

CEEW-CEF Market Handbook

2022-23 (Annual issue)

10 May 2023



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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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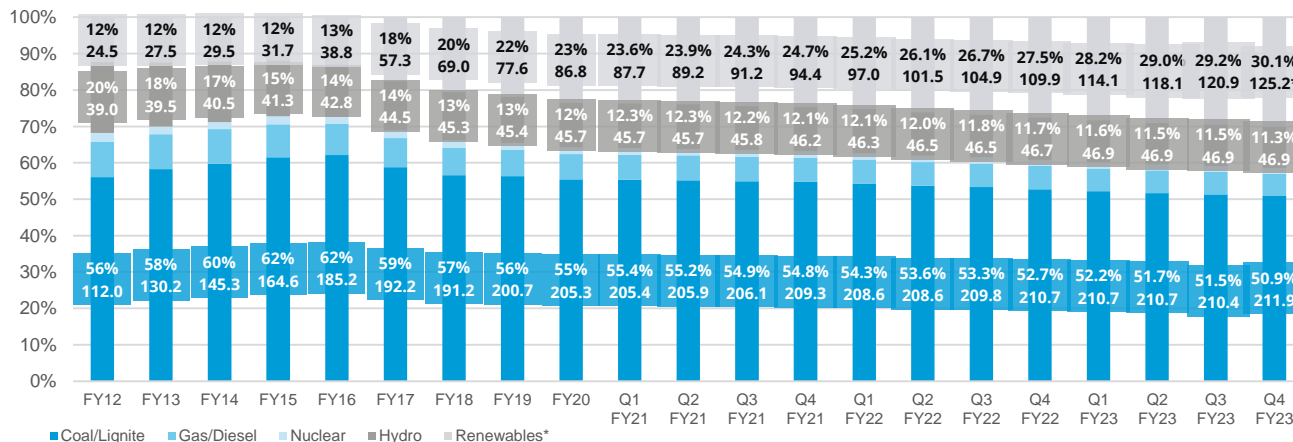
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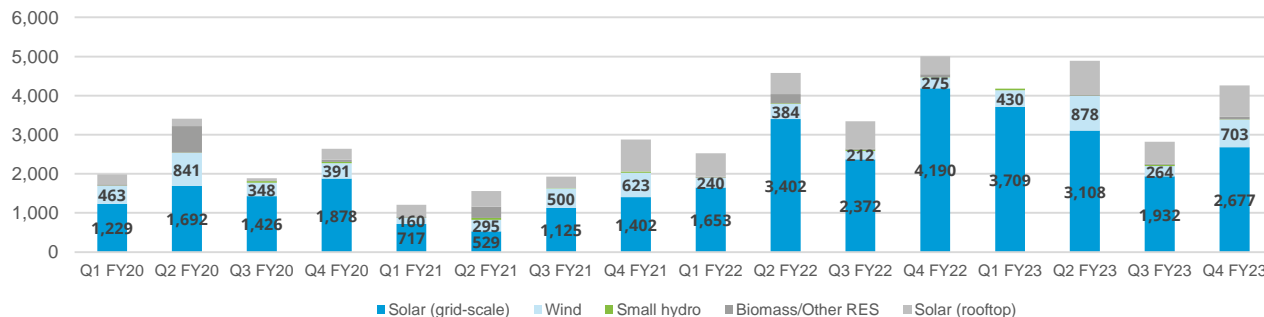
Generation capacity: share of RE + hydro in total installed capacity crossed 40% in FY23; wind capacity addition doubled in FY23 vs FY22

Installed capacity mix (GW)



Source: Central Electricity Authority (CEA). * Includes solar rooftop capacity (8877.93 MW as of March 2023).

RE capacity addition (MW)



Source: Ministry of New and Renewable Energy (MNRE).

Takeaways & Outlook

In FY23, a net power generation capacity of 16.6 GW was added (vs 17.3 GW in FY22). It was primarily dominated by renewable energy (RE) (15.3 GW, 92.2%), followed by coal/lignite (1.2 GW, 7.0%) and hydro (0.1 GW, 0.8%).

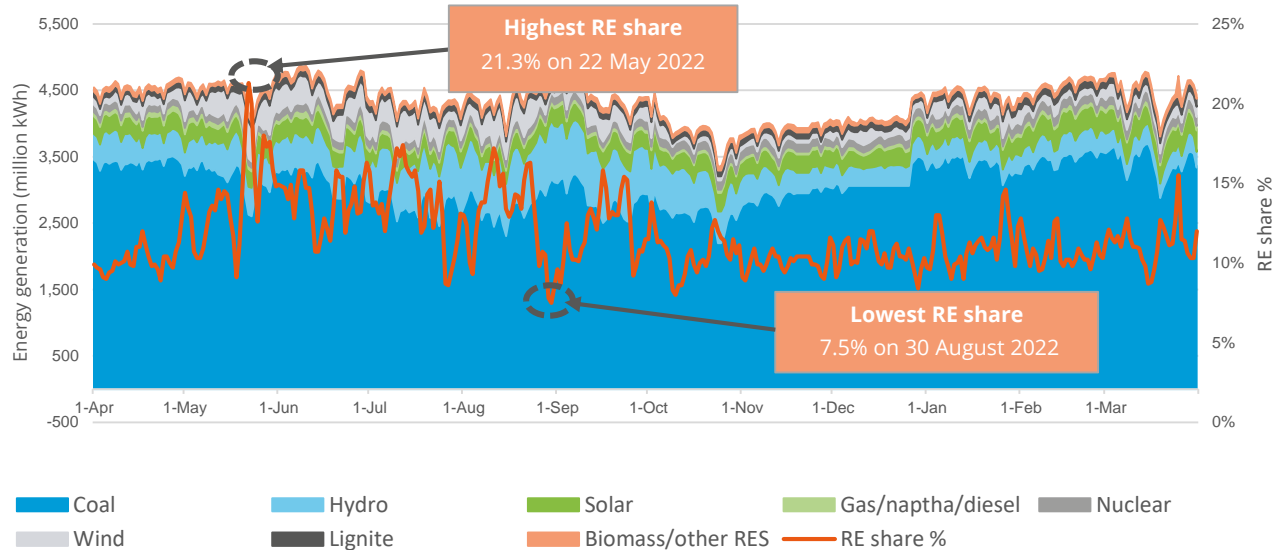
In RE, solar (grid-scale and rooftop) continued to dominate RE capacity addition, accounting for 12.8 GW (83.7%) (vs 13.9 GW in FY22). Wind capacity addition in FY23 doubled compared to FY22 and stood at 2.3 GW (14.9%) (vs 1.1 GW in FY22). The share of small hydro and bio-power stood at 0.6% and 0.8%, respectively.

In FY23, the total installed capacity reached 416 GW, of which 125.2 GW (30.1%) was RE, and 46.9 GW (11.3%) came from hydro. As per MNRE, another 82.6 GW of RE is under implementation as of February 2023.

In FY23, 9.91 GW of RE capacity was auctioned (vs 17.47 GW in FY22). It consisted of six plain vanilla solar, five plain vanilla wind, three floating solar and three wind-solar hybrid tenders. In addition, auctions for 1000 MW pumped hydro storage, 500 MW/1000 MWh battery energy storage and 500 MW/3000 MWh energy storage were concluded.

Energy mix: share of RE in the generation mix stood at 11.8% in FY23; share of RE + hydro and coal/lignite were up in FY23 compared to FY22

Source-wise daily generation (FY23)



RE share snapshot

	FY21		FY22		FY23	
	RE share %	Day	RE share %	Day	RE share %	Day
Highest	16.8%	12 August 2020	19.2%	08 August 2021	21.3%	22 May 2022
Lowest	6.1%	02 September 2020	7.0%	23 December 2021	7.5%	30 August 2022
Average (daily)	10.1%	NA	10.8%	NA	11.8%	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

Total electricity generation was up by 11.5% in FY23 compared to FY22. Contributing factors included a higher number of heat wave days and the absence of active western disturbances in Q1 FY23 and higher colder-than-usual days in December 2022 and January 2023.

- Q1: Up by 16.0%
- Q2: Up by 6.8%
- Q3: Up by 10.0%
- Q4: Up by 11.8%
- Total FY22: Up by 11.5%

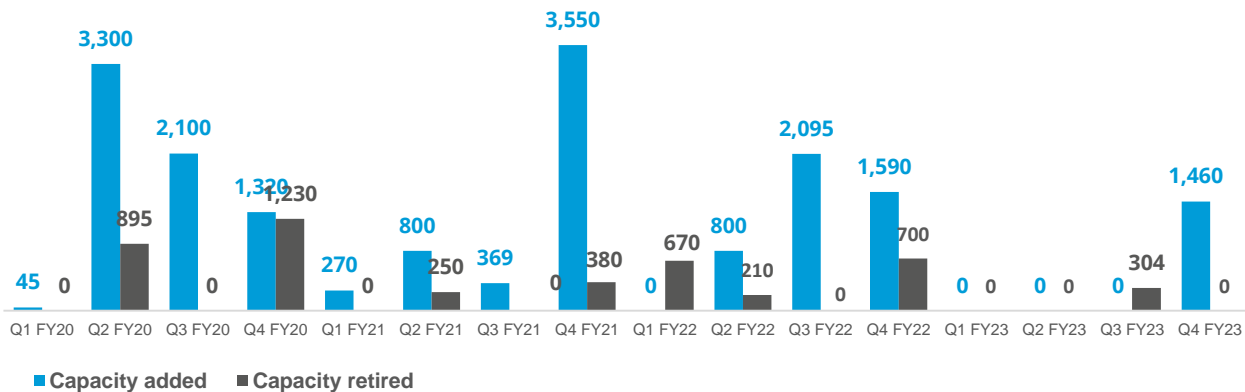
Overall RE generation in FY23 increased by 21.8%, the large hydro generation grew by 6.1%, whereas coal/lignite generation grew significantly by 12.0% (versus FY22).

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

- **RE:** Share up from 10.8% to 11.8%
- **Hydro:** Share down from 11.5% to 11.0%
- **RE + Hydro:** Share up from 22.3% to 22.8%
- **Coal/lignite:** Share up from 72.5% to 73.1%

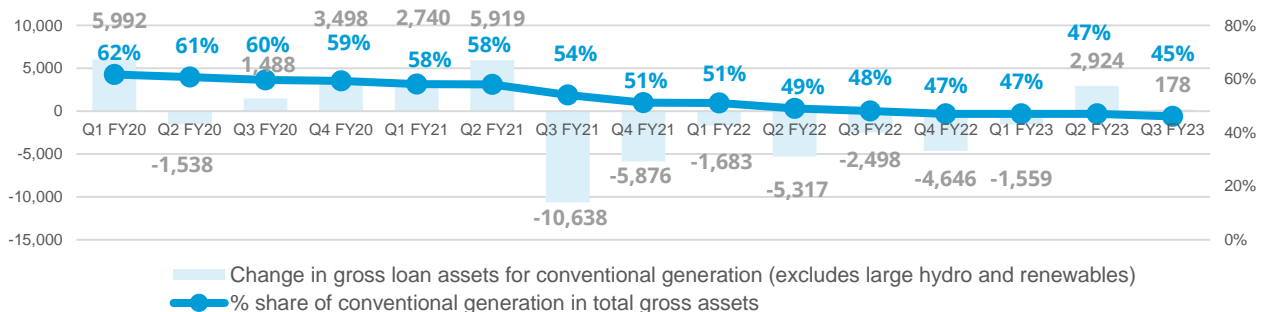
Coal phase-out: net coal capacity addition declined by 60.2% in FY23 compared to FY22; share of conventional generation in PFC/REC's loan book declined to 45%

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 PFC loan asset data break-up is unavailable for Q4 FY23.

Takeaways & Outlook

In FY23, 1,460 MW of new coal capacity was added, and 304 MW was retired. Net capacity addition (1,156 MW) declined by 60.2% (vs FY22). New coal capacities include NTPC's north Karanpura and APGENCO's Damodaran Sanjeevaiah thermal power stations.

PFC/REC, one of India's largest power sector financiers, continues to reduce its exposure to conventional power generation. The share of conventional generation in PFC/REC's loan book continued to trend downward and declined to 45% in Q3 FY23 from 47% in Q2 FY23 and 48% in Q3 FY22.

The share of transmission and distribution (T&D) and RE generation (including large hydro) projects continued to increase. They accounted for ~44% (INR 1,73,769 crore) and ~10.1% (INR 39,634 crore) of the total loan book as of Q3 FY23 vs ~41% (INR 1,51,023 crore) and ~10.3% (INR 38,215 crore) in Q3 FY22, respectively.

There was no noticeable change in PFC/REC's overall gross loan assets in Q1 and Q2; however, it increased by 5% in Q3 FY23 (vs Q4 FY22).

RE auctions: multiple standalone energy storage auctions concluded in FY23; 9.91 GW RE capacity auctioned in FY23; another 40.89 GW RE capacity is under tendering process

Notable auctions (FY23)

Capacity allotted (MW) | Least tariff discovered (INR/kWh)

Quarter	Auction Details	Capacity (MW)	Least Tariff (INR/kWh)
Q4	PCKL, Karnataka, pumped hydro storage (PSH), 1000 MW (March 2023)	1000	NA
	GUVNL, Gujarat, wind phase-IV, 300 MW (January 2023)	300	2.96
Q3*	GUVNL, pan India, solar phase-XVIII, 500 MW (January 2023)	500	2.51
	MSEDCL, Maharashtra, RE with storage, 250 MW non-solar hours (December 2022)	250 (RE non-solar hours)	9.0
	NTPC, pan India, ESS, 500 MW/3000 MWh (December 2022)	500 (ESS)	NA
Q2*	RUMSL, Madhya Pradesh, floating solar, phase II, 300 MW (November 2022)	300	3.69
	RUMSL, Madhya Pradesh, wind-solar hybrid, 750 MW (September 2022)	750	3.03
	GUVNL, Gujarat, wind, phase-III, 500 MW (July 2022)	500	2.84
Q1*	SECI, pan India, wind-solar hybrid tranche-V, 1,200 MW (May 2022)	1,200	2.53

Bid spotlight: PCKL, Karnataka, PHS, 1000 MW*8 hours

Winners

- Annual cost of storage: INR 147.5 lakh/MW/year
- Winners: JSW Energy and Greenko Group

Key provisions

- Project location: Karnataka; single or multiple locations
- Power purchase agreement (PPA) duration: 40 years
- Scheduled commissioning period: 36 months; part commissioning is allowed
- Energy procurement by discoms: 8 million units daily
- Under construction, yet to commission and existing projects without PPA can participate

Comments

- Award criteria include annual fixed cost (AFC) and cost of cycle loss (CCL). Input energy for pumping shall be provided by the discom up to the declared cycle loss.
- The storage will be used for time-shifting/ peak-off peak load management by Karnataka discoms.
- Response time: to reach maximum contract capacity (5 minutes), ramp-up and down (30% in 60 seconds), and cold start (30 minutes).

Takeaways & Outlook

Auctioned RE capacity stood at 9.91 GW in FY23, of which plain vanilla solar and wind stood at 3.25 GW (33%) and 2.55 GW (26%), respectively. **3.11 GW (31%) of auctioned capacity was in innovative power procurement formats**, and 1.00 GW was from pumped hydro storage. **In addition, 4,020 MWh of standalone energy storage tenders were concluded in FY23.**

Auctioned capacity in Q1 and Q2 was moderate; however, amidst deadline extensions for multiple tenders, the auctioned capacity in Q3 and Q4 reduced significantly. **As per MNRE, 40.89 GW of RE capacity is under tendering process.**

- Q4 FY23: 1.80 GW
- Q3 FY23: 1.96 GW
- Q2 FY23: 3.00 GW
- Q1 FY23: 3.15 GW

In March 2023, MNRE directed renewable energy implementing agencies (REIAs) to conduct bids for 50 GW RE annually until FY28. The 50 GW target will spread across four quarters, with a minimum issuance of 15 GW in the first two quarters and 10 GW in the third and fourth quarters.

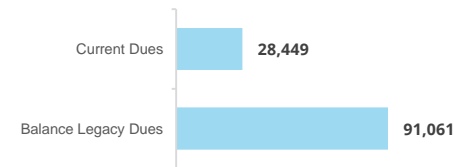
Source: SECI and state renewable agencies.

SECI = Solar Energy Corporation of India; GUVNL = Gujarat Urja Vikas Nigam Limited; RUMSL = Rewa Ultra Mega Solar Limited; MSEDCL = Maharashtra State Electricity Distribution Co. Ltd.; PCKL = Power Company of Karnataka Limited; ESS = energy storage system. *Note: For Q1, Q2 and Q3 FY23, only the least tariff auctions and unique auctions, such as RE with storage or hybrid projects, have been covered.

Discom payables: legacy dues of discoms to generating companies reduced from INR 1,38,378 crore to INR 91,061 crore

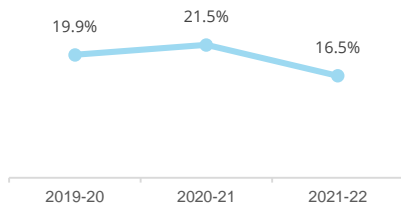
Amount overdue by discoms to power producers (INR crore)

As of March 2023



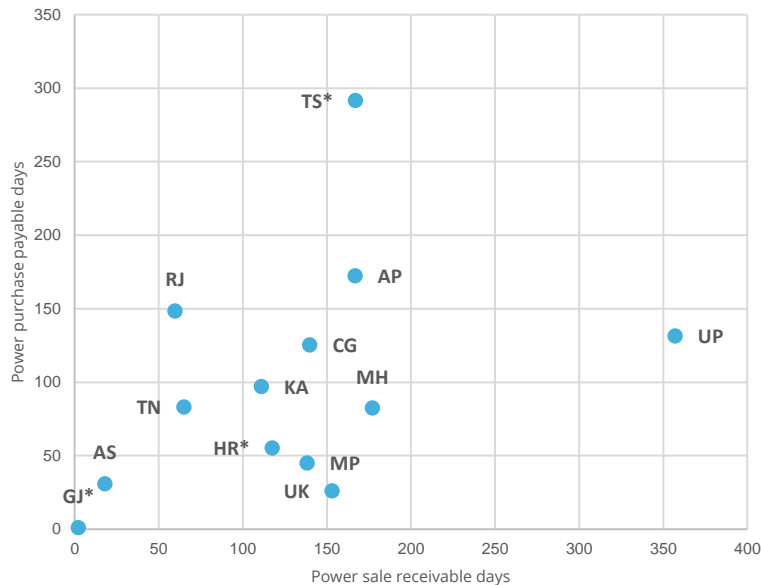
Source: PRAAPTI portal (based on voluntary disclosures from power producers; PIB Press Release).

Overall AT&C losses (%)



Source: Integrated rating and ranking of power distribution utilities.

Discom payable and receivable days for RE-rich states



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

Takeaways & Outlook

As of March 2023, legacy dues[#] of discoms to generating companies reduced from INR 1,38,378 crore to INR 91,061 crore and the current dues[#] stood at INR 28,449 crore.

According to the Ministry of Power's (MoP) Ujwal DISCOM Assurance Yojana (UDAY) platform, discoms in Karnataka, Haryana, Madhya Pradesh, Uttar Pradesh and Assam topped the latest quarterly performance assessment*.

Under the RDSS scheme, 204.6 million prepaid smart consumer meters, 5.4 million smart DT meters and 0.19 million smart feeder meters have been sanctioned across 28 states/UTs (46 discoms).

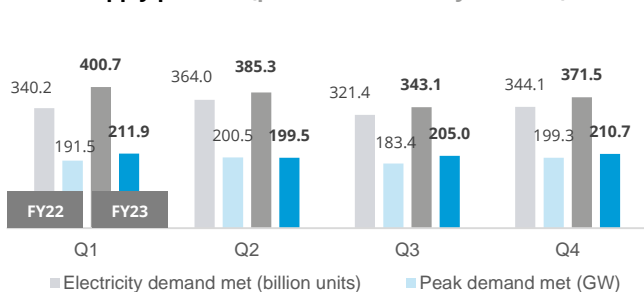
As per the performance of the power utilities report 2021-22, pan-India AT&C losses stood at 16.5% vs 21.5% in 2020-21.

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 December 2022.; [#]Legacy dues are already past their due date and remain partially or completely unpaid. Current dues are partially or completely unpaid but are still within their respective due dates. cef.ceew.in

Power markets: trading of ESCerts under PAT cycle II resumed on IEX; traded volumes across all segments were down except for real-time and GDAM market

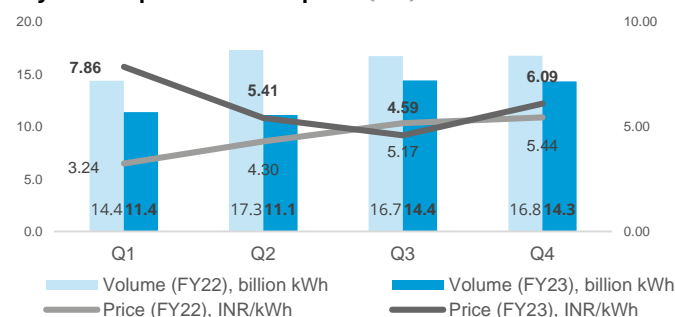
Power supply position (peak and electricity demand)



Source: CEA.

Quarterly peak power demand in FY23 consistently surpassed FY22 and FY21 levels; it was above the 200 GW mark in Q1 and Q4 due to a higher number of heatwaves days and colder-than-usual days. In terms of average electricity demand met in FY23, there was an uptick of 9.6% vs that of FY22.

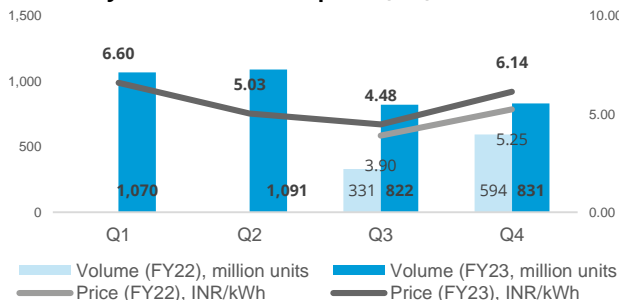
Day-ahead spot market snapshot (IEX)



Source: IEX.

Day-ahead market (DAM) achieved 51,151 million kWh volume in FY23, registering a fall of 21% (vs FY22) due to higher prices. The average market clearing price (MCP) stood at INR 5.90/ kWh in FY23, 35% higher than in FY22 due to a demand-supply mismatch.

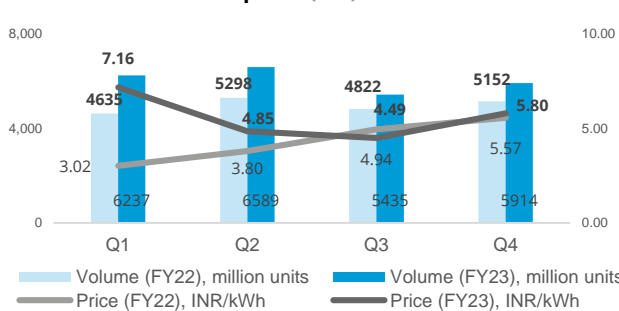
Green day ahead market snapshot (IEX)



Source: Indian Energy Exchange (IEX).

Green day-ahead market (GTAM) achieved 3,814 million kWh traded volume in FY23 vs 921 million kWh in FY22. It continued to grow since its inception in October 2021.

Real-time market snapshot (IEX)



Source: IEX.

In FY23, the real-time market (RTM) traded 24,174 million kWh, registering a 21% growth in FY23 (vs FY22). Since its inception, discoms have been tapping into the RTM to efficiently balance the power demand and supply in real time.

Takeaways & Outlook

Peak power demand continued to rise in FY23. It reached a **new high of 211.9 GW in Q1 FY23** and again crossed the **200 GW mark in Q4 FY23**. In energy terms, the average monthly electricity demand (met) saw an uptick of 9.6% in FY23 (versus FY22).

In Q4 FY23, **CERC approved the launch of high-price day-ahead market (HP-DAM) under the integrated day-ahead market segment of IEX. This will enable high variable cost generators to trade on the energy exchange.** In addition, **CERC** also extended the duration to cap the price range of MCP at INR 12/kWh until further notice.

In FY23, 5.97 million RECs were traded at a price of INR 1.0/kWh on IEX. Trading of energy saving certificates (ESCerts) under PAT cycle II resumed on the IEX platform on 14 February 2023. In February and March 2023, 0.18 million ESCerts were traded.

Policy and regulatory developments: CERC approved launch of HP-DAM on IEX; bidding trajectory for RE projects released; allotment under PLI for solar modules (tranche-II) concluded

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Union Cabinet approved the National Green Hydrogen Mission

- In January 2023, Union Cabinet approved [the National Green Hydrogen Mission](#).
- It aims to make India a global hub for producing, utilising and exporting green hydrogen and its derivatives.
- Key expected outcomes are green hydrogen production capacity of at least 5 MMT per annum, total investments of ~ INR 8 lakh crore, creation of ~6 lakh jobs, and cumulative reduction of ~ 1 lakh crore fossil fuel imports and abatement of ~50 MMT greenhouse gas emissions annually.

MNRE updated List - I under ALMM* order for solar PV modules

- In January 2023, MNRE notified [revision - IX](#) of ALMM list - 1 to include 89 manufacturers with a cumulative capacity of 21,681 MW.
- Later, in February 2023, it was [further updated](#) to include 91 manufacturers with a cumulative capacity of 22,389 MW.

CERC approved launch of high price day ahead market (HP-DAM)

- In February 2023, [CERC](#) approved the introduction of HP-DAM in the integrated day ahead market segment of IEX.
- It will provide a new avenue to the high variable cost generators who could not participate in DAM due to the existing price ceiling of INR 12/kWh.
- The gas and imported coal-based generators and BESS can sell the electricity with a price range of INR 0 - 50/kWh.

Review of competitive bidding mechanism for power procurement from wind projects

- In January 2023, [MNRE](#) notified the review and announced that 8GW bids will be issued each year starting 2023 till 2030.
- Bids will be in single-stage two envelop closed bid format.
- Every bid will comprise state-specific sub-bids in the eight wind-resource-rich states with a size cap of 2 GW in each state.

MNRE declared bidding trajectory for renewable energy projects

- In March 2023, [MNRE](#) announced a bidding trajectory to achieve 500 GW of RE capacity by 2030.
- The REIAs (SECI, NTPC, NHPC and SJVN) are directed to cumulatively conduct bids for 50 GW of RE annually till FY28, including 10 GW of wind.
- Bids can be vanilla solar and wind, solar-wind hybrid, or round-the-clock RE power, all with/without storage, depending on the procurers' requirements.

MNRE updated the RLMM of wind turbine

- In March 2023, [MNRE](#) notified the updated RLMM to include 14 manufacturers.
- The wind turbine capacities in this list vary between 225 kW - 3600 kW.
- The list is based on the new procedure.

Takeaways & Outlook

Various announcements in FY23 presented positive policy signals for the wind energy sector; [MoP](#) introduced a separate wind energy purchase obligation, [MNRE](#) released the draft repowering policy for wind projects, MNRE moved to scrap the competitive bidding mechanism for wind power procurement, and **most recently, MNRE directed the REIAs to conduct 10 GW of wind bids every year till FY28.**

In addition, [MoP](#) notified the Electricity (Amendment) Rules, 2022; through that, the implementing agency is directed to compute uniform renewable energy tariffs for each RE category in the central pool.

In Q4 FY23, the solar sector witnessed two key developments: **39,600 MW of domestic solar PV module manufacturing capacity was allotted to 11 companies, with a total outlay of INR 14,007 crore under the [PLI scheme for solar modules \(tranche-II\)](#).** In addition, [MNRE](#) exempted the ALMM solar modules requirement for solar projects until March 2024.

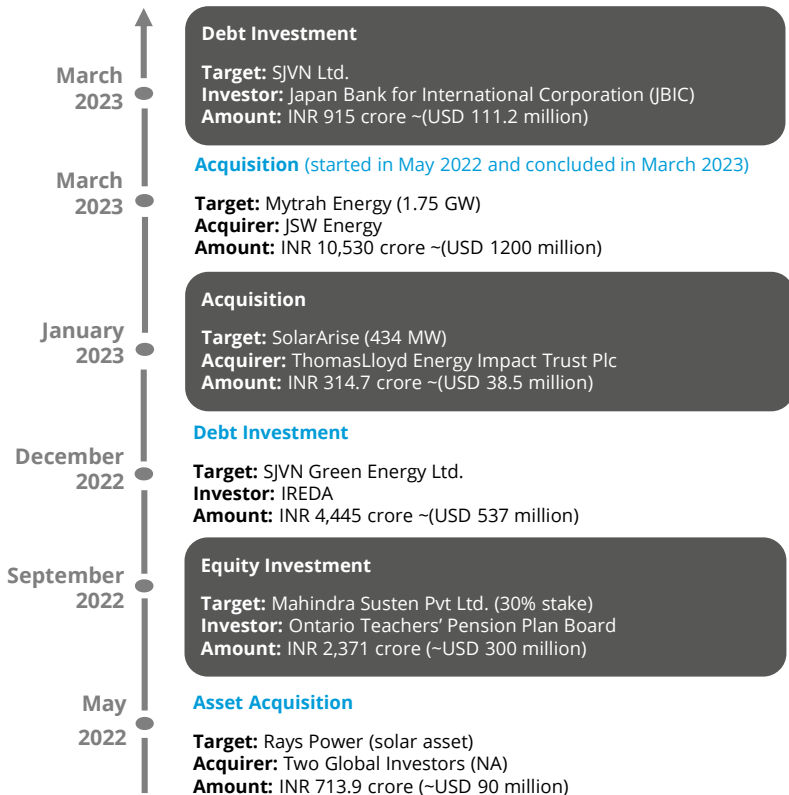
In addition, [MoP](#) waived ISTS charges on electricity generated from new hydropower projects.

Source: CEEW-CEF Compilation.

*ALMM = Approved List of Models and Manufacturers; CERC = Central Electricity Regulatory Commission; PLI = Production Linked Incentive; RLMM = Revised List of Models and Manufacturers of Wind Turbines; MMT = Million Metric Tonnes; ISTS = interstate transmission system.

Renewable energy finance: overall market concentration in RE auctions declined slightly in FY23 compared to FY22; SJVN received INR 915 crore debt investment

Notable deals (FY23)

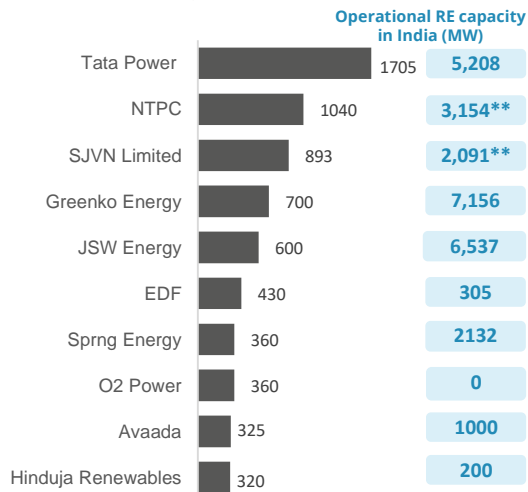


81% Q4 FY23 **50%** FY23

Market concentration in auctioned RE capacity

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

Developer-wise* RE capacity auctioned during FY23 (9,908 MW#)



Takeaways & Outlook

In FY22, 9.91 GW of RE capacity was auctioned. Public sector undertakings (PSU) such as NTPC and SJVN were among the top developers to capture the RE auctions market in FY23. Tata Power, Greenko Energy and JSW Energy were among the top private developers.

The market concentration saw a slight decline in FY23 to 50% (vs 51% in FY22), with a diverse set of public and private sector developers participating in the auctions (a total of 27 in FY23).

In FY23, the deal activity primarily consisted of debt and equity investments and asset acquisition in the solar and wind sector.

JSW Energy concluded the acquisition of 1.75 GW of wind and solar portfolio of Mytrah Energy, and **ThomasLloyd Energy Impact Trust Plc completed the acquisition of SolarArise**. SJVN received INR 915 crore from JBIC to finance its 90 MW floating solar (Madhya Pradesh) and 100 MW solar project (Gujarat).

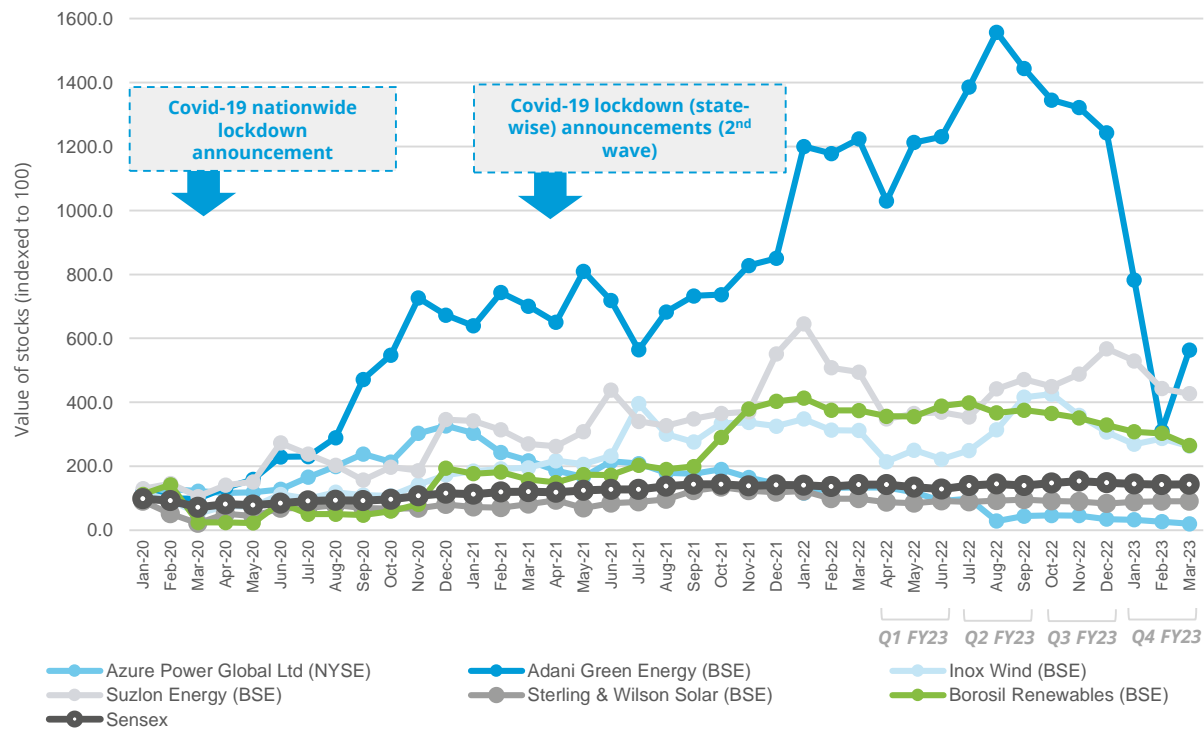
In addition, **Virescent Renewable Energy Trust** is in discussion with **Jakson Group** to acquire 100 MW of solar assets.

Source: CEEW-CEF Compilation.

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

Renewable energy finance: RE stocks trended downwards throughout FY23 except for a few peaks in Q2 and Q3

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



Takeaways & Outlook

In FY23, most of the listed RE stocks trended downwards, barring a few peaks in Q2 and Q3 FY23. The market (Sensex) remained mostly stagnant throughout the year.

The share price of RE developer **Adani Green Energy** saw a sharp plunge in Q4 FY22, down by 53.9% in March 2023 (vs March 2022). In the case of **Sterling and Wilson Solar**, the share price was down by 8.32% in March 2023 (vs March 2022). **The share price of Borosil Renewables**, which holds a near monopoly position in India's solar panel glass manufacturing, was down by 29.2% in March 2023 (vs March 2022).

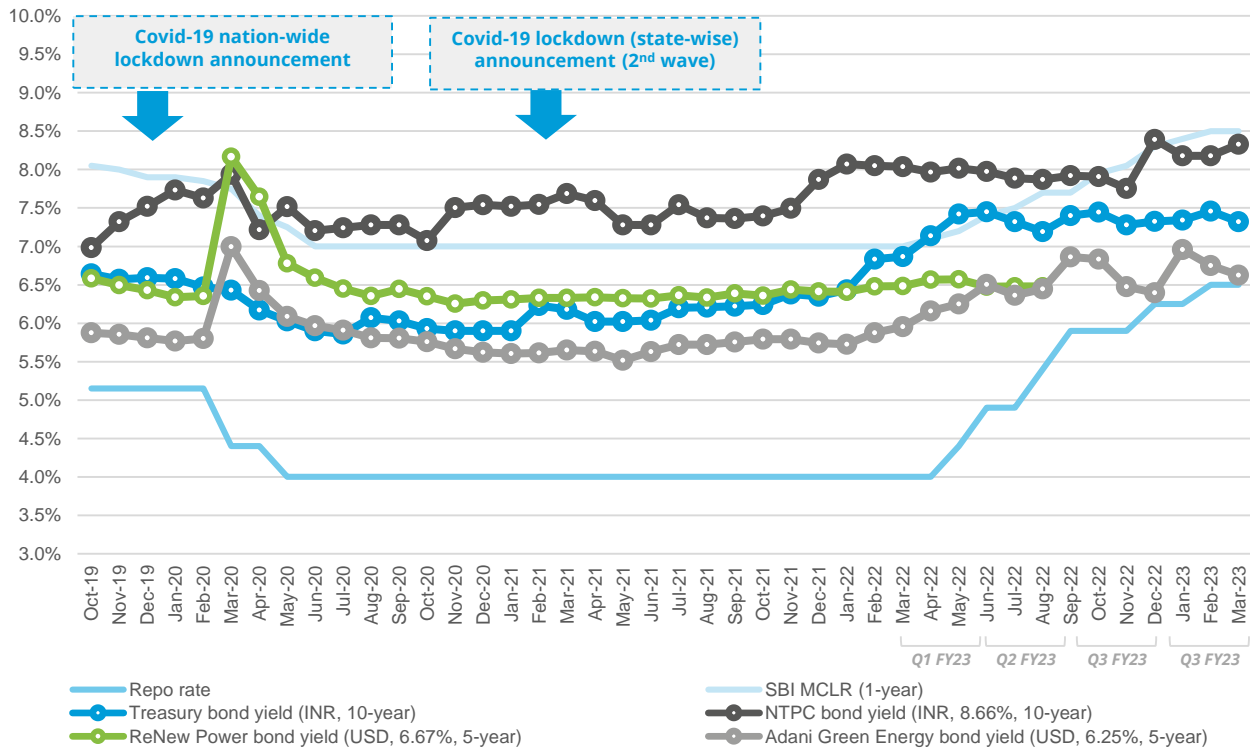
The share price of wind developer-manufacturers **Inox Wind** was down by 15.7%, whereas **Suzlon Energy** was down by 13.6% in March 2023 (vs March 2022).

Source: Money Control.

Note: Share prices are the last traded value in each month.

Renewable energy finance: first-ever sovereign green bonds auctioned in FY23; repo rate was hiked six times in FY23

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.

Takeaways & Outlook

Reserve Bank of India (RBI) conducted the first sovereign green bond (SGrB) auction worth INR 16,000 crore in two tranches; on **25 January and 9 February 2023**. It had two SGrB offerings (a) 5-year (SGrB 2028) and (b) 10-year (SGrB 2033). **Both tranches were oversubscribed**; the 5-year offering received 96 and 62 bids, and the 10-year offering received 170 and 91 bids in tranche I and II, respectively. **The proceeds will be used to finance and/or refinance expenses of eligible green projects as per the sovereign green bonds framework.**

In FY23, the repo rate was hiked six times for 4.0% (April 2022) to 6.50% (March 2023). **FY23 witnessed a gradual increase in the SBI MCLR (1-year) rate**, from 7.1% (April 2022) to 8.5% (March 2023).

Key bond yields, including the 10-year treasury and NTPC's 10-year bond yields, fluctuated throughout the year. In FY23, ReNew Power refinanced the dollar-denominated green bonds issued in 2019 (6.67%, 5-year) to cut the bonds' INR interest cost by 200 basis points and push the maturity to December 2027. It became the first Indian RE developer to refinance a dollar-denominated bond from an Indian non-banking financial corporation.

Highlights of draft guidelines on pump storage projects

Draft guidelines to promote the development of pump storage projects (PSP) in India, Feb 2023

Guidelines issued for the promotion of pumped storage are:

- **Allotment of project sites:** the state governments may allot project sites to (a) CPSUs and state PSUs on a nomination basis, (b) private developers through a two-stage competitive bidding process or (c) via tariff-based competitive bidding (TBCB).
- **No upfront charges** to be paid by the developer.
- **Appropriate commission is guided to undertake favourable market reforms** to support PSP projects.
- **Financial Viability:** Central Government may notify a benchmark cost of storage to ensure only financially viable PSPs projects are taken up.
- **PSPs (net consumers) will be exempted from free power obligation.**
- **No requirement to create a local area development fund** as PSPs have a minimal environmental impact.

Source: Ministry of Power

India's recent energy storage tenders

Project location & tender issue date	Application & technology	Details
Pan India (RUVNL), Jan 2023	1500 MW, wind-solar hybrid with storage	RfS released in Q4 FY23
Pan India (AEML), December 2022	1500 MW, RE RTC	RfS released in Q3 FY23, deadline extended
Pan India (SECI), November 2022	1200 MW, wind-solar hybrid with ESS (Tranche VI)	RfS released in Q3 FY23, deadline extended
Pan India (SECI), September 2022	2250 MW, RE with storage (RTC III)	RfS released in Q2 FY23; deadline extended
Gujarat (GUVNL), August 2022	500 MW/1000 MWh standalone BESS phase - I	RfS released in Q2 FY23; deadline extended
Maharashtra (MSEDCL), August 2022	250 MW RE with BESS	RfS released in Q2 FY23; deadline extended
Gujarat (GUVNL), June 2022	500 MW RE/250 MWh ESS phase XV	RfS released in Q1 FY23; deadline extended
Rajasthan (NTPC), April 2022	250 MW/500 MWh BESS	RfS released in Q1 FY23

Source: SECI and state renewable agencies. RfS = request for selection.
*RUVNL = Rajasthan Urja Vikas Nigam Limited.

Takeaways & Outlook

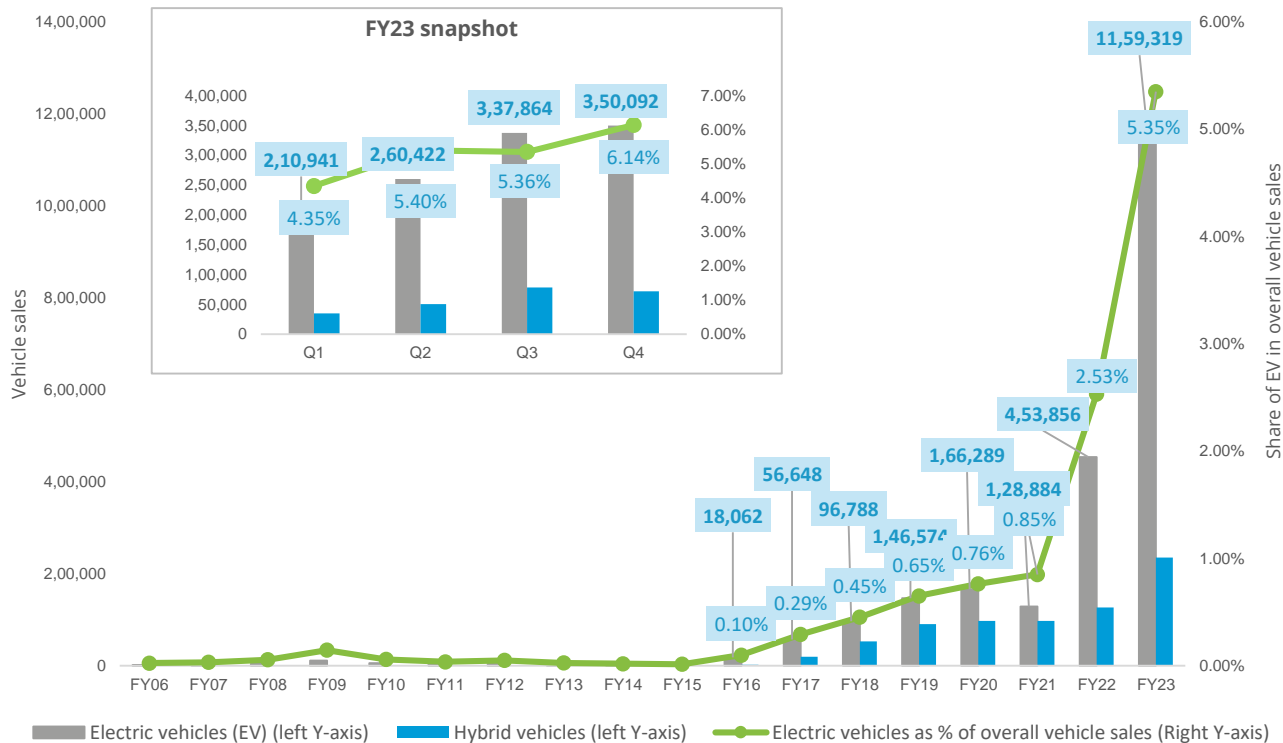
FY23 was a favourable year for the energy storage sector. Five energy storage tenders (including RE + storage, standalone, and PSP) were concluded in FY23, including NTPC's 500 MW with 3000 MWh ESS and PCKL's 1000 MW PSP in Karnataka.

In addition, central and state bidding agencies announced eight other energy storage (with or without RE) tenders in FY23. This includes RUVNL's 1500 ME wind-solar hybrid with ESS, SECI's 1200 MW wind-solar hybrid with ESS and GUVNL's 500 MW/1000 MWh standalone BESS tenders.

In the Union Budget 2023-24, a scheme on viability gap funding (VGF) formulated by the MoP to develop 4,000 MWh of BESS was announced.

In FY23, Jindal Steel and Power Limited (JSP) and Greenko Group entered into a memorandum of understanding (MoU) where Greenko Group agreed to provide 1000 MW energy storage capacity from its pumped storage project (located in Madhya Pradesh and Rajasthan) to JSP. In addition, SJVN and Indian Oil are planning to form a joint venture to develop RE with ESS projects to supply round-the-clock (RTC) power.

Electric vehicle sales in India



Takeaways & Outlook

EV sales continued to grow exponentially in FY23, recording a growth rate of 170% (compared to FY22), and it crossed the one million mark in FY23. The share of EVs in overall vehicle sales went up to 5.35% (vs 2.53% in FY22). More than two lakh EVs were sold in each quarter of FY23.

As of FY23, 25 states and union territories (UT) have notified their EV policies. Punjab, Chandigarh, Haryana, Chhattisgarh, UT of Ladakh, Rajasthan, Jharkhand, Manipur and Tripura are the new entrants, whereas Tamil Nadu and Uttar Pradesh released their revised policies.

In the Union Budget 2023-24, budget allocation for the FAME-II scheme significantly increased from INR 2,908 crores to INR 5,172 crores.

OEMs with the highest EV sales* in FY23 were:

- **2W:** Ola Electric (1,52,506), Okinawa (94,610) and Hero Electric (87,961)
- **3W:** YC Electric Vehicle (29,903), Saera Electric (21,261) and Piaggio vehicles (21,875)
- **4W**:** Tata Motors (36,824), MG Motors (4,511) and Hyundai Motors (786)

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 (2023), CEEW Centre for Energy Finance. * Based on sales data up to Q4 FY23; **4W represents Light motor vehicles and Light passenger vehicles.

Thank you

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Date	Company	Size (USD million)	Sector	Coupon rate (%)	Rating	Tenor (Years)	Purpose
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
February 2021	Continuum Green Energy	561	Solar and wind	4.50%	BB+ (Fitch)	6	Refinancing of existing debt

Source: Climate Bonds Initiative and company press releases.

Date	Company	Size (USD million)	Sector	Coupon rate (%)	Rating	Tenor (Years)	Purpose
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
July 2019	Greenko	500	Solar and wind	5.55%	BB (Fitch)	5.5	Refinancing of solar and wind projects

Source: Climate Bonds Initiative and company press releases.

65.90%

FAME-II target met

As of FY23

Note: Target of selling 1,562,000 EVs (2W, 3W, 4W and buses) under FAME-II scheme by FY24.

Recent electric vehicle launches



Fujiyama Ozone+

Price: INR 99,999 onwards

Range: 140 km

Battery capacity: 60V 42Ah li-ion



Altigreen neEV Tez

Price: INR 3,55,000 onwards

Range: 98 km

Battery capacity: 8.2kWh



Hyundai Ioniq 5

Price: INR 44,95,000 onwards

Range: 631 km

Battery capacity: 72.6 kWh



Godawari Eblu Spin

Price: INR 20,000 onwards

Range: 40 km

Battery capacity: 36V/12Ah, 36V/18Ah

591

Number of EV OEMs in India

As of FY23

EV penetration

In FY23

4.53%

2W sold were EV

52.38%

3W sold were EV

152

Total FAME II approved models

As of FY23

11,59,319

EVs sold

As of FY23

25

States and UTs notified EV policies

As of FY23

For more updates visit [CEEW-CEF Electric Mobility Dashboard](#)



Build evidence

Consistent, reliable, and up to date monitoring & analysis of clean energy markets – investment, payment schedules, market trends, etc.

Create coherence

Periodic convening of multi-stakeholder groups to deliberate on market activities in clean energy

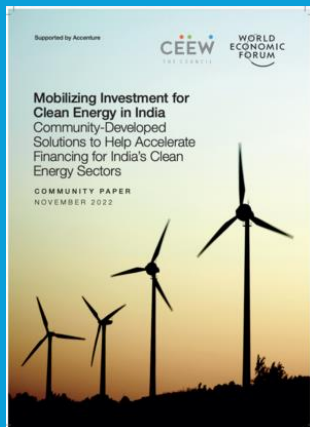
Design solutions

Design and feasibility pilots of fit-for-purpose business models & financial solutions for clean energy solutions

Our recent publications, dashboards and tools



Greening India's Automotive Sector



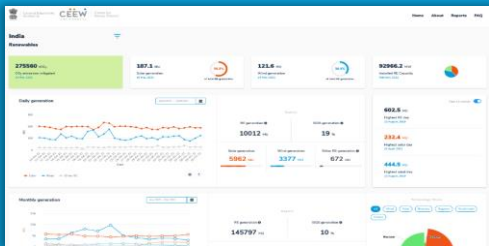
Mobilizing Investment For Clean Energy In India



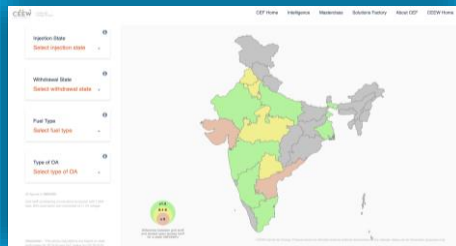
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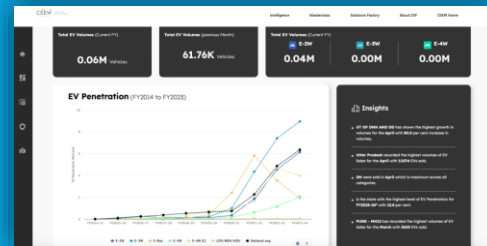
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Electric Mobility Dashboard