility dashboard, Department of Heavy Industries, CEA.*

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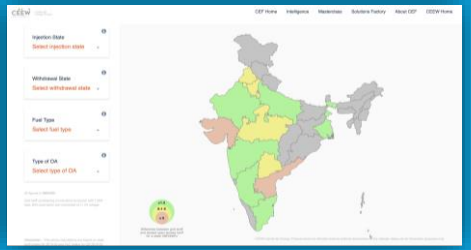

Open Access Tool


Electric Mobility Dashboard