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clean energy news and insights

India

INDIA'S NEW SOLAR MARKET

# LEADERS

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**IN 2023**

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**INDIA ADDS RECORD  
10 GW SOLAR CAPACITY  
IN Q1 2024**

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Tamil Nadu - Coimbatore



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Maharashtra - Nagpur

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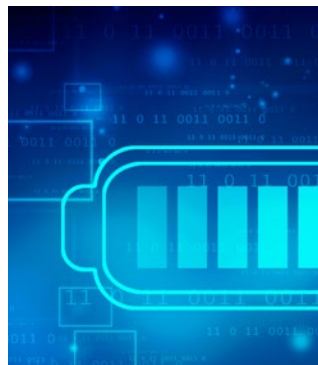
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# Foreword



**I**ndia added over 10 GW of solar in the first quarter of 2024, the highest capacity installed in any quarter to date. Solar capacity additions surged 400% compared to the over 2 GW installed in Q1 2023, according to the recently released *Q1 2024 India Solar Market Update* by Mercom India Research. The installations in Q1 2024 were driven by the commissioning of several projects that had been delayed in previous years due to issues with module supply chain and pricing, grid connectivity, land availability, and regulatory challenges.

Stakeholders in the Indian solar industry expect exemptions in the reimplementation of the ALMM order following the General Elections. There is particular hope that projects being developed for private power consumers will be exempt from the requirement to use ALMM-enlisted modules. However, this may not be a priority for the government.

The regulatory environment in India remains uncertain due to the general elections. Grid connectivity regulations by the Central Electricity Authority and delays in securing General Network Access approvals have impacted the commissioning timelines of various solar and wind-solar hybrid projects. The industry hopes that the new government will introduce measures to streamline these regulatory processes.

A huge driver of demand is the mandate for renewable implementing agencies to bid 40 GW of renewable energy a year. So far, the agencies have been very close to achieving this.

For India to consistently install 20 GW of solar capacity each year, the government must address land procurement issues. Securing continuous land parcels, especially near power transmission lines, remains a significant challenge.

Grid stability and transmission capacity are other critical issues that need to be addressed.

There is a substantial pipeline of large-scale solar projects scheduled for 2024, positioning India for a record-breaking year by a significant margin. Assuming stability in policy and supply chains, and if government agencies continue to auction projects and meet the set targets, India is poised to be among the top three solar markets globally.

According to the latest *Market Leaderboard Report*, thirty-eight new companies entered the top ten list this year, highlighting a dynamic solar market with significant opportunities. Established companies also solidified and strengthened their positions in a highly competitive market. Unless there is a change to the ALMM policy, Indian manufacturing companies are poised to gain significant market share for the first time.

The opportunity for solar companies in India is immense as the market matures and advances to the next level of growth. There is unprecedented optimism in the industry, although there is also concern about constant policy changes that may hinder growth.

**Raj Prabhu**  
CEO

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**Mercom**  
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# Developers Solicit ISTS Charges Waiver Extension Amid Lack of Substations

The renewable project developers are looking for proactive measures by the government to address the infrastructure gap before it impacts the projects that are bid factoring ISTS charges waiver

By: Gautamee Hazarika

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**A**s the deadline for the Inter-State Transmission System (ISTS) charges waiver approaches, additional substations are critical to ensure the smooth facilitation of renewable energy projects.

The government has extended the ISTS charges waiver deadline multiple times since 2019. The latest extension applies to solar, wind, renewable energy hybrid, pumped hydro storage, and battery energy storage systems commissioned by June 30, 2025. This waiver will remain in effect for 25 years.

The objective behind the waiver of ISTS charges was to encourage renewable capacity addition by

reducing the cost of generation to achieve the country's non-fossil fuel energy capacity of 500 GW by 2030. The Ministry of Power also broadened the waiver's coverage to encompass hydropower projects, offshore wind, green hydrogen, and green ammonia projects.

According to a developer, "The Central Electricity Regulatory Commission has nine separate transmission zones with the resultant ISTS charges for renewables ranging from about ₹1 (\$0.012)/kWh to ₹2.30 (\$0.028)/kWh. So, without the ISTS charges waiver, some projects may become unfeasible."

While the initiative and relief provided by the extension are

commendable, the transmission infrastructure challenges, especially the shortage of substations, are a huge concern for projects under development. If the projects are delayed due to these constraints, the developers could miss out on the waiver, and the projects could end up being economically unviable.

The developers are looking for proactive measures by the government to address the infrastructure gap before it impacts the projects that are bid factoring ISTS charges waiver.

A renewable energy developer told Mercom, "For projects that are under development but are not commissioned by the 2025





### Developers wish for a centralized “Open Access Cell” to streamline application processes

deadline solely due to issues related to transmission or sub-station infrastructure, developers will have the option to invoke force majeure.”

However, some stakeholders have also pointed out that the risk of not commissioning the projects is far higher than not qualifying for the waiver of ISTS charges.

The Central Transmission Utility (CTU) regularly releases a list of available substations and those already engaged.

For the projects lined up for construction, the developers need to regularly check the available substations and purchase land closer to those substations to avoid challenges.

The developer added, “Despite approximately 40 GW of available transmission capacity, these resources are in states with relatively lower solar irradiation. Developers will have to consider the lower energy generation in these locations before participating in bids to avoid quoting unrealistic lower tariffs.”

According to another developer, “During the long-term access (LTA) regime, the power generators were to pay the ISTS charges. This led to a large majority of the renewable energy capacity being concentrated in regions like Rajasthan and Gujarat, causing huge grid congestion. Now, in the GNA regime, the ISTS charges are levied on the beneficiaries. For projects being developed under competitive bidding by implementing agencies, the charges will act as a deterrent for ISTS-connected projects. The government is implicitly ensuring renewable





## CERC has nine separate transmission zones with RE ISTS charges from ~₹1/kWh - ₹2.30/kWh

energy projects are developed through state-level bids, especially in states where the renewable energy uptake has been low and where there is no grid congestion, like in Bihar, Uttar Pradesh, Punjab, and Haryana, among others.”

### Impact on green energy open access projects

For green energy open access projects, the waiver of ISTS charges results in lower project costs, translating to attractive tariffs for businesses procuring power from ISTS-connected green open access projects.

Subrahmanyam K V, Vice President of Business Development of Radiance Renewables, said, “As of February 2024, there is a demand for GNA connectivity by consumers totaling approximately 7 GW, out of a total project connectivity of 12.5 GW.”

He pointed out three pressing problems leading to the substation shortages. He said, “There exists a disparity between planned capacity and actual implementation on the ground. It’s imperative to strategically position substations near areas abundant in resources, facilitating the establishment of co-located solar and wind projects. Given India’s rich solar and wind resources, the emphasis should be on pursuing hybrid power projects wherever feasible. Co-located projects also offer reduced transmission charges compared to standalone ones. Furthermore, the absence of a standardized process for GNA regulations in each state for NOC requisition and scheduling underscores the need for inter-





## Markets

state collaboration to streamline procedures.”

Another leading developer emphasized that ISTS allows green power to be delivered through open access to states lacking favorable policies or availability of land.

For example, although Uttar Pradesh is known for the high demand for green energy by consumers, developers face challenges of unfavorable conditions compared to states like Maharashtra or Karnataka, which have suitable land, solar irradiation, and supporting policies.

In such scenarios, the exemption of ISTS charges proves beneficial for both consumers and developers, allowing access to green power at a reasonable cost. Without this exemption, consumers would be compelled to purchase green power at higher rates than those offered by DISCOMs, making green power procurement unfeasible.

With the tight timeline of June 2025 looming for setting up all transmission projects, an extension is crucial, as not all projects can be completed within this timeframe.

Currently, Karnataka, Maharashtra,

Gujarat, Tamil Nadu, Rajasthan, and Uttar Pradesh continue to remain preferred states for ISTS projects.

Additionally, stakeholders have highlighted several challenges encountered during the execution of green open access projects. One notable issue is the involvement of numerous nodal agencies in the approval process, which creates obstacles in securing timely and seamless approvals.

Despite ISTS charges exemption for green energy open access projects notified by the central government, stakeholders have told Mercom they still must obtain approvals from both states involved, resulting in a cumbersome procedure.

Developers look forward to establishing a centralized “Open Access Cell” to streamline application processes and expedite approvals.

### Extension of ISTS Waiver

Kannan Krishnan, Joint Managing Director of Jakson Green, calling for an extension of the waiver, said, “Extending the ISTS charges waiver for another three years will undoubtedly serve as a catalyst for exponential

growth within the industry. However, it’s evident that further infrastructure development, particularly the establishment of additional substations, is essential for the seamless execution of ISTS projects”.

“We believe an extension beyond 2025 will facilitate a smoother transition and sustained growth trajectory for the renewable energy sector. This extension will provide the necessary time for infrastructure alignment and foster an environment conducive to industry expansion and innovation.”

In Subrahmanyam’s view, granting a minimum extension of one year would aid round the clock renewable energy in an effective way. Without such an extension, consumers are left exposed to an open risk of transmission charges which can upset the project economics.

Given the ambitious industrial net zero targets, stakeholders are advocating for an extension until 2030 to facilitate more installations to meet these targets, akin to the extension already granted for green hydrogen and ammonia projects. 🌞







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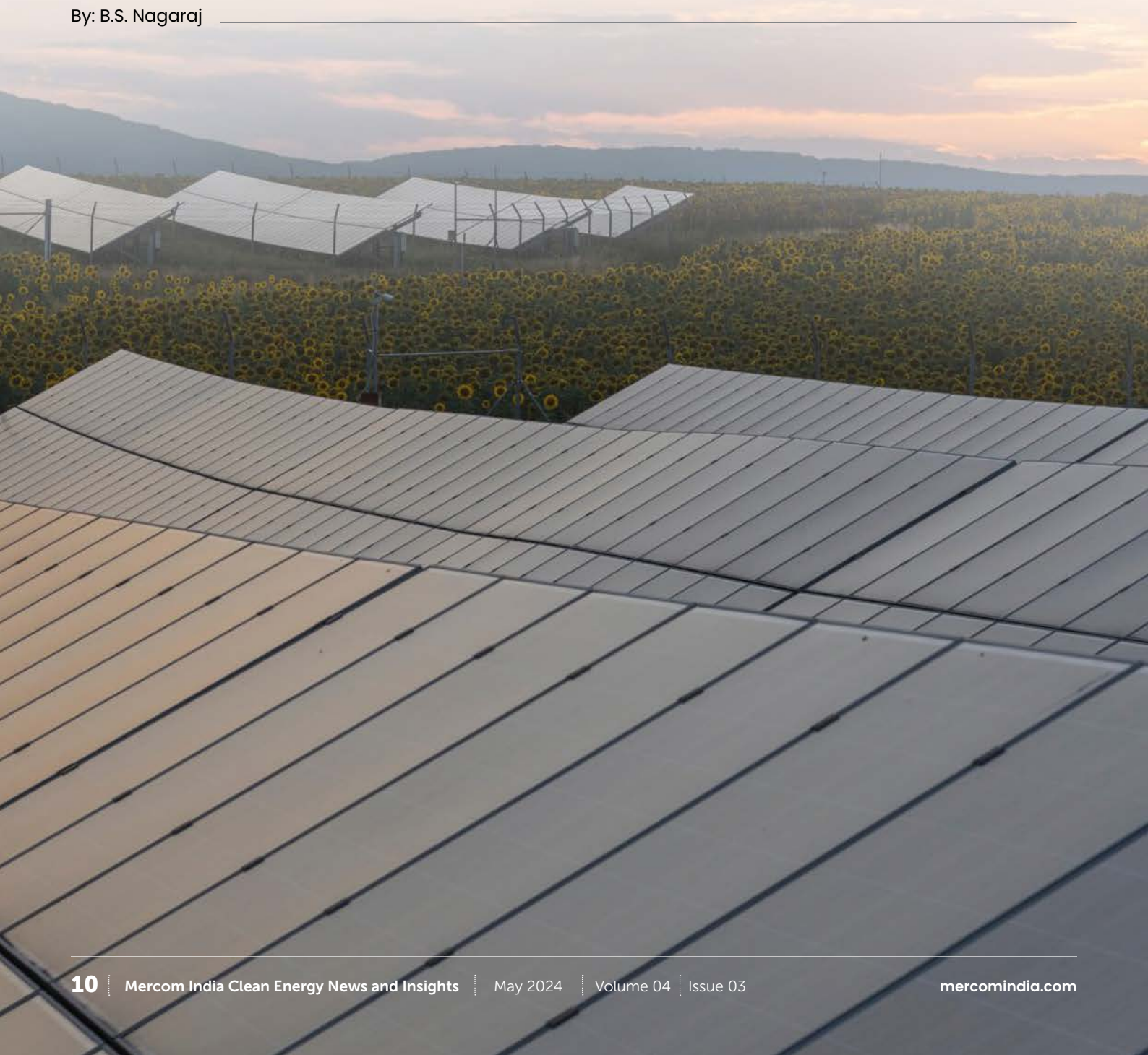
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# Challenges Derailing Telangana's Solar Open Access Projects

At a time when solar open-access installations are gaining traction across the country, developers with small-capacity projects in Telangana say the inordinate delay in adhering to regulatory frameworks by DISCOMs is creating bottlenecks

By: B.S. Nagaraj

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**F**rom tedious and time-consuming long-term open access (LTOA) renewal process to generator-end power quality challenges to partial payments for unutilized banked energy, the state's solar open access developers cite a long list of problems that are threatening the feasibility of their projects.

They also complain that their solar open-access generators are being asked to furnish consumer-end power quality tests, even in the absence of any guidelines for testing and approved testing agencies. They said other states do not insist on such tests.

Solar open access has gained ground in many states in recent years. India achieved a record-breaking

annual installation of solar open access, adding 3.2 GW, in the calendar year 2023, according to the 2023 Q4 & Annual Mercom India Solar Open Access Market Report.

As of December 2023, the cumulative installed solar capacity in the open access segment reached 12.2 GW.

But Telangana is considered a laggard, given the reluctance of the state's DISCOMs for fear of losing high tariff-paying consumers and a policy regime unfavorable to the growth of open access installations.


Last October, the Telangana State Electricity Regulatory Commission increased the additional surcharge for open access consumers to ₹1.98 (~\$0.0237)/kWh, a whopping 408% increase over the first half of the financial year 2023-24, for the second

half of the year. However, this was brought down to ₹1.40 (~\$0.0168)/kWh for the first half of FY 2025, providing some relief to open-access developers.

According to Mercom India's report, the state has 328.5 MW of cumulative open-access solar capacity, with the government-owned Singareni Collieries owning about 200 MW of the projects and private players operating the rest. Most of the solar open-access projects in the state are under 10 MW, with the average capacity being 3-4 MW.

One of the biggest challenges solar open-access generators face in Telangana is the inordinate delay in processing LTOA renewal applications. "According to the regulations, these applications must be disposed of in 30 days. But it is taking up to 4-5





months, even after close follow-ups by generators,” said a solar open access developer.

“We can understand if the application is for fresh LTOA, but renewal applications need not take long since all the authorities already have the required information,” he said.

Developers also complain that DISCOMs were issuing de-energization letters for not adhering to Technical Standards for Connectivity to the Grid (Amendment) Regulations, 2013. In these regulations, the section applicable to wind generating stations and generating stations using inverters outlines certain harmonics, direct current injection, and flicker

requirements.

“Under these regulations, the responsibility for adhering to voltage harmonic limits is not within the scope of solar and wind generators who, take voltage as a reference from the grid. Solar generators depend on utilities for the quality of power supply,” according to a solar open access developer.

The power electronic converters support the injection of current harmonics in the grid, which leads to potentially unacceptable load voltage distortion. To address this, the IEEE 519 guidelines specify the maximum allowable voltage distortion and current harmonics injected by the converter at the generating unit. The

power variations in generating units result in voltage flicker at the load bus, which can be corrected by reactive power compensation.

“The IEEE standard clearly outlines that the utility and generator’s joint responsibility is to ensure the electrical system harmonics are within the limits. Utilities must install harmonic filters, which they have not done,” the developer said.

Moreover, for solar generators, the non-generation hours are from 18:00 hrs to 06:00 hrs, and the harmonics recorded during this period are attributable to the supply from the utilities and not the solar generators. Telangana solar open access developers say other states only





consider the levels of the recorded harmonics during the generation hours.

Another pain point for Telangana's solar open-access developers is the mandate to get power quality tests from the consumer. "These tests have no precedence, and no prescribed vendors are available in the market," according to Sidharth Balda, Director, EnerSol Infra, a Hyderabad-based solar open access developer with a 2 MW project.

Contrary to the regulation, developers also claim that the DISCOMs only make partial payments for unutilized banked energy. According to TSERC Regulation 1 of 2017, unutilized banked energy is to be

“

## With total solar open access capacity of 328.5 MW, average project size in Telangana is 3-4 MW

considered as deemed purchase by DISCOMs at the Average Pooled Power Purchase Cost determined by the Telangana State Electricity Regulatory Commission. This regulation implies that generators should receive payments for unutilized banked

energy at 100% of the Average Pooled Power Purchase Cost.

The two Telangana DISCOMs, Southern Power Distribution Company, and Northern Power Distribution Company, were rated C- in 2022 and 2023 but slightly improved to C in 2024, according to the Twelfth Annual Integrated Ratings brought out by the Ministry of Power.

It is learnt that the developers' association wrote to the Telangana State Southern Power Distribution Company (TSSPDCL) seeking redressal of their complaints and wanting fair treatment and adherence to regulatory frameworks to enable the smooth functioning of the electricity sector. ☺



# India's New Solar Market Leaders in 2023

Mercom's India Solar Market Leaderboard provides a comprehensive overview of the solar market and highlights key contributors across the supply chain

**I**ndia's solar market witnessed the emergence of new leaders in the calendar year 2023, according to Mercom's recently released India Solar Market Leaderboard 2024, showcasing intense competition for market dominance.

The report provides insight into notable shifts in the market share across ten categories over the past calendar year, highlighting which companies are gaining traction and which ones fell behind.

India added around 7.5 GW of solar capacity in 2023, significantly lower than the 13.4 GW installed in 2022, as deadline extensions and policy uncertainty pushed companies to delay projects. Delayed transmission construction timelines and grid connectivity issues in states like Rajasthan, Madhya Pradesh, and Gujarat also contributed to the decline.

"The market is widening right now. If you are looking at the rooftop or open access projects, the market has been expanding, providing opportunities

to new players," said Priya Sanjay, Managing Director at Mercom India.

## Large-Scale Solar Project Developers

Large-scale solar projects accounted for the lion's share at 77.2% of total installations. Meanwhile, the country's cumulative installed solar capacity reached approximately 72 GW by the end of 2023.

Adani Green Energy, UPC Renewables, Tata Power Company, Gujarat State Electricity Corporation (GSECL), and Rising Sun Energy (Yinson Holdings) were the top-utility scale solar project



developers in the calendar year (CY) 2023.

### Leading Utility-Scale Solar Developers

1	Adani Green Energy
2	UPC Renewables
3	Tata Power Company
4	Gujarat State Electricity Corporation
5	Rising Sun Energy (Yinson Holdings)

Source: Mercom India Research

Adani Green Energy accounted for 28.9% of the yearly capacity additions.

Leading the utility-scale solar developer's list, Adani Green Energy added 525 MW of solar capacity as a part of a 700 MW wind-solar hybrid power project in Jaisalmer, Rajasthan. In December 2023, the company

secured a follow-on funding of \$1.36 billion and enhanced its construction financing pool to \$ 3 billion to fund a 2,167 MW renewable energy park in Khavda, Gujarat.

UPC Renewables ranked second, accounting for 11.6% of the yearly capacity additions. The company commissioned 300 MW of utility-scale solar projects awarded by SECI as part of Phase VI of ISTS-connected projects in Khandwa, Madhya Pradesh.

Tata Power came in third, accounting for 9.2% of the annual installations in 2023. It

commissioned a 110 MW solar power project in Bikaner, Rajasthan. The project supplies green power to the Kerala State Electricity Board.

GSECL and Rising Sun Energy (Yinson Holdings) rounded off the top five, contributing 9.1% and 7.3% to capacity additions, respectively.

The top five utility-scale project developers accounted for almost 66% of the market share.

### Leading Solar Module Suppliers

Jinko Solar, LONGi Green Energy

Technology, JA Solar, Waaree Energies, and Trina Solar were the top solar module suppliers in CY 2023.

Monocrystalline modules comprised 82.6% of shipments. Over 44% of the monocrystalline modules shipped during the year were bifacial. TOPCon modules accounted for nearly 10% of the modules shipped to the country, and polycrystalline modules made up 5.8% of the supply.

The top five suppliers contributed to 59.4% of module capacities shipped to domestic solar projects. Indian manufacturers catered to 35.5% of the domestic solar industry's module requirements, while 64.5% were imported.

### Leading Solar Module Suppliers

1	Jinko Solar
2	LONGi Green Energy Technology
3	JA Solar
4	Waaree Energies
5	Trina Solar

Source: Mercom India Research

Jinko Solar was the leading supplier, accounting for 20.4% of the modules shipped to India. It has nine production facilities globally. The company expects its annual solar wafer, cell, and module production capacities to reach 120 GW, 110 GW, and 130 GW by the end of CY 2024.

LONGi Green Energy Technology ranked second, accounting for 18.8% of the module shipments. It has solar cell and module manufacturing facilities in China, Vietnam, and Malaysia, as well as solar ingot and wafer production facilities in China and Malaysia.

JA Solar ranked third, accounting for 8.7% of the module shipments. It has 12 manufacturing bases worldwide. The company has an operating capacity of 56 GW of





solar cells and 40 GW of modules. Its production capacities across silicon wafers, cells, and modules are set to surpass 100 GW each in 2024.

Waaree Energies and Trina Solar rounded off the top five, accounting for nearly 6% and 5.5% of the annual module shipments, respectively.

LONGi Green Energy Technology, Aiko Solar, Solar Space, TS Solar Energy, and Tongwei Solar were the top solar cell suppliers in 2023.

The leading Indian module suppliers in CY 2023 were Waaree Energies, Adani Solar, Premier Energies, Saatvik Green Energy, and Rayzon Solar.

The solar modules imported to India were mainly from China. The top suppliers exporting to India included Jinko Solar, LONGi Green Energy Technology, JA Solar, Trina Solar, and Znshine Solar.

### Top Rooftop Solar Installers

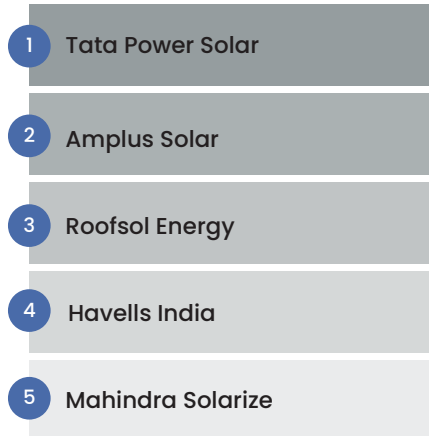
Tata Power Solar, Amplus Solar, Roofsol Energy, Havells India, and Mahindra Solarize were the top rooftop solar companies in India during CY 2023.

India added 1.7 GW of rooftop solar capacity in CY 2023, according to the 2023 Q4 & Annual Mercom India Rooftop Solar Market Report. As of December 2023, the country's cumulative rooftop solar installations

reached 10.5 GW.

These five companies accounted for 44.9% of the market share in 2023.

### Leading Rooftop Solar Installers



Source: Mercom India Research

Tata Power Solar led the annual capacity additions, accounting for 26.2% of the installations.

Tata Power Solar, a subsidiary of Tata Power Company, remained the top rooftop solar installer. As of December 2023, the company's cumulative installed rooftop solar capacity stood at nearly 2 GW. The company's pan-India distribution network, partnerships for rooftop solar system installations, financing, and a streamlined project supply chain have

helped drive the capacity additions.

Amplus Solar ranked second, accounting for 7.9% of yearly installations. A member of the Gentari Group, Amplus Solar owns and manages a portfolio (operational and under construction) of over 1.9 GW distributed solar assets with more than 650 projects spread over 24 states across India. The company's cumulative installed rooftop solar capacity stood at 533 MW as of December 2023.

Roofsol Energy ranked third, accounting for 4% of yearly installations. It has over 300 solar projects in India rooftop solar installations stood at 280 MW.

Havells India and Mahindra Solarize rounded off the top five with 3.9% and 2.8%, respectively.

### Leading Solar EPC Companies

Oriano, Waaree Renewable Technologies, Prozeal Green Energy, Tata Power Solar, and Gensol Engineering emerged as the top utility-scale solar engineering, procurement, and construction service providers in CY 2023.

In CY 2023, there were significant changes in market shares compared to the previous year. Oriano, Waaree RTL, Prozeal Green Energy, and Gensol were new entries into the top ten list in 2023.



## Leading Utility-Scale EPC Players

1	Oriano
2	Waaree Renewable Technologies
3	Prozeal Green Energy
4	Tata Power Solar
5	Gensol Engineering

Source: Mercom India Research

Oriano was the top EPC player, with a market share of 14.8%. It led the list of EPC service providers in 2023. During the year, the company has installed captive solar power projects totaling 40 MW in Jharkhand and Bihar for Shree Cement.

Accounting for 13.7% of the market share, Waaree Renewable Technologies, the EPC arm of Waaree Energies, ranked second during the year. The company commissioned 87.5 MW as a part of UPC Renewables' 150 MW ISTS-connected solar project in Khandwa, Madhya Pradesh.

Prozeal Green Energy's market share was 13.6%. It climbed to third position in 2023 from ninth in the previous year.

Tata Power Solar and Gensol Engineering had 11.9% and 7.4% market share, respectively.

The top five utility-scale solar EPC service providers accounted for over 61.4% of the market share.

## Top Module Mounting Firms

Goodluck India, Arctech, and GameChange Solar were the top three module mounting structure suppliers to the Indian solar market in CY 2023. Raydean Industries and Strolar Mounting Systems rounded off the top five.

The top five companies shipped 67% of the mounting structures used in the country's solar projects during the year.

## Leading Solar Module Mounting Structure Suppliers

1	GoodLuck India
2	Arctech
3	GameChange Solar
4	Raydean Industries
5	Strolar Mounting Systems

Source: Mercom India Research

Goodluck India ranked first, accounting for 17% of the total module mounting structures shipped in 2023. It supplies module mounting structures to grid-connected solar projects and solar carports. According to its nine-month financial year 2023-24 results, the company had a production capacity of 4,12,000 metric tons per annum across six manufacturing facilities and five in-house hot dip galvanizing plants in India.

Arctech ranked second, accounting for 14% of the module mounting structures supplied in 2023. It has a combined production capacity of 13 GW, including a 3 GW manufacturing facility in Mundra, Gujarat.

GameChange Solar entered the top ten list in 2023 in the third position, accounting for 13% of solar module mounting structures supplied during the year. The company had an annual production capacity of 55 GW for key systems.

## Top Open Access Developers

O2 Power, Continuum Green Energy, CleanMax Enviro Energy, Fourth Partner Energy, and Ampin Energy Transition were the top solar open-access developers in 2023. The top five open-access project developers accounted for almost 36% of the market share.





## Markets

### Leading Solar Open Access Developers

- 1 O2 Power
- 2 Continuum Green Energy
- 3 CleanMax Enviro Energy
- 4 Fourth Partner Energy
- 5 Ampin Energy Transition

Source: Mercom India Research

Open access solar installations in CY 2023 totaled 3.2 GW, up 5.7% from 3 GW installed in CY 2022, according to Mercom India's Q4 & Annual 2023 India Solar Open Access Report. Cumulative solar installations in the open access market reached 12.2 GW as of December 2023.

O2 Power led the top open-access developers list, accounting for 11% of the yearly capacity additions. In 2023, O2 Power commissioned a 240 MW co-located wind-solar hybrid energy project in Karnataka. During the year, the company announced

agreements with healthcare, data center, and shipping companies to supply solar power via open access.

Continuum Green Energy ranked second, accounting for 7% of the annual installations. It commissioned a 102.4 MW solar capacity of a 272.4 MW group captive wind-solar project in Tirunelveli, Tamil Nadu.

CleanMax Enviro Energy ranked third, accounting for 6% of the annual installations. The company commissioned 200 MW solar capacity as part of a 400 MW wind-solar hybrid project in Babra, Gujarat. The project is spread across 800 acres of land.

Fourth Partner Energy and Ampin Energy Transition rounded off the top five, contributing 6% each to capacity additions.

In 2023, India installed around 7.5 GW of large-scale solar projects, with open-access installations accounting for 42.7% of the total.

### Top Inverter Suppliers

Sungrow Power Supply (Sungrow), FIMER India (ABB), Sineng Electric, TBEA Energy India, and Ginlong (Solis) Technologies were the leading inverter suppliers in India for the CY 2023.

### Leading Solar Inverter Suppliers

- 1 Sungrow Power Supply
- 2 FIMER India
- 3 Sineng Electric
- 4 TBEA Energy India
- 5 Ginlong (Solis) Technologies

Source: Mercom India Research

Sungrow was the top solar inverter supplier in CY 2023, garnering a 32% market share. The company was the top solar inverter supplier in CY 2022 and 2023, with an inverter shipment growth of nearly 113% YoY. It has one of the world's largest inverter facilities, with a global annual production capacity of 305 GW, including 25 GW outside China. The company's Indian manufacturing facility has completed five years of manufacturing and expanded to a yearly production capacity of 10 GW.







Accounting for 17% of the market share was FIMER India. It climbed to second place in CY 2023. The company's inverter shipments nearly doubled YoY due to mounting demand for central inverters for the large pipeline of utility-scale solar projects scheduled for commissioning in 2024.

Sineng Electric followed with a market share of 16%. It came in at third in 2023 despite a shipment increase of over 50% YoY. The company's three manufacturing facilities in Wuxi and Wuzhong in China and Bangalore, India, have a total annual production capacity of 50 GW. Sineng Electric also has an in-house testing center.

TBEA Energy India and Ginlong (Solis) Technologies ranked fourth and fifth, accounting for 12% and 5% of the total market share, respectively.

### Central Inverters

Central inverters accounted for 55% of the total inverter supply in CY 2023, surpassing string inverters after two years. Sungrow (46%), FIMER India (29%), and Sineng Electric (20%) were the top suppliers, accounting for 95% of the market share. Central inverters have recently regained popularity among developers due to their low

cost and high reliability.

### String Inverters

String inverters accounted for 45% of the total inverter supply in India. TBEA Energy India had the highest market share, accounting for 21%, followed by Sungrow with 15% and Sineng Electric with 10%. The top three suppliers accounted for 47% of the string inverter supplied in CY 2023.

### Top Solar Module Manufacturers

ReNew, Waaree Energies, First Solar, Adani Solar, and Emmvee Photovoltaic Power led the annual solar module manufacturing capacity additions in CY 2023.

India added 20.8 GW of solar modules and 3.2 GW of solar cell production capacity in CY 2023, according to Mercom's State of Solar PV Manufacturing in India 2024 report.

The country's cumulative solar module and cell manufacturing capacity reached 64.5 GW and 5.8 GW, respectively, as of December 2023. Of the installed module manufacturing capacity, about 60% was equipped to make modules in M10 and G12 wafer sizes.

As of December 2023, monocrystalline modules accounted

for 67.5% of the country's module production capacity, followed by polycrystalline, Tunnel Oxide Passivated Contact (TOPCon), and thin-film.

The top five manufacturers accounted for 72% of the production capacity additions in CY2 2023.

### Leading Module Manufacturers

- 1 ReNew
- 2 Waaree Energies
- 3 First Solar
- 4 Adani Solar
- 5 Emmvee Photovoltaic Power

Source: Mercom India Research

Leading the total capacity additions during the year, ReNew accounted for 19% of the market share. The company's newly commissioned manufacturing unit in Jaipur, Rajasthan is spread across 22 acres and can produce ~15,000 solar modules/day.

Also, accounting for 19% of the total capacity additions Waaree Energies added 4 GW of module manufacturing capacity in Q1 2023.

First Solar, Adani Solar, and Emmvee Photovoltaic Power rounded off the top five. First Solar commissioned its thin-film module manufacturing unit in Tamil Nadu in Q4 2023. The facility has a nameplate capacity of 3.3 GW. The unit involved an investment of approximately \$700 million (~₹57 billion).

India's module manufacturing capacity is expected to surpass 150 GW, and cell capacity will likely reach over 75 GW by 2026. The monocrystalline is expected to account for most of the annual module production capacity (although declining), followed by TOPCon, Heterojunction (HJT), and other technologies. 📈



# Solar Auctions Surge by 229% in Q1 2024, Tender Activity Up 122%

The new bidding guidelines and tender trajectory targets for the implementing agencies were the primary reasons behind the surge in solar tender and auction activity during the quarter

By: Urvashi Gupta

**A**uctioned solar capacity in India surged to over 25 GW in the first quarter (Q1) of 2024 from 820 MW in Q1 2023, primarily due to the new bidding guidelines mandating that auctions be conducted within 110 days of bid submission dates.

According to Mercom India Research data, solar auctions increased by 229% quarter-over-quarter (QoQ) from 7.62 GW and 2,957% year-over-year (YoY).

Solar tenders floated by various agencies during Q1 2024 rose 122% YoY to over 30.7 GW and 92.2% QoQ.

The rise in tender and auction activity is primarily due to renewable energy agencies accelerating their

efforts to meet their bidding targets for the financial year.

Tenders and auction activity comprised standalone solar, floating solar, and wind-solar hybrid projects. For wind-solar hybrid tenders, the solar capacity is calculated at a ratio of 67% of the total tendered hybrid capacity where specific solar capacities are not mentioned.

## Top Tender Issuing Agencies in Q1 2024

Maharashtra State Electricity Distribution Company (MSEDCL) issued the highest capacity of tenders at 7.4 GW, accounting for 24.1% of the total tendered capacity in Q1. MSEDCL Solar Agro Power and NTPC were the

second-highest tendering agencies, with 4.3 GW each, accounting for ~14% of the total tendered capacity.

The Solar Energy Corporation of India (SECI), with 2.6 GW, and Uttar Pradesh Power Corporation (UPPCL), with 2 GW, rounded off the top five, accounting for 8.5% and 6.5% of the total tendered capacity.

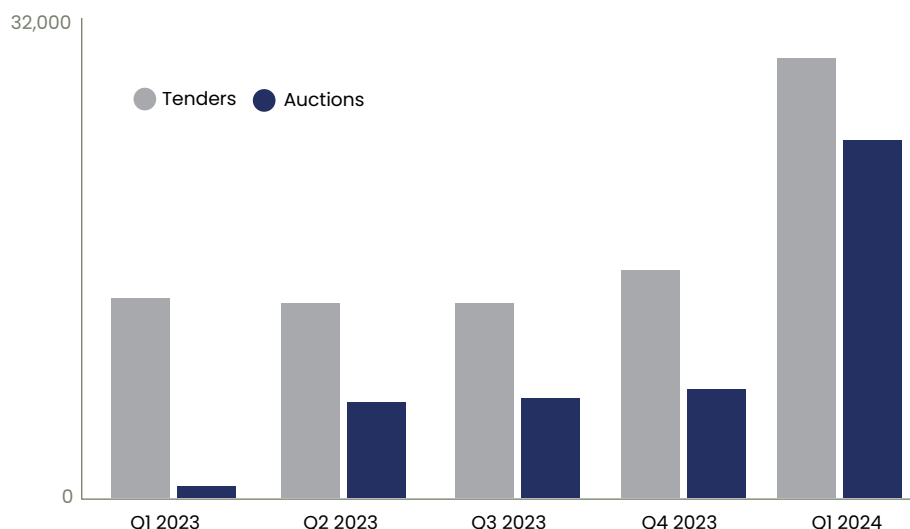
## Large Tenders in Q1 2024

MSEDCL invited bids for the long-term power procurement from 5,000 MW grid-connected solar photovoltaic power projects.

UPPCL issued a tender to set up 2 GW of grid-connected solar projects under the build-own-operate and maintain (BOOM) model for 25 years.



## India Large Scale Solar Tenders and Auctions by Quarter (MW)



Source: Mercom India Research (Mar 2024)

SECI invited bids to set up 1,500 MW ISTS-connected solar projects under Tranche XIV.

### Major Auctions in Q1 2024

MSEB Solar Agro Power's auction

for 7.78 GW of solar projects was the highest capacity auctioned during the quarter. In second place was NTPC's auction for 1.584 GW for firm and dispatchable renewable energy (FDRE), followed by SJVN's 1.5 GW solar

auction.

SJVN Green Energy, Megha Engineering & Infrastructures, and Avaada Energy were amongst the winners of MSEB Solar Agro Power's auction to procure over 7 GW solar power under Component C of the Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan program.

ABC Cleantech (Axis Energy), Juniper Green Energy, Serentica Renewables India II (Serentica Renewables), Tata Power Renewable Energy, and ReNew Solar Power (ReNew) won NTPC's auction to supply 3 GW of FDRE from ISTS-connected projects under FDRE Tranche II.

Anboto Solar (Solarpack), Apraava Energy, Avaada Energy, and ReNew Solar Power (ReNew) were declared winners in NTPC's auction to set up 1,500 MW of ISTS-connected solar power projects (Tranche-I).

Subscribe to Mercom's India Solar Tender Tracker to stay on top of real-time tender activity. ☺

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# India's Solar Power Generation Up 8.8% in Q1 2024

As the new capacity additions increased in the country, solar generation has witnessed a boost to reach 32 BU in Q1 2024

By: Tarun Kothamasu

**I**ndia generated approximately 32 billion units (BU) of solar power in the first quarter (Q1) of the calendar year (CY) 2024, an 8.8% year-over-year (YoY) increase.

The country's solar energy generation has steadily increased over the years with the capacity

additions.

Rajasthan, Karnataka, and Tamil Nadu were the top states for solar power generation. Rajasthan witnessed the highest solar generation with 10.1 BU, followed by Karnataka and Tamil Nadu with 4.3 BU and 3.9 BU, respectively.

The generation was up by 18.8%

quarter-over-quarter (QoQ) from 26.6 BU.

Solar generation in Rajasthan, Karnataka, and Tamil Nadu was up 17.4%, 18.7%, and 20% QoQ, respectively, due to an increase in installed solar capacity and the early onset of the summer.

Solar power accounted for 18.5% of

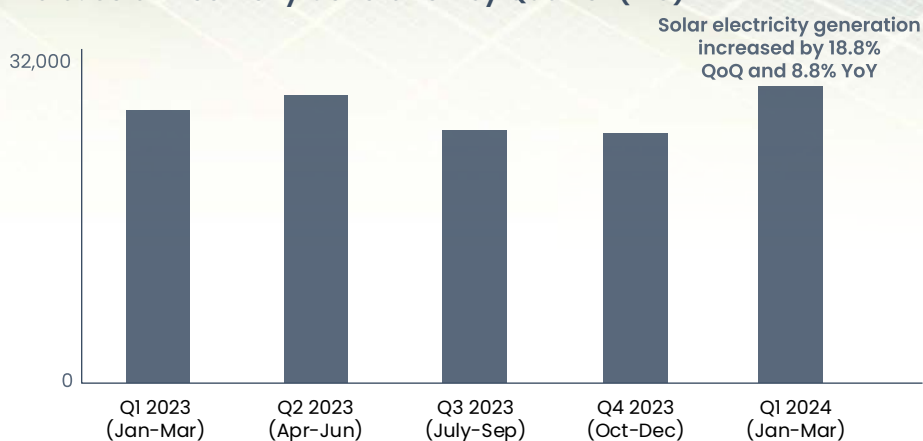


India's total installed power capacity and 42.9% of the installed renewable capacity as of March 2024, according to data from the Central Electricity Authority (CEA), Ministry of New and Renewable Energy (MNRE), and Mercom's India Solar Project Tracker. The share of solar rose from 15.2% of the total power capacity and 37.4% of the installed renewable energy capacity by the end of Q4 2023.

The southern region generated the highest amount of solar power during the quarter, with 12.1 BU, accounting for 38.3%, followed by the northern region with 11.8 BU and the western region with 7.3 BU, accounting for 37.3% and 23.1%, respectively. The eastern and northeastern regions accounted for 1% and 0.3%, respectively.

To encourage project developers to add capacities, the Ministry of Power (MoP) amended the guidelines to the tariff-based competitive bidding process for the procurement of firm and dispatchable renewable power from grid-connected solar, wind, wind-solar hybrid, and renewable

### India: Solar Electricity Generation by Quarter (MU)



Source: CEA

Mercom India Research

energy projects with energy storage in February 2024.

During the month, the Ministry also notified the start of the central pools for solar power and solar-wind hybrid power on February 15, 2024. The Ministry issued a procedure for implementing renewable energy pools in October 2023 to encourage renewable energy offtake by

distribution companies, stimulating growth in the sector.

Subscribe to Mercom's India Solar Project Tracker to access the most comprehensive database of large-scale solar projects covering commissioned and under-development projects from the beginning of the National Solar Mission. 📧





# India Adds Record 10 GW Solar Capacity in Q1 2024

Multiple policy and market conducive developments drove the solar capacity additions to record levels during the quarter, bringing India's total solar installations to 82 GW at the end of March 2024

By: Arjun Joshi

**I**ndia achieved a milestone by adding over 10 GW of solar capacity in the first quarter (Q1) of 2024, the highest quarterly installation to date. This figure represents an almost 400% year-over-year (YoY) increase compared to the over 2 GW installed in Q1 2023, according to the recent Q1 2024 India Solar Market Update from Mercom India Research. Quarter-over-quarter (QoQ)

“

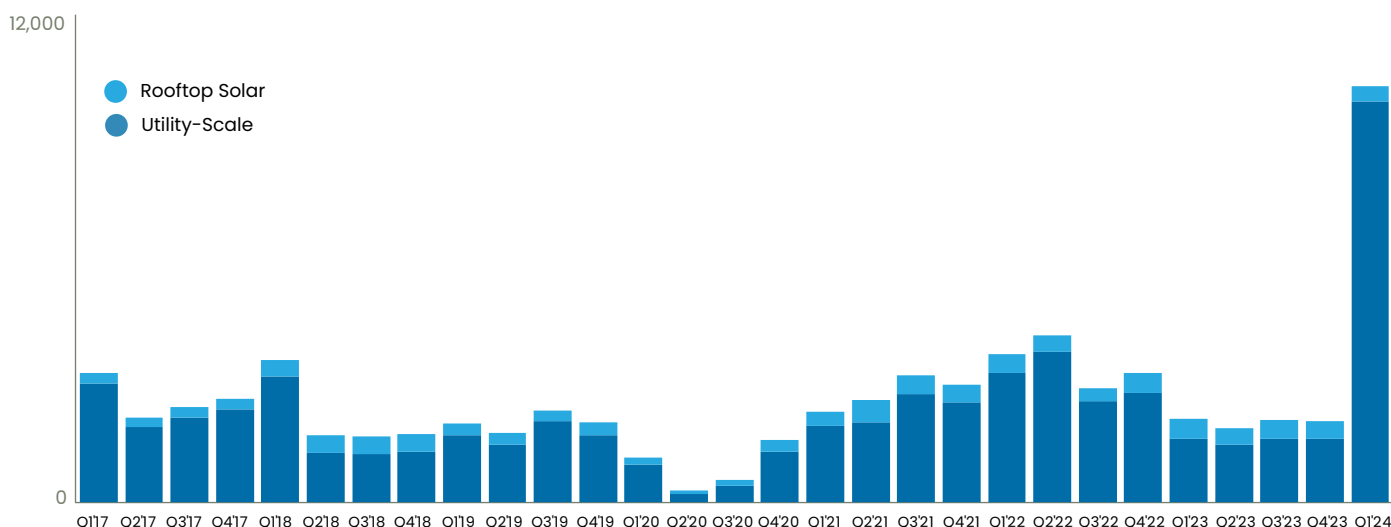
**In Q1 2024, India installed 9.7 GW of large-scale solar capacity**

capacity additions also surged 414% from nearly 2 GW in Q4 2023.

In Q1 2024, India installed 9.7 GW of large-scale solar capacity, which included 1.8 GW from open access solar projects. This represents a 524% QoQ increase and a nearly 534% YoY rise.

“The surge in installations in Q1 2024 was driven by the commissioning of several delayed projects that had received extensions in previous

### Solar Installations by Quarter\* (MW)



\*Previous quarters may have been updated based on late announcements and inclusions

Source: Mercom India Research (Mar 2024)

quarters due to high module prices. Falling module prices and suspending the Approved List of Models and Manufacturers (ALMM) order enabled developers to import modules at lower costs, facilitating project completions,” said Priya Sanjay, Managing Director, Mercom India.

Many projects were commissioned early to take advantage of the ALMM order suspension. Granting grid connectivity to projects previously stalled in the Great Indian Bustard habitat also contributed to the record-breaking installations.

“There is a substantial pipeline of large-scale projects scheduled for 2024, positioning India for a record-breaking year by a significant margin. Assuming stability in policy and supply chains, and if government agencies continue to auction projects and meet the set targets, India is poised to be among the top three solar markets globally,” commented Raj Prabhu, CEO at Mercom Capital Group.

In Q1 2024, India added 15.2 GW of new power capacity, with solar power accounting for 66% of these additions.

Rajasthan and Gujarat led the large-scale solar installations, contributing 38% and 35% of the capacity additions, respectively, while Madhya Pradesh followed with 8%.

As of March 2024, India’s

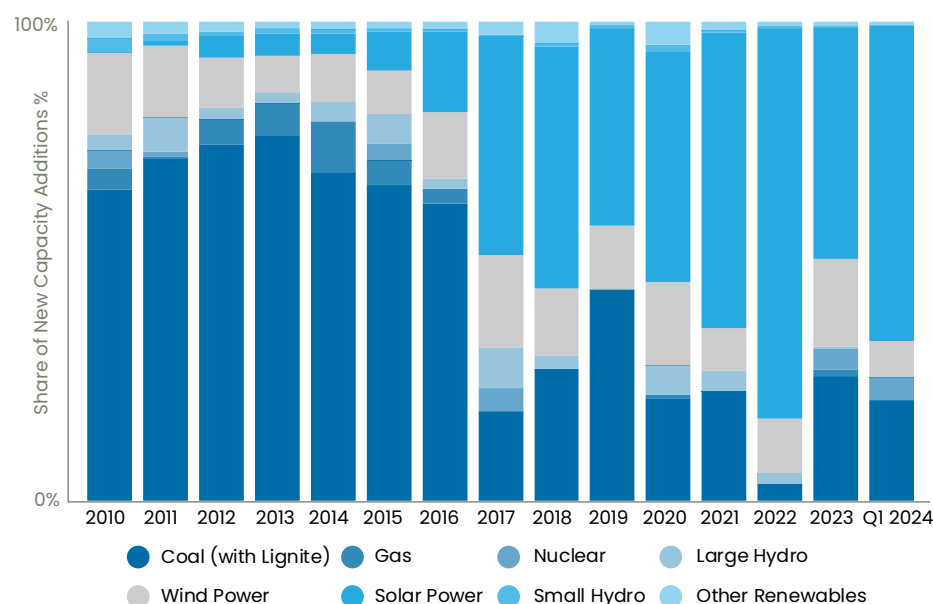
cumulative installed solar capacity reached 82 GW. Solar energy represented 18.5% of India’s total installed power capacity and 43% of the total installed renewable energy capacity.

Rajasthan had the highest cumulative installed large-scale solar capacity, accounting for 29% of the national total, followed by Gujarat and

Karnataka at 14% each.

According to Priya Sanjay, Gujarat’s proactive approach to renewable energy, especially with residential solar and wind-solar hybrid power projects, enabled it to overtake Karnataka. “Gujarat’s foresight and supportive infrastructure and policies have attracted numerous large-scale projects.”

### Share of New Power Capacity Additions in India (2010 – Q1 2024)



Solar accounted for 66% of new power capacity additions during Q1 2024

Data from CEA, MNRE, Mercom India Solar Project Tracker

Source: Mercom India Research (Mar 2024)





## The country's highest large-scale solar projects are in Rajasthan (29%)

By the end of Q1 2024, India's large-scale solar project pipeline stood at 143.3 GW, with an additional 93.1 GW of projects tendered and pending auction.

### Project cost declines

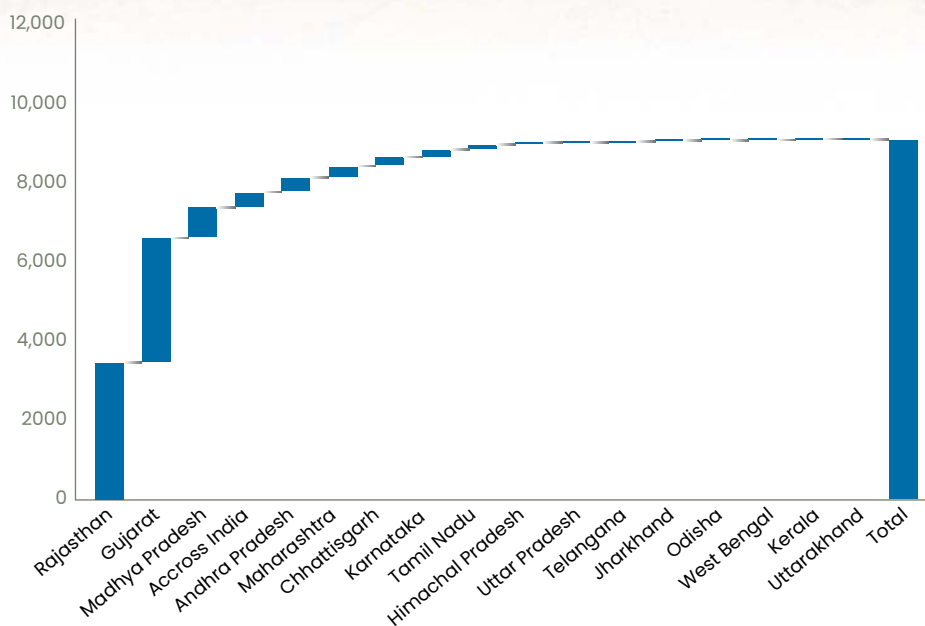
The average cost of large-scale solar projects fell by 7% QoQ and 28% YoY, significantly improving the projects' internal rate of return.

"The reduction in the average cost of large-scale solar projects is largely attributed to the falling prices of solar modules," Priya Sanjay said.

During the quarter, tenders totaling 30.7 GW were announced, up 122% YoY and 92% QoQ. Additionally, 25 GW of solar projects were auctioned, a 229% QoQ increase and a 2,957% YoY rise.

Priya Sanjay noted that the surge in tendering activity was driven by agencies adhering to defined targets and timelines. Previously, delays in

Q1 2024 Large-Scale Solar Installations (MW)



Source: Mercom India Research (Mar 2024)

auctions and PPA signings deterred bidders as they led to funds getting locked up. However, streamlined auctions and attractive tariffs have revitalized the process, leading to quicker PPA signings and increased developer interest.

Inadequate transmission

infrastructure and land acquisition delays could hinder timely project commissioning. Developers are racing to complete projects before the June 2025 ISTS charges waiver deadline. Rising land costs and scarce prime sites for solar could further complicate the landscape. ☹️





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# Political Parties Bet Big on Renewables in 2024 Election Manifestos

Ahead of the seven-phase elections to the Lok Sabha, India's lower house of Parliament, starting in April, the two major political parties in the fray have committed themselves to implementing a plethora of energy transition initiatives

By: B.S.Nagaraj

**I**n their manifestos, the ruling Bharatiya Janata Party (BJP) and the Opposition Indian National Congress have outlined their vision for adopting renewable energy to achieve energy independence.

The manifesto of the BJP, which has been governing India since 2014 and is seeking a third consecutive term, has detailed programs it plans to undertake on the renewable energy front.

The BJP has promised to ensure 'energy independence' by 2047 and reduce petroleum imports through a mix of electric mobility, a network of charging stations, renewable energy generation, and improved energy

efficiency.

By implementing the PM Surya Ghar Muft Bijli Yojana, the party said it would enable homes nationwide to run devices like electric stoves, fans, air conditioners, televisions, and electric vehicle charging through solar energy.

In February, the Union Cabinet approved the program to install rooftop solar systems in 10 million households, with a total outlay of ₹750.21 billion (~\$9.05 billion) until the financial year 2025–26.

"We will harness Bharat's renewable energy potential, targeting 500 GW of renewable energy through the establishment of mega solar parks, wind parks, and the Green Energy Corridor project, among others," the

BJP has said.

Among other significant promises, the BJP wants to incentivize private sector investment in large-scale battery energy storage systems infrastructure to foster renewable energy integration, grid stability, and resilience.

Other key points from the BJP's manifesto are:

Increasing ethanol blending in petrol to mitigate environmental degradation while providing additional income to farmers.

Expanding green hydrogen production and developing technologies to make India a major green hydrogen production hub.

Establishing smart grids incorporating smart meters and





control centers for efficient and intelligent energy management.

Setting up a center of excellence for clean energy technologies, positioning the country as a global manufacturing hub for wind, solar, and green hydrogen, and scaling bio-energy manufacturing facilities from all types of waste.

Accelerating the PM e-Bus Seva initiative by introducing e-buses in more cities.

### **Congress to Mobilize Green Energy Capital**

The Congress Party committed itself to mobilizing the massive capital required for India's green energy transition and achieving the

goal of net zero by 2070. The party plans to set up the Green Transition Fund of India together with state governments and the private sector.

"We will launch a Green New Deal Investment Program focused on renewable energy, sustainable infrastructure, and the creation of green jobs," the party said.

A parliamentary committee had said India would need an annual investment of ₹1.5-₹2 trillion (~\$19.72-~\$26.29 billion) in the renewable energy sector until 2030, compared to the ₹750 billion (~\$9.86 billion) estimated earlier.

The Congress said it would launch a major program to install solar

panels connected to tube wells to generate energy and promote solar-powered engines for tapping groundwater for agriculture.

"We will promote green energy. We will implement renewable energy schemes that will make the panchayats or municipalities self-sufficient in electricity as far as possible. We will promote solar-powered engines for tapping groundwater for agriculture," the Congress manifesto said.

It also promised to incentivize panchayats to establish and maintain solar grids to generate power for common purposes and create jobs at the panchayat level. ☀



# NREL's Roadmap to Make Tandem Solar Cells Commercially Viable

The researchers at NREL have proposed a roadmap to overcoming technical challenges to enhance the commercial viability of tandem solar cells

By: Pragathi Ravi

**R**esearchers at the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) have proposed enhancing cell and module efficiency to record levels, scale manufacturing, address reliability, and durability issues, and figure out the design of hybrid tandem solar modules to better commercialize them.

Tandem cells, which combine two or more junctions, are recognized

for their potential to achieve much higher efficiencies—over 40% under ideal conditions—compared to single-junction cells. Despite this, the commercial scalability of these cells continues to be hindered by the need for improved material properties, better integration techniques, and solving the durability and reliability issues.

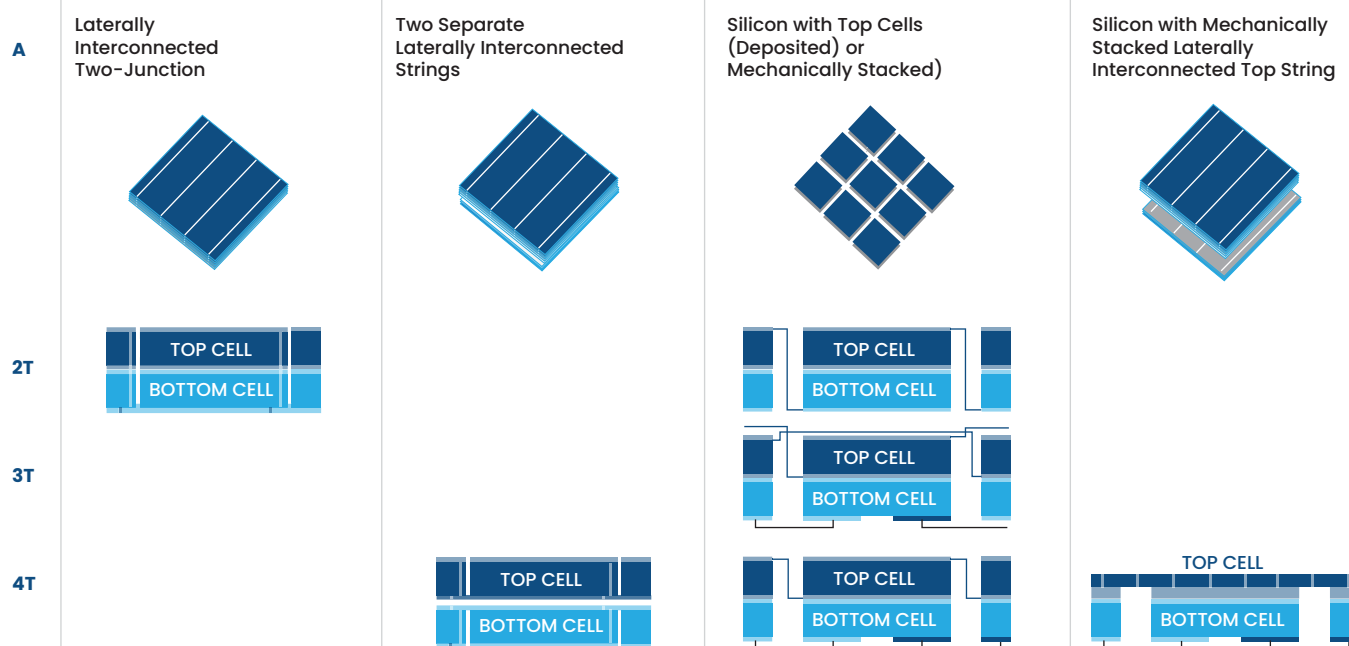
In a recently published study in the journal *Joule*, the researchers have outlined a pathway by reviewing

the current state of photovoltaic (PV) technologies and proposed a roadmap for overcoming the challenges. Through this, the team was able to effectively map the fundamental aspects of the cells and also identify the technical hurdles that needed to be navigated to improve the commercial viability of the tandem cells.

As per the researchers, most solar modules currently in use depend on a single junction, which can only absorb



## Demonstrated cell-level configurations



Source: NREL, University of Colorado

a fraction of the solar spectrum, limiting their efficiency. Tandem solar cells, when stacked together, hold the potential to reach higher efficiencies.

Tandem cells also come with their own challenges. "For single-junction PV materials, modules are made by interconnecting individual cells laterally in series. For tandems, there are multiple options to interconnect the cells, which provides another layer of complexity to the design of tandem modules," said co-author Emily Warren, a staff scientist in the High-Efficiency Crystalline Photovoltaics group at NREL.

The roadmap they charted focuses on combining two or more different PV technologies – hybrid tandems – to provide maximum efficiency. These are further divided into top cells and bottom cells.

The researchers have also found that only three single-junction PV technologies were successfully scaled up to at least a gigawatt production.

Inroads have been made by solar cells from copper indium gallium diselenide (CIGS) and cadmium telluride (CdTe). CIGS is suitable for a bottom cell and CdTe as a top.

However, the commercialization trajectories between silicon and

thin-film cells made of CIGS and CdTe inform the challenges that must be overcome to establish a gigawatt-scale tandem technology. Silicon PV benefitted from a steady influx of investments by the semiconductor community, resulting in shared knowledge and standardized processes.

For CIGS and CdTe, companies have guarded their processes and deposition techniques as they attempt to make headway against silicon PV.

For the top cell, the roadmap also vouches for the potential of other materials such as Gallium arsenide (GaAs) and gallium indium phosphide (GaInP) – both of which are known for their highest efficiency in single-junction devices. However, they are expensive, and the researchers at NREL were keen to search for cheaper manufacturing methods.

"Metal halide perovskites provide high enough efficiencies as a top cell and are also cost-effective enough to incorporate that the tandem would have much higher efficiencies than the single-junction cells of either technology," said Kirstin Alberi, the lead author of Joule.

For the bottom cell, silicon is an

obvious choice that is currently dominating the solar industry. The researchers claim that a tandem cell consisting of these top and bottom cells currently holds the record for efficiency. Further, this can be an important driver for lowering the total system cost by reducing the area of the system and the associated balance of system costs.

With these benefits, the study has placed tandem cells on the roadmap of PV manufacturers and has predicted that the cells will reach 2% of the market share by 2030.

"Existing consortia have proven to be immensely helpful in the development and commercialization of single-junction PV technologies because they can help in information sharing, advocating for cross-cutting research that will help the field as a whole, and focusing larger sets of stakeholders to work together to solve problems that impact the entire field," said Alberi.

The authors have sought to enable researchers and manufacturers to collaborate and address important aspects of tandem design, reliability, and scaling to facilitate progress in mass commercialization. ☺



# EV Sales Sustain Growth Momentum, Record 40% Surge in Q1 2024

The electric vehicle market segment has witnessed consistent growth over the past year, carrying the momentum into 2024, as January and February recorded over 100,000 units sold, and March crossed the 200,000 mark

By: Arjun Joshi

**E**lectric vehicle (EV) sales in India reached a record 486,669 units in the first quarter (Q1) of 2024, a jump of over 40% year-over-year (YoY) against the 347,676 units sold in the same period of 2023.

The EV market consistently exceeded the 100,000-unit threshold each month during the quarter, and March witnessed the highest-ever monthly sales figure of 204,337 units.

EVs account for 7.9% of overall automobile sales, which totaled 6,157,070 units in Q1 2024, according to data released by the Ministry of Road Transport and Highways through its Vahan Dashboard. The numbers do not include data for Telangana and Lakshadweep.

India now has over 3.95 million registered EVs.

## Electric two-wheelers

Electric two-wheelers accounted for nearly 62% (301,010) of total EVs sold in Q1 2024.

Ola once again led the segment with the highest sales at 116,810, followed by TVS (56,412), Bajaj Auto (40,530), Ather (35,627), and Greaves Electric (7,852).

## Electric three-wheelers

Electric three-wheelers constituted 33% (164,696) of all EVs sold in Q1 2024.

Mahindra Last Mile Mobility emerged as the leader in this category, achieving the highest sales

with 16,136 units sold, followed by YC Electric (10,052), Piaggio Vehicles (7,424), Saera Electric Auto (6,640), and Bajaj Auto (6,312).

## Electric four-wheelers

Electric four-wheelers represented 4% of the total sales at 20,963 units in Q1 2024.

Tata Motors was once again the most preferred electric four-wheeler automobile maker, with 14,075 units sold. MG Motor (3,215), Mahindra & Mahindra (1,982), Hyundai (436), and BYD India (350) were the other major players.

Phase II of the Faster Adoption and Manufacturing of Electric and Hybrid Vehicles (FAME) program ended on March 31, 2024. 📍



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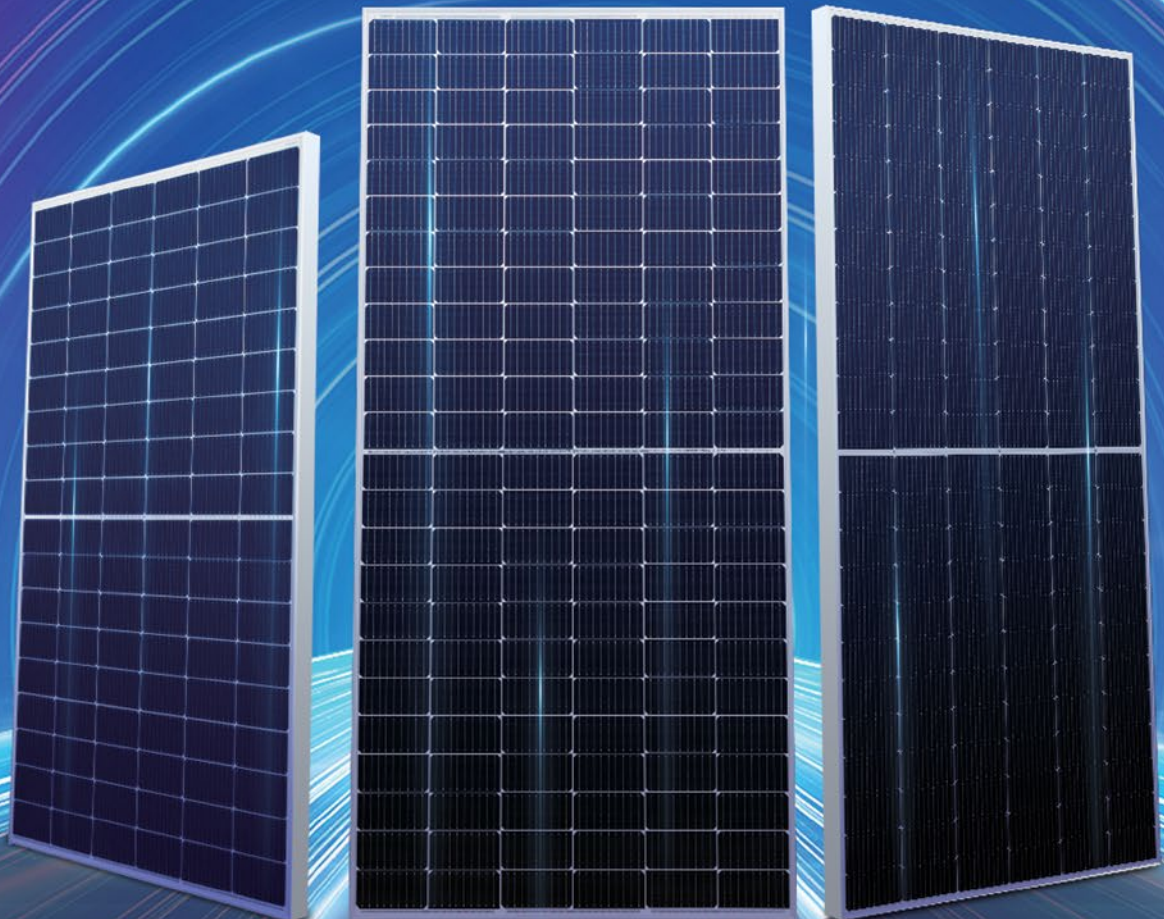
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# Solar's Share in Installed Power Capacity Rose to 19% YoY in Q1

The share of solar in the power capacity mix surged due to the increase in new capacity additions as developers tried to take advantage of reduced module prices and the ALMM deadline nearing

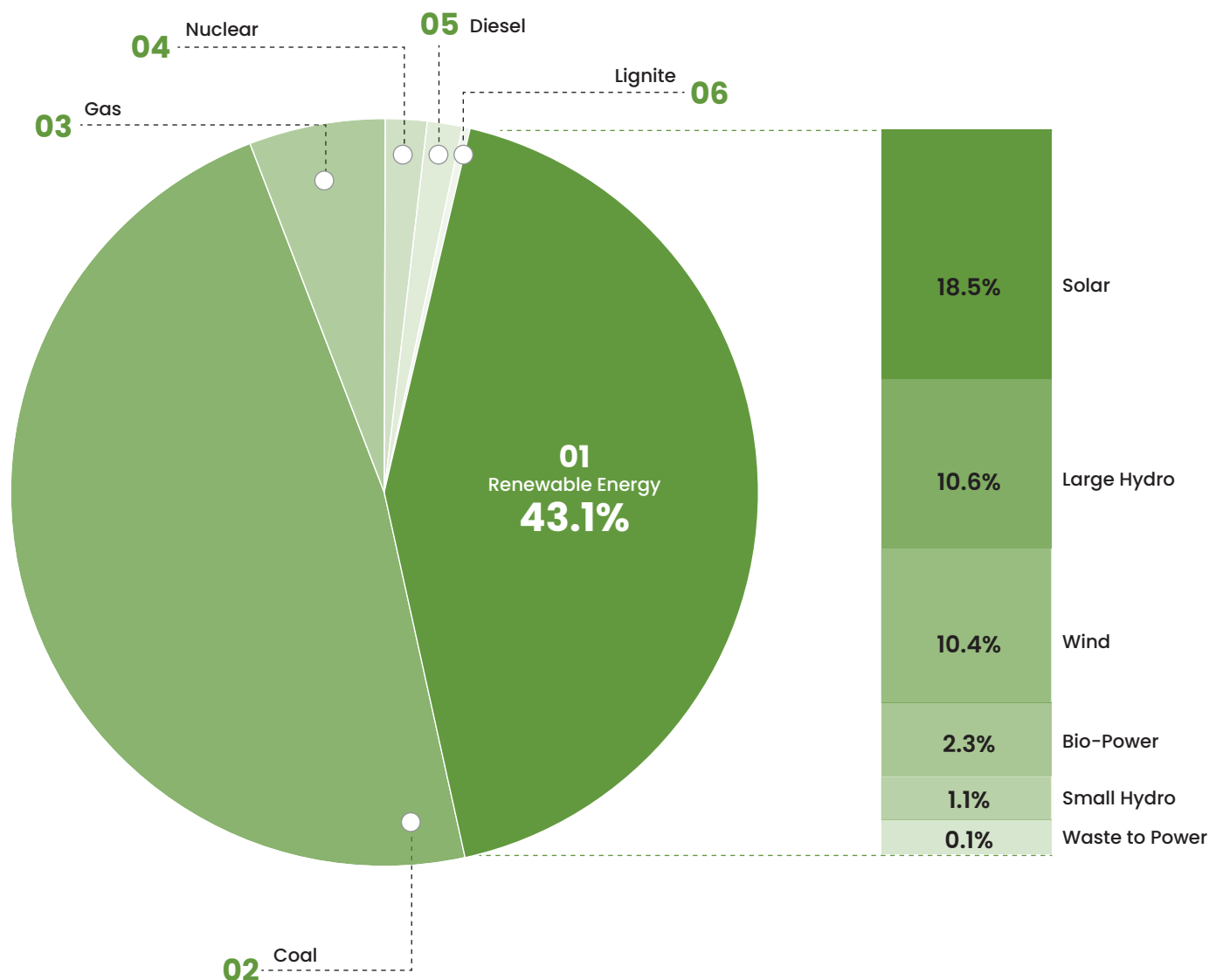
By: Rohit Nema

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## India - Cumulative Installed Power Capacity Mix (%)

Renewables (including Large Hydro) comprise ~43% of India's total installed capacity, with solar accounting for ~18%. Among renewables, solar accounts for ~43% of the installed capacity



Date from CEA, Mercom India Solar Project Tracker (installed Capacity as on 31st Dec 2023)

Source: Mercom India Research

**S**olar power accounted for 18.5% of India's total installed power capacity and 42.9% of the installed renewable capacity in the first quarter (Q1) of the calendar year (CY) 2024, up from 15.2% and 37.4% year-on-year (YoY), respectively.

India's installed renewable energy capacity, including large hydro projects, stood at 190.6 GW, accounting for a 43.1% share of the overall power capacity mix at the end of Q1 2024, according to data from the Central Electricity Authority

(CEA), Ministry of New and Renewable Energy (MNRE), and Mercom's India Solar Project Tracker.

The total renewable energy share in the power mix increased from 179.5 GW, representing 42% of the overall power capacity mix, at the end of CY23.

India generated about 32 BU of solar power during the quarter.

Large hydro accounted for 10.6% and wind 10.4% of the country's overall installed power capacity at the end of March 2024.

Biomass and small hydro

accounted for 2.3% and 1.1%.

### Energy from conventional sources

As of March 2024, the installed capacity of conventional power sources stood at 251.4 GW, making up 56.9% of all installations, decreasing from 58% in the previous quarter.

Coal-based thermal power constituted 47.7%, gas 5.7%, nuclear 1.8%, lignite 1.5%, and diesel 0.13%.

Coal remained the top power source, with nearly 211 GW of thermal installations by the end of March 2024, increasing from 207.8 GW in the previous quarter. ☺

# Telangana's Green Energy Open Access Regulations

The state has released the new green open access regulations providing consumers detailed processes and rules for procuring renewables

By: Arjun Joshi

**C**onsumers with a contracted or sanctioned load of 100 kW and above, including those combining multiple connections to reach 100 kW within the same electricity division of a power distribution company (DISCOM), can procure power through green energy open access (GEOA), according to Telangana State Electricity Regulatory Commission (Terms and Conditions of Open Access), Regulation, 2024.

The regulations align with the green energy open access regulations issued by the Ministry of Power last June.

## Categorization of Green Energy Open Access

GEOA consumers are categorized based on how long they use the intra-state transmission or distribution system, both within the same distribution system and within the state but in different distribution systems or different states.

Long-term open access refers to the permission to utilize the state's transmission and distribution system for more than seven years but not exceeding 25 years.

Medium-term refers to the permission to utilize the state's transmission and distribution system

for over a month but not more than seven years.

Short-term refers to the permission to utilize the state's transmission and distribution system for less than one month.

## Procedure for grant of access

GEOA applicants must submit a complete application using the central portal. The application is forwarded to the State Nodal Agency (SNA) by the Central Nodal Agency for verification.

Captive consumers must submit a security deposit by April 30 each year in the form of an unconditional



and irrevocable bank guarantee. This deposit should be equivalent to 51% of their captive consumption for one year. It serves as a payment security mechanism for estimated charges like cross subsidy surcharge, additional surcharge, and any other charges as decided by the Commission.

The application fee is ₹5,000 (~\$60) for long-term and medium-term transactions and ₹1,000 (~\$12) for short-term transactions.

Those seeking long-term transactions must commission their projects or units within 12 months from the agreement date to prevent corridor blocking.

Applications for medium-term and short-term GEOA for power projects or generating units that have not yet been commissioned must be submitted no earlier than two months before the expected commissioning date to avoid unnecessary blocking of transmission or distribution corridors.

Applicants for long-term and medium-term transactions must accompany their application with a ₹5,000 (~\$60)/ MW bank guarantee, which is returned upon signing the wheeling agreement but encashed if the application is withdrawn before this.

If there is a significant change in the injection point location or power quantity (more than 10%), a new application must be submitted for the entire capacity. Relevant documents, fees, and a bank guarantee for additional capacity are required for long-term access. The applicant retains access to their original allotment if the network cannot accommodate the extra capacity.

If an application is rejected due to deficiencies, any fees and guarantees submitted are returned, and the applicant may reapply after addressing the issues. Until GEOA is granted, applicants cannot inject energy into the licensee's network.

Energy injected before agreement submission incurs an average power purchase cost rate of 75% of the generic tariff charges. Failure to execute the agreement within the specified time cancels the granted GEOA.



Application details and status are made public on the SNA's website.

#### Procedure for Applying for Day Ahead Transactions

The applicant must apply to the central portal for day-ahead GEOA transactions.

SNA will review applications received from the central agency before 1:00 PM on the day before scheduling day-ahead transactions. It will check for system congestion and notify applicants via email or fax by 3:00 PM on the same day, confirming approval if there is no existing PPA for the requested capacity under open access.

The applicant must pay a non-refundable processing fee of ₹1,000 (~\$12) for each transaction.

However, the open access will only be implemented if the applicant pays the specified charges outlined in these regulations and orders issued by the Commission before 5:00 PM on the day before scheduling for day-ahead transactions.

#### Consumption criteria

For units marked for captive use, theFor units marked for captive use, their consumption is checked based on the net electricity generated by the power station. This means the total electricity produced minus any extra electricity used for auxiliary purposes.

The net electricity generated will be determined annually at the end of the year.

Verification criteria for various types of captive consumers will be as



## Policy

follows:

- The electricity used for self-consumption should be at least 51% of the net electricity generated annually for single captive consumers, partnerships, and limited liability partnerships.
- For associations of persons, the electricity consumed for captive use should be at least 51% of the net electricity generated annually. Each member's share should match their ownership in the power project, with a permissible variation of 10%.
- Members of a cooperative society must collectively consume not less than 51% of the net electricity generated annually.
- Special purpose vehicles must consume not less than 51% of the net electricity generated annually.

### Shareholding criteria

A single captive consumer must hold at least 26% of the equity share capital with voting rights throughout the year. A certificate from the company secretary is required to support the shareholding.

For partnership firms or limited liability partnerships, the partners' ownership in the captive project should be not less than 26%

proprietary interest and control over the generating station or power project annually. They must have a certificate from the company secretary to support their shareholding.

In the case of associations of persons, the captive consumer should hold an aggregate of not less than 26% of the ownership or paid-up equity share capital with voting rights throughout the year. They must have a certificate from a registered chartered accountant to support their shareholding.

Members of cooperative societies should hold 26% of the ownership annually. They must have a certificate from the district registrar of the cooperative society to support their shareholding.

In the case of special purpose vehicles, the captive consumer must hold an aggregate of not less than 26% of the proportionate paid-up equity share capital with voting rights of the units identified for captive use. They must have a certificate from a registered chartered accountant to support their shareholding.

Solar and wind-based or mini-hydel open access generators of contracted capacity up to 5 MW shall

not be required to provide a day-ahead wheeling schedule, and the actual electricity injected by them will be deemed to be the scheduled energy.

### Open Access Charges

The Commission has set the following charges for green energy open access:

- Transmission Charges
- Wheeling Charges
- Cross-subsidy Charges (If a user purchases green energy from a renewable energy-based generating plant, the charges won't increase by more than 50% for twelve years from the plant's operation start date. This cross-subsidy charges limit remains even if the user switches to different green energy sources during this period. If power is drawn from non-green open access sources within twelve years, the 50% cross-subsidy charges increase limit will not apply. Cross-subsidy charges don't apply to power from Waste-to-Energy plants or when green energy is used for green hydrogen and ammonia production. Captive users supplying electricity from





their own generating plants for self-use are exempt from cross-subsidy charges)

- Additional Surcharges (Additional Surcharges will not apply to GEOA consumers if they pay fixed or demand charges. Additional Surcharges won't apply if power comes from a Waste-to-Energy plant or if green energy is used for green hydrogen and ammonia production. AS also does not apply to electricity from offshore wind projects commissioned up to December 2032 for GEOA consumers. Additionally, Additional Surcharges don't apply to open access consumers using their own captive power projects for power wheeling.
- Scheduling and State Load Dispatch Center charges
- Deviation and Reactive charges
- Standby Charges (if applicable)

### Banking


Energy banking up to 30% of the total monthly consumption of electricity from DISCOM will be allowed.

The banking charges will be 8% of the energy banked by GEOA consumers with the DISCOM.

The banking period for energy will be one month, and any unused energy at the end of the month will expire. However, the GEOA consumer will receive renewable energy certificates for the unused energy. Energy credits will be adjusted based on the time slots designated by the Commission for tariff determination.

Energy banked during peak time slots can be used during both peak and off-peak times by paying banking charges, while energy banked during off-peak times can only be used during off-peak times.

If transmission and wheeling charges or losses were already applied when the energy was injected into the system, they will not be applied again when the energy is withdrawn.

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# Proposed Rules for the Residential Rooftop Solar Program

The MNRE has proposed guidelines to implement the PM-Surya Ghar Rooftop Solar program, including eligibility, disbursement, and technical specifications

By: Gautamee Hazarika

**T**he Ministry of New and Renewable Energy (MNRE) has issued draft guidelines for implementing the PM-Surya Ghar: Muft Bijli Yojana in the residential rooftop solar segment.

The Government of India launched the program on February 13, 2024. It aims to install rooftop solar projects in ten million households at a cost of ₹752.01 billion (~\$8.9 billion).

The previous Phase II of the grid-connected rooftop solar program will be subsumed under the current program, along with the remaining financial outlay and liabilities, effective from the program's launch.

The financial outlay for the program includes nine sub-components.

The program would be implemented through the National Portal.

The breakdown of central financial assistance (CFA) is as follows:

- Residential sectors with a tender capacity of up to 2 kW or part thereof will receive 60% of the benchmark

cost of 2 kW.

- Additional tender capacity in the residential sector (up to 1 kW) will qualify for 40% of the benchmark cost of the additional kW.
- No additional CFA will be provided for residential sectors beyond 3 kW.
- Group housing societies and residential welfare associations (GHS/RWA) for shared facilities, including EV charging, up to 500 kW [at ₹3 (~\$0.035)/kW per house], are eligible for 40% of the benchmark cost of additional kW.

Based on the benchmark cost for FY 2023-24, rooftop solar projects up to 2 kW in households receive ₹30,000 (\$361.85)/kW or part thereof, while additional capacity between 2 kW and 3 kW is

eligible for ₹18,000 (\$217.12)/kW. GHS/RWA will receive ₹18,000 (\$217.12)/kW as central financial assistance.

The funds for the CFA and other disbursements related to the program will originate from the budget designated for the rooftop solar phase II program until a separate budget is allocated for it.

The program will be implemented until March 31, 2027, when all claims must be settled.



**Eligibility**

1. For the purpose of CFA, a residential rooftop solar project must be the grid-connected solar power system tagged to a particular residential power connection of the local DISCOM. It will only include installations on a roof/terrace/balcony/elevated structures.
2. The CFA should be irrespective of the size of the inverter installed. If a consumer installs a rooftop solar project with a higher/lower-rated inverter capacity than the number of modules, the CFA provided will be as per the rated DC capacity of the module system (according to the CFA structure) and not as per the inverter capacity.
3. To be eligible for the CFA, solar modules used in the installation must satisfy the Domestic Content Requirement condition, i.e., domestically manufactured modules manufactured from domestically manufactured cells.
4. A rooftop solar installation by residential consumers/RWAs that have availed CFA under the prior/current program for rooftop solar by the Ministry of New and Renewable Energy and have subsequently increased the RTS



## For national vendor registration, a bank guarantee of ₹2.5 million is required

installation size will be eligible for additional CFA under the current program only the balance capacity up to 3 kW of overall RTS project size.

Suppose a household previously installed a rooftop solar system of 1 kW capacity under the Phase 2 grid-connected rooftop solar program and received a subsidy of ₹14,588 (\$174.26), and later increases the total capacity to 4 kW. In that case, it can claim additional subsidy only for the additional 2 kW capacity under the current program, amounting to ₹48,000 (\$573.42).

Similarly, suppose a household initially installs a 1 kW system and receives a subsidy of ₹30,000

(\$358), subsequently expanding the total capacity to 4 kW. In that case, it can claim additional subsidy only for the additional 2 kW capacity, totaling ₹48,000 (\$573).

A rooftop solar installation can receive CFA only once after installation. If an already installed rooftop solar system is relocated to a new location, it will not be eligible for CFA under the program.

The program aims to assist in installing grid-connected rooftop solar projects in the residential sector by providing central financial support from the government. However, no CFA will be extended to non-residential segments of consumers, including the government, commercial, and industrial sectors.

Vendors must register on the National Portal, where they can specify their operational states and districts.

Upon registration, vendors must submit a bank guarantee according to the type of registration:

For state-based vendor registration,





each state or union territory requires a bank guarantee of ₹250,000 (~\$2,989).

For national vendor registration, a bank guarantee of ₹2.5 million (~\$29,892) is required for all States/ Union Territories.

As vendors install capacity through the National Portal, the bank guarantee requirement will be adjusted based on the installed capacity:

- For installations ranging from 0 to 200 kW, the existing initial bank guarantee will apply.
- For installations between 200 kW and 1,000 kW, a bank guarantee of ₹1.5 million (~\$17,933) will be required.
- For installations between 1000 kW and 5,000 kW, a bank guarantee of ₹5 million (~\$59,773) will be required.
- For installations exceeding 5000 kW, a bank guarantee of ₹10 million (~\$119,547) will be required.

Vendors can respond to beneficiaries' expressions of interest, manage their project portfolios, showcase offered rooftop solar systems with pricing details, display their history of completed projects, and provide other relevant information for the beneficiaries' benefit.

The implementing agency (State DISCOM or designated agency), MNRE officials, or any other authorized agency may conduct inspections of ongoing installations or installed plants.

### Technical Specifications

A rooftop solar system should include components such as solar

“

## The program will be implemented until March 31, 2027, when all claims must be settled

photovoltaic modules, inverter/ microinverters, module mounting structures, energy meters, array junction boxes, DC distribution boxes, AC distribution boxes, protections— earthing, lightning, surge, cables, drawings and manuals, and any other necessary components based on site requirements.

Projects must be commissioned according to technical specifications published by MNRE.

Vendors will be responsible for any deficiencies or negligence/ malpractice leading to bank guarantee encashment, profile deactivation, vendor blacklisting, or other disciplinary actions.

Vendors must rectify any deficiencies in the system that result in non-disbursal of CFA or non-commissioning by the DISCOM due to quality/component issues.

A prerequisite for CFA eligibility is using domestic modules manufactured from domestic cells as per domestic content requirements. No CFA will be disbursed if this requirement is not met.

MNRE may periodically notify the approved list of modules and

inverters eligible for CFA based on specified technical criteria to prevent vendors from supplying poor-quality equipment.

Vendors must use one of these approved modules and inverters in all projects installed under the program.

Original equipment manufacturers (OEM) of enlisted inverters must share generation data reporting from their systems via API integration with the National Portal.

Data generated and transmitted by these inverter systems should be integrated with the National Portal to enhance services for beneficiaries.

Registered vendors must provide repair/maintenance services free of charge for five years from the commissioning date.

Consumers undertaking installations by bearing the capital expenditure, either by themselves or through the assistance of a bank loan and the upfront payment made to a registered vendor, will be considered projects undertaken in CAPEX mode.

All CFA requests for such projects must be made on the National Portal.

Non-performing/under-performing PV panels will be replaced free of charge during the warranty period. Beneficiaries will receive specified warranties from OEMs on system components for any future replacement of malfunctioned components.

Both beneficiaries and vendors have the option to raise grievances through the National Portal. These grievances will then be directed to the State Implementation Agency for resolution via a two-tier escalation matrix. 📧



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# Draft Regulations on Regional Load Despatch Center Charges

The CERC has proposed rules to determine the registration process and various Regional Load Despatch fees and charges to be paid by the generating companies, DISCOMs, and consumers

By: Arjun Joshi

**T**he Central Electricity Regulatory Commission (CERC) has issued draft regulations to determine fees and charges to be collected by Regional Load Despatch Centres (RLDCs) from the generating companies, distribution companies (DISCOMs), bulk consumers, inter-state transmission licensees, buyers, sellers and inter-state trading

licensees, settlement nodal agency and any other users.

The proposed regulations are named Central Electricity Regulatory Commission (Fees and Charges of Regional Load Despatch Center and other related matters) Regulations, 2024.

Stakeholders can submit their comments and suggestions by May 6, 2024.

## Registration Process

Users intending to access the grid must sign up with their Regional Load Despatch Centre (RLDC) at least 30 days before using it. When new units or parts of the transmission system are added, the company must inform the RLDC 30 days before these additions start operating.

Power exchanges and trading licensees must register with the



National Load Dispatch Center (NLDC) 30 days before using the services.

Upon application, auto-generated acknowledgment for receipt of the application will be issued by the concerned RLDC or NLDC. After scrutiny, the concerned RLDC or NLDC may inform the applicant of any deficiencies in the application within one week. The applicant must rectify the deficiency within one week, after which the application will be closed.

The RLDC or NLDC, after scrutinizing registration applications and being satisfied with the correctness of the information furnished in the application, must register the applicant and send a written intimation to the applicant.

RLDCs or NLDCs will then maintain a list of registered users on their website and their registration date.

RLDCs or NLDCs can cancel a user's registration after giving at least a month's notice if the user (i) loses their connection, (ii) their Grid Network Access ends, or (iii) they fail to pay the required fees for over 120 days past the due date. If the user resolves these issues, they can apply for registration again.

Registered entities that experience

a change in name or legal status after registration must notify the relevant RLDC or NLDC. They should provide supporting documents from an appropriate authority, like the Registrar of Companies, the National Company Law Tribunal, or any other court. The RLDC or NLDC will verify these documents and update their records to reflect the change within 30 days of receiving the information.

#### Registration Fees

DISCOMs, bulk consumers, and inter-state transmission licensees must pay a one-time registration fee of ₹1.5 million (~\$18,032) upon applying for grid access.

Generating companies:

- Up to 10 MW installed capacity: ₹75,000 (~\$901)
- More than 10 MW and up to 100 MW: ₹150,000 (~\$1,803)
- More than 100 MW and up to 500 MW: ₹750,000 (~\$9,016)
- More than 500 MW and up to 1,000 MW: ₹1 million (~\$12,021)
- More than 1,000 MW: ₹1.5 million (~\$18,032)

Interstate trading licensees, renewable power park developers,

qualified coordinating agencies, SNA, sellers, and buyers must pay a one-time registration fee of ₹15,000 (~\$180) along with the scheduling application.

Power exchanges must pay a one-time registration fee of ₹3 million (~\$36,065) to NLDC.

#### Functions of RLDC and NLDC

The functions of the Dispatch Center include Market Operation and System Operation functions.

The Market Operation function involves:

- Assisting new entities in accessing the grid.
- Administering open access.
- Finalizing inter-change schedules for energy accounting.
- Managing Day Ahead Market and Term Ahead Market.
- Overseeing Real-Time Market and Ancillary Services Market.
- Managing interface energy metering.

Registry Function under programs like renewable energy certificate, perform, achieve, trade, and others as directed by the Commission or Government of India.

System operation function includes:





### Power exchanges must pay a one-time registration fee of ₹3 million to NLDC

- Operational planning, scheduling, and dispatch on a day-ahead and real-time basis.
- Analysis after dispatch.
- Dissemination of information.
- Any other tasks assigned to RLDCs or NLDCs by the Act, Regulations, or Commission orders.

#### Capital Expenditure

The CAPEX plan outlines the capital expenditure undertaken during the control period, encompassing various vital areas. This includes upgrading and expanding infrastructure, modernizing existing assets, and adopting state-of-the-art IT and communication systems to enhance operational efficiency and cybersecurity.

Additionally, the plan incorporates provisions for disaster recovery control centers, civil structure construction and renovation, and procurement of necessary infrastructure facilities. It also accounts for installing new assets or replacing existing ones prematurely due to legal changes or unforeseen circumstances, subject to regulatory approval.

Furthermore, the plan addresses liabilities arising from arbitration awards or compliance mandates from statutory authorities or court orders.

RLDCs and NLDCs must provide the Commission with details regarding replacing existing assets. This includes information such as the proposed date of replacement, cumulative depreciation recovered up to that date, cumulative loan repayment, and writing off the gross value of the original assets from the fixed assets. Additionally, they must outline the estimated expenditure and completion period for each replacement program.

Consolidated CAPEX programs are managed as follows: CAPEX involving both NLDC and RLDCs will be included in NLDC's plan, while CAPEX involving one or more RLDCs will be separated and included in the respective RLDC's plan.

Any CAPEX needed during the control period due to unforeseen events like force majeure or changes in laws, directives from the Commission, or other authorities not included in the initial CAPEX plan will be considered during the true-up process. However, if the extra capital expenditure exceeds 20% of the approved capital expenditure for the control period, a separate request can be submitted during that period.

#### Determination of fees

The annual LDC charges for 2019-2024 will be adjusted according to Regulation 13 of the Central Electricity Regulatory Commission (Fees and Charges of RLDC and NLDC) Regulations, 2019.

From this adjustment, the capital cost approved by March 31, 2024, will be the starting point for calculating the opening capital cost on April 1, 2024, for determining the annual LDC charges for 2024-2029.

The NLDC, including the Corporate Centre and all RLDCs, must submit a petition within 180 days of notification of these regulations.

It should include the capital expenditure incurred and certified by





the auditor as of March 31, 2024, as well as projections for the expenditure during 2024–2029 based on the CAPEX plan.

The annual LDC charges for 2019–2024 will be reviewed according to Regulation 13 of the Central Electricity Regulatory Commission (Fees and Charges of RLDC and NLDC) Regulations, 2019. As of March 31, 2024, the capital cost will be used as the starting point for calculating the annual LDC charges for the control period 2024–2029.

To determine the charges for 2024–2029, the NLDC will file a petition within 180 days from the date of notification of the regulations. This petition, submitted on behalf of NLDC

and all RLDCs, will be based on the capital expenditure incurred by March 31, 2024, and the projected spending for the control period 2024–2029, as outlined in the CAPEX plan. Before filing the petition, the NLDC must share it with users and post it on its website to invite public comments. The Commission will consider any feedback received within 60 days.

After hearing from all relevant parties, the Commission will issue an order determining the fees and charges. During the petition process, RLDCs will continue billing users based on fees approved by the Commission until March 31, 2024. After the control period ends, provisional billing will continue based on fees approved

“

## Operation and maintenance allowed for 2023–2024 will be escalated by 5.25% yearly

by the Commission until March 31, 2024. The Commission will separately determine fees and charges for each RLDC and NLDC.

The annual NLDC charges, including Corporate Centre expenses, will be distributed among RLDCs based on the GNA of the drawee DICs in each region as of March 31, 2024.

### Truing up of annual charges

NLDC must submit a petition by October 31, 2029, on behalf of RLDCs and NLDC (including Corporate Centre) for conducting a truing-up exercise after the control period ends. This petition should include details of capital expenditures, sources of financing, operation and maintenance expenses, and any other incurred costs from April 1, 2024, to March 31, 2029, duly audited and certified by the auditor.

The Commission will conduct the truing-up exercise along with the application for determining fees and charges for the next control period based on the admitted expenditures up to March 31, 2029. RLDCs and NLDCs will perform annual reconciliation and provisional truing-up of their expenses, refunding any excess fees collected to users by September 30 of the following year.

If necessary, a mid-term review of expenses may be conducted within the control period, with NLDC filing a mid-term true-up Petition before the Commission.

Any amount under-recovered or over-recovered by RLDCs, including NLDC charges, will be refunded or recovered from users in six equal monthly installments, along with





## Policy

simple interest equal to the Reference Rate of Interest as of April 1 of the respective year until the Commission's order issuance date.

### Computation of Capital Cost

After careful review, the Commission will use the capital cost approved to determine the annual LDC charges for RLDCs and NLDCs.

This cost will be calculated by considering several factors: the approved capital cost as of March 31, 2024, excluding any liabilities; additional capitalization expenses as per Regulation 14(1); depreciation of replaced fixed assets as per Regulation 14(2); interest during construction and related expenses approved by the Commission; and excluding grants received from the government or statutory bodies without repayment obligations from the capital cost calculations.

The admitted capital cost will undergo a prudence check, examining the reasonableness of various factors such as capital expenditure, financing plan, interest during construction, incidental expenses during construction, financing charges, foreign exchange rate variations, cost overruns, and time overruns. Interest during construction will be calculated based on actual and normative loans, with norms applied to cases where equity infusion exceeds 30% of total funds deployed. Incidental expenses during construction will be computed

from project commencement, considering pre-operative costs, and any revenue earned during construction will reduce these expenses.

If project delays are not the RLDC's or NLDC's fault, interest during construction and incidental expenses during the delayed period may be allowed after a prudence check, with any liquidated damages recovered from contractors adjusted in the RLDC's or NLDC's capital cost. RLDCs and NLDC will submit Auditor and Management Certificates for capital expenditure incurred as of March 31, 2024, and projected expenditure for the control period 2024-29, respectively.

After reviewing their prudence, the Commission may approve capital expenditure for existing or additional assets planned during the tariff period. If assets are de-capitalized, their original cost will be subtracted from the gross fixed asset value, and the corresponding loan and equity will be deducted from the outstanding loan and equity in the year of de-capitalization. Adjustments will also be made to cumulative depreciation and loan repayments, considering the year of capitalization.

### Debt-equity ratio

The debt-equity ratio for Regional Load Despatch Centres and National Load Despatch Centres is determined based on various factors. The actual

ratio admitted by the Commission until March 31, 2024, is considered for the beginning of the control period 2024-2029. The Commission will set it according to regulations for expenditures incurred before April 1, 2024, where the ratio hasn't been determined.

From April 1, 2024, the ratio is set at 70% debt and 30% equity. The excess is treated as a normative loan if the actual equity deployed exceeds 30%. However, if the actual equity is less than 30%, it determines the return on equity.

Any foreign currency investments are converted into Indian rupees. Grants received for projects are not considered part of the debt-equity ratio. Premiums raised by Grid-India for share capital and internal resources used for project funding are included in paid-up capital only if they're utilized for capital expenditure.

### Fees and charges structure

Charges include Load Despatch Centre (LDC) Fees for grid access registration and other services and Annual LDC Charges (ALC) for power scheduling. ALC includes RLDC charges, NLDC charges (including Corporate Centre expenses), and performance incentives for RLDCs and NLDCs.

RLDC charges include return on equity, interest on loan capital, depreciation, operation and maintenance expenses, human



resource expenses, and interest on working capital. NLDC charges are computed using the following methods, including expenses for the Corporate Centre approved by the Commission.

All NLDC and Corporate Centre expenses are distributed to Regional Load Despatch Centres based on their respective Grid Network Availability (GNA). Additionally, performance-linked incentives, approved by the Commission, are applied in addition to Annual RLDC charges.

### Computation of annual LDC charges

Return on equity is computed at a pre-tax rate of 15.5%, adjusted according to the effective tax rate of the relevant financial year as per the Finance Act. This adjustment is done by grossing up the base rate with the effective tax rate. Considering the applicable tax rate for Grid-India, the actual return on equity is adjusted at the end of the control period.

### Depreciation

The asset's salvage value (excluding IT equipment and software) will be considered 10%, and depreciation will be allowed up to a maximum of 90% of the capital cost of the asset. The salvage value for IT equipment and software will be considered NIL, and 100% of the assets' value will be considered

depreciable.

Land is not a depreciable asset, and its cost shall be excluded from the capital cost while computing the depreciable value of the capital cost of the asset.

The value of the assets not in use or declared obsolete should be removed from the capital cost to calculate depreciation.

### Operation and Maintenance Expenses

Operation and maintenance allowed for 2023-2024 will be escalated by 5.25% yearly to arrive at permissible operation and maintenance expenses for each year of the control period 2024-2029.

### Human resource expenses

Human resource expenses allowed for 2023-2024 will be escalated by 5.25% yearly to arrive at a permissible human resource expense for each year of the control period 2024-2029.

Any significant human resource expenses envisaged during the control period 2024-29 due to additional manpower wage revision will be allowed separately after the prudence check.

### LDC Development Fund

The Grid-India will maintain a separate fund called 'Load Despatch Centre Development Fund (LDCD Fund)' for the purposes specified in

this Regulation.

The charges from return on equity, interest on loan, depreciation, registration fees, Charges for scheduling under T-GNA, REC Charges, PAT Charges, and interest earned on the LDCD Fund shall be deposited into the LDCD Fund after meeting the statutory tax requirements.

The RLDC and NLDC shall be entitled to utilize the money deposited in the LDCD Fund for the creation of new assets, loan repayment, servicing of the interest and dividend payment restricted to 15.50% of paid-up capital, meeting equity portion for new assets, margin money for raising loan from the financial institutions and payment towards purchase consideration for acquisition ventures subject to the approval of the Commission.

### Performance-Linked Incentive

Each RLDC and NLDC can recoup an incentive equivalent to 12% of their Annual LDC Charges if they achieve a performance level of 90% against the Key Performance Indicators for the previous year ending on March 31.

This incentive will increase proportionally by 1% of annual LDC charges for every 5% improvement in performance above 90%. Conversely, the incentive will decrease by 1% for every 3% drop in performance below 90%, also proportionally. 📍



# Telangana Quashes Grid Support Charges for Rooftop Solar

The state electricity regulator has stated that the imposition of grid support charges would discourage consumers from opting for rooftop solar, impacting the state installation numbers

By: Gautamee Hazarika

**T**he Telangana State Electricity Regulatory Commission (TSERC) has refused to impose Grid Support Charges (GSC) on rooftop solar installations, whether

operating under net-metering or gross-metering arrangements.

It held that GSC should only be applied to captive power plants and solely for the power utilized by the co-located load.

Moreover, considering that retail supply tariffs have already been set for the fiscal year (FY) 2023-24 and the year is coming to a close, the Commission decided not to determine GSC for FY 2023-24.

Instead, it instructed state distribution companies (DISCOMs) to submit a separate request for GSC

determination for FY 2024-25, following its methodology.

The Commission has established the GSC calculation as follows: Grid Support Charges (GSC) = Power consumed by the co-located load x Rate of GSC (₹/kW/month). The Rate of GSC is set at ₹15.50 (~\$0.18) per kW per month.

## Background

The Southern Power Distribution Company of Telangana and the Northern Power Distribution Company of Telangana had filed petitions on November 30, 2022, for the determination of aggregate revenue requirement, retail supply tariff along with cross subsidy surcharge and GSC for the retail supply business for FY 2023-24.

The DISCOMs proposed imposing GSC on captive consumers based on the



methodology outlined in a previous Andhra Pradesh Electricity Regulatory Commission. These charges are intended to reflect the benefits enjoyed by captive power plants.

The Commission had instructed the Grid Coordination Committee (GCC) to examine the Parallel Operation of Captive Power Plants and the consequent imposition of GSC.

The GCC analyzed the impact of captive power plants connecting to the grid in its report and assessed whether grid support is necessary for their parallel operation. This analysis was done using the Power System Simulator for Engineering (PSS/E) software.

It also examined the behavior of captive power plants to evaluate their short-circuit capacity and stability under two different scenarios using the PSS/E software:

- Captive plants connected in parallel with the grid
- Captive plants operating in isolation

Subsequently, the Commission decided to refer the matter of grid support charges/parallel operation charges back to the GCC due to changes in the methodology for levying GSC. The GCC submitted its report on October 7, 2023.

#### Commission's Analysis

Grid networks represent a cost-effective and efficient means of serving areas with high-density loads. These networks offer maximum reliability and operational flexibility.

By drawing power from multiple transmission lines, grid-connected consumers experience minimal outages during scheduled

maintenance of transmission lines.

Moreover, integrated grid operation enhances voltage regulation, allowing for smoother power flow to consumers. The grid manages sudden load changes and disturbances associated with the starting of large motors, mitigating severe voltage fluctuations.

Additionally, the robust grid network's high inertia ensures that a fault in one unit does not cause voltage disruptions beyond acceptable limits for sensitive loads.

Consumers with high contracted loads who utilize captive plants to fulfill some or all of their demands need to typically reduce their contracted demand with distribution licensees. Captive power plants continue to operate in parallel with the grid for several reasons:

1. The grid provides stability to power plants when starting large-capacity motors in industries.
2. Voltage and frequency dips during the starting of large motors are minimized as the grid acts as an infinite Bus.
3. Without grid support, the captive plants may experience sluggish performance due to slow responses from governors and excitation systems.
4. Grid connection prevents generator tripping due to sudden load disconnections from captive plants.
5. Grid connection assists captive plants with fluctuating loads, such

as steel mills and arc furnaces, in stabilizing their operations.

Consequently, the grid serves as the backbone for captive plants to ensure their efficient electrical performance. Initially, consumers relied on contracted demand to meet peak demand, covering fixed charges for infrastructure provided by utilities.

“

## Rooftop solar capacity in Telangana is about 383 MW

However, as consumers installed captive plants and reduced contracted demands, utilities faced revenue losses while the plants benefited from grid support at minimal or no cost.

i) The grid absorbs load fluctuations in parallel operation, reducing stress on captive generators



## Markets

and equipment and enabling constant power generation regardless of load cycles.

- ii) Fluctuating loads from industries connected to the grid introduce harmful harmonics, with the utility grid absorbing more than captive power plants, adversely affecting equipment and power quality.
- iii) Unbalanced loads generate negative phase sequence current, significantly higher at common coupling points than generator output terminals. Grid connection reduces stress on captive generators by channeling this current.
- iv) Captive power plants benefit from higher fault level support in parallel with the grid, resulting in less voltage drop at load terminals.
- v) The grid stabilizes plant operations for starting heavy loads like HT motors.
- vi) Grid supply acting as an infinite bus minimizes voltage and frequency variations during motor and heavy load startups, with no meter recording sudden or

fluctuating load power demands.  
vii) Grid connection prevents captive generator tripping due to sudden load disconnections.

viii) Grid connection absorbs transient loads, enhancing system stability.

Grid support, an essential service utility provided to consumers, warrants charges imposed on captive power plants benefiting from this support.

The Commission ruled that GSC cannot be levied on:

- Captive power plants (both renewable and conventional) that are not co-located
- Independent power producers (IPP) (both renewable and conventional)
- Rooftop solar installations
- Generators with power purchase agreements with Telangana DISCOMs

The rationale for the non-applicability of GSC to the above is provided below:

1. Non-captive plants: Per the APTEL order, an IPP can only be

classified as a captive plant if it self-consumes more than 51% of its generation. If the IPP consumes less than 51% of energy, it cannot be deemed a captive plant and is not liable to pay GSC.

2. Similarly, renewable energy plants, including waste heat recovery plants, those based on municipal solid waste, and co-generation plants not meeting the conditions, cannot be classified as captive plants and, hence, are exempt from GSC.
3. Rooftop solar: With the observed rooftop solar capacity in Telangana at about 383 MW, the Commission aims to encourage the expansion of rooftop solar power, and hence, GSC cannot be imposed on such installations.

The Commission noted that according to the APTEL, GSC cannot be applied to the entire installed capacity, as doing so would entail levying it on capacity sold to third parties. ☺







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# Fast-Charging Sodium Battery Could Be Viable Alternative to Lithium-Ion

Researchers from KAIST and LBNL have developed a high-energy, high-power hybrid sodium-ion battery that could replace lithium-ion batteries

By: Pragathi Ravi





**L**ed by Jeung Ku Kang, a team from the Korea Advanced Institute of Science and Technology (KAIST) and Lawrence Berkeley National Laboratory (LBNL) has found a way to enhance sodium-ion hybrid energy storage systems through an innovative hybrid energy storage system that integrates anode and cathode materials.

Sodium, a metal 500 times more abundantly available than lithium, shows much promise for electrochemical storage technologies. While iron-based sulfides are environmentally non-toxic, low-cost, and promising anode materials, they have low electrical conductivity, significant volume change during charging/discharging cycles, and slow kinetics.

This necessitated the development of next-generation energy storage materials.

In a recent paper in the *Energy Storage Materials* journal, the researchers said they combined these materials to allow for high energy density, rapid charging capabilities, and robust long-term stability over many charging cycles, addressing the limitations plaguing sodium-ion technologies.

Sodium-ion hybrid energy storage cells that can use the different potential windows of capacitor-type cathodes and battery-type anodes have attracted a lot of attention because they could, in principle, simultaneously allow for high energy density and fast-rechargeable power density.

The team synthesized iron sulfide-

embedded S-doped carbon or graphene (FS/C/G) anode materials from the iron-based metal-organic framework or graphene oxide heterostructures via graphitic carbon formation and sulfidation.

This optimized the balance and minimized the disparities in energy storage rates between the electrodes.

They also achieved high-energy density and fast-rechargeable sodium ion cells by developing a low-crystallinity multivalence iron FS/C/G anode and a ZIF-derived porous carbon cathode.

Through this, the team was able to offer a more abundant and potentially cheaper alternative to lithium-ion systems, which will be especially useful for large-scale energy storage applications. 🌱







# GENCOs Allowed to Sell Surplus Power in the Market

The Ministry of Power has clarified that power stations must always be available and ready to dispatch power according to the Tariff Policy 2016

By: Arjun Joshi

**T**he Ministry of Power clarified that generators can sell surplus power in the power market to best use unutilized generation capacity.

The clarification, sent to energy departments of all states and generating companies, comes amid concerns that some power generators are not offering surplus power in the power market, leading to unused capacity.

In October 2021, the Ministry of Power issued guidelines for operationalizing the optimum utilization of generating stations as per the requirements of the electricity grid. These guidelines aim to ensure that power generators can effectively utilize their capacity by selling surplus power in the market.

Section 9(5) of the Electricity (Late Payment Surcharge and Related Matters) Rules of 2022, later amended in 2024, empowers generators to sell surplus power within their declared generation capacity, even if distribution companies do not requisition it.

Despite these provisions, the Ministry of Power has received feedback from power utilities highlighting certain restrictions in existing agreements. For instance, Fuel Supply Agreements (FSAs) and agreements under SHAKTI B (ii) for independent power producers restrict linkage coal solely for fulfilling long-term power purchase agreement obligations with distribution companies.

In response to these concerns,

the Ministry of Power clarified that generating companies, including those with long-term coal linkages under FSAs, can offer surplus power in the market.

This clarification, under the provisions of the Tariff Policy of 2016 and the Electricity (Late Payment Surcharge and Related Matters) Rules, aims to promote a more dynamic and responsive electricity market by utilizing power generation capacity efficiently.

By allowing power generators to sell surplus power, the government aims to minimize wastage of resources.

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# Industry News and Policy Briefs

**AdaniConneX**, a **data center solutions provider** and a joint venture between Adani Enterprises and EdgeConneX, established **sustainability-linked financing** to raise **\$1.44 billion** to fund its **renewable-powered data centers** and enable **digital infrastructure growth** in the country. The company said the upcoming data center facilities would leverage technologies and renewable energy solutions to minimize the **ecological footprint** while **optimizing operational efficiency**.



Renewable energy company **BluPine Energy** secured the **debt financing of ₹4.18 billion (~\$50.1 million)** from **HDFC Bank** for its **120 MW solar power project in Sadla, Gujarat**. The company won the project in **Gujarat Urja Vikas Nigam's auction** to **supply solar power** projects (Tranche XVIII) in January 2023. BluPine had won 50 MW in the initial auction for 500 MW solar projects at **₹2.52 (~\$0.0302)/kWh** and later received **additional greenshoe capacity**.

Public infrastructure finance company **REC Limited** availed a **green loan of ₹60.5 billion (~\$387.6 million)** from **SACE**, an Italian export credit agency, to finance a slew of **green projects in India**. This **maiden green loan transaction in India** also marks a first-of-its-kind successful collaboration between the two companies. The green facility benefits from an **80% SACE guarantee** under its Push Strategy program. This facility is SACE's **first JPY-dominated loan transaction**.



**Tata Power Solar Systems** will partner with the **Indian Bank** to bolster the adoption of affordable **rooftop solar** in the residential segment by making **low-interest loans** available to consumers. Under the partnership, **financing solutions** will be offered for installations up to **3 kW** under the **Pradhan Mantri Surya Ghar Muft Bijli Yojana** and installations with capacities from **3 kW to 10 kW** under the regular program. Residential consumers can avail loans up to **₹200,000 (\$2,401)** at a **7% annual rate of interest**.

**BluWheelz**, a tech-enabled logistics firm with an **electric vehicle fleet**, received **\$1 million** in a **bridge funding** round led by **Venture Catalysts**, an integrated incubator. The other participants in the investment round included **FAAD, LetsVenture, and Chakra Growth Fund**. The company expects to utilize the funds to expand its **EV-fleet** offerings for logistics across India. Operating in **18 cities** and providing **logistic companies** with **fleet management services**, including 2-wheelers, 3-wheelers, and 4-wheelers, BluWheelz plans to integrate **6-wheelers**, pioneering EV fleet as a service in India.



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## News in Brief

Telangana-based solar cell and module manufacturer **Premier Energies** filed the **draft red herring prospectus** (DRHP) with the Securities and Exchange Board of India to raise over **₹15 billion (~\$179.91 million)** through an **initial public offering (IPO)**. The IPO would consist of a **fresh issue of equity shares** with a face value of **₹1 (~\$0.012)** aggregating up to **₹15 billion (~\$179.91 million)** and an **offer for sale** of up to **28.2 million shares** by the selling shareholders. Premier Energies proposes to utilize the net proceeds of the fresh issue to invest **₹11.68 billion (~\$140.09 million)** for **part-financing** the establishment of a **4 GW Solar TOPCon cell** and **4 GW solar TOPCon module manufacturing facility** in Hyderabad.



**Ecozen**, a Pune-based startup focused on clean technology solutions for agriculture, raised **\$30 million** in a **new funding round** to **accelerate its growth** and **global expansion**. The investment includes **equity from existing investors** like Nuveen as well as **new debt financing** from the **InCred Credit Fund** and the **U.S. International Development Finance Corporation**. The capital will allow Ecozen to **scale up production** of its **solar-powered systems** for **agricultural irrigation** and **cold chain solutions**, the company said in a press release. It also plans to **expand** on its current **solar pump controller systems** and **cold storage solutions** offerings.

Bengaluru-based biofuels firm **GPS Renewables** secured **\$50 million** in debt financing from a **consortium of banks and non-banking financial companies** to accelerate the nationwide rollout of its **Compressed Biogas (CBG)** and **Renewable Natural Gas (RNG) projects**. Institutions in the financing round included Punjab National Bank, HDFC, Yes Bank, HSBC Bank, Kotak Mahindra Bank, ICICI Bank, Citibank, Vivriti Capital, Northern Arc, Spark Capital, Tata Capital and SIDBI.



**Avaada Energy** closed a **₹44.71 billion (~\$535.3 million)** refinancing deal with the **National Bank for Financing Infrastructure and Development (NaBFID)** for four inter-state transmission system-connected **solar projects** with a combined capacity of **1.7 GW in Rajasthan**. The financing from NaBFID, a specialized government-owned development finance institution, will enable the **prepayment of existing loans** and offer a **successful exit** to multiple lenders. The facility will be approved and disbursed as a **20-year rupee term loan facility**.

Tech giant **Apple** announced a joint venture with Mumbai-based renewable energy firm **CleanMax** to **power its operations** in India with **renewable energy** as part of its goal to be **carbon neutral** across its entire value chain by the **end of this decade**. As part of the collaboration, CleanMax has installed **14.4 MW of rooftop solar** power projects across **six industrial sites** in India. These installations are expected to mitigate around **207,000 tons of CO2 emissions** over their operational lifetime. The projects will power **Apple's offices**, its **two retail stores** in the country, and other operations.





**JSW Energy**, a private sector power producer, has completed a **₹50 billion (~\$600 million) qualified institutions placement (QIP)**, attracting strong interest from marquee global and domestic institutional investors. The QIP, marking the **first-ever equity raise** by the company since its listing in 2010, was **oversubscribed over 3.2 times**, it said in a statement. The proceeds from the QIP will enable JSW Energy to **strengthen its balance sheet** and **provide greater financial flexibility to execute its growth plans**.

Government-owned lender Indian **Renewable Energy Development Agency (IREDA) approved loans** amounting to **₹373.54 billion (~\$4.48 billion)** and **disbursed ₹250.89 billion (~\$3.01 billion)** in loans during the **financial year (FY) 2023-24**. The approved and disbursed amounts were the **highest-ever annual figures** recorded by the lender. The **loan approvals** were up **14.63%** year-over-year from ₹325.87 billion (~\$3.91 billion), and the **disbursements** increased by **15.94%** from ₹216.39 billion (~\$2.59 billion) at the end of FY 2022-23.



**Luminous Power Technologies** inaugurated a **250 MW solar module manufacturing facility** in **Rudrapur, Uttarakhand**. The fully automated **10-acre plant** built with an initial investment of **₹1.2 billion (~\$14.4 million)** is expandable up to **1 GW capacity**. Luminous aims to double its growth in three years. The facility will produce **polycrystalline, monocrystalline, N-type, and TOPCon solar panels** with adaptability ranging from 5BB to 16BB configurations for **residential, commercial, and agricultural needs**.

## Policy Briefs

### Center

The **Ministry of Power** clarified that **power stations** must **always be available** and **ready to dispatch power** according to the **Tariff Policy 2016**. Power generators can **sell surplus power** in the **power market** to best use **unused generation capacity**. The clarification, sent to **energy departments** of all states and generating companies, comes amid concerns that some **power generators** are **not offering surplus power** in the power market, leading to **unused capacity**.





## News in Brief

The **Central Electricity Regulatory Commission (CERC)** issued **draft regulations** to determine **fees and charges** to be **collected by Regional Load Despatch Centres** from the generating companies, distribution companies, bulk consumers, inter-state transmission licensees, buyers, sellers, and inter-state trading licensees, settlement nodal agency and any other users. The proposed regulations are named **CERC (Fees and Charges of Regional Load Despatch Center and other related matters) Regulations, 2024**.



**Anticipating an energy demand** higher than in previous years as temperatures rise across the country, the government is taking **measures to ensure zero load shedding** in the summer months. Union Minister for Power and New & Renewable Energy R. K. Singh has held a series of meetings where it was stressed that all stakeholders should do **adequate planning** to prevent a situation in which **one state has surplus power** while **another state faces power shortages**.

The **Ministry of New and Renewable Energy** has invited comments and suggestions on the draft guidelines for implementing the **PM-Surya Ghar: Muft Bijli Yojana** in the **residential rooftop solar segment**. The last date for receiving the comments/suggestions is April 30, 2024. The Government of India launched the program on February 13, 2024. It aims to install rooftop solar projects in **ten million households** at a cost of ₹752.01 billion (~\$ 8.9 billion). The previous **Phase II of the grid-connected rooftop solar program** will be subsumed under the current program, along with the remaining **financial outlay and liabilities**, effective from the program's launch. The financial outlay for the program includes **nine sub-components**.



## Policy Briefs

### States



The **Telangana State Electricity Regulatory Commission** has **refused to impose Grid Support Charges (GSC)** on rooftop solar installations, whether operating **under net-metering** or **gross-metering arrangements**. It held that GSC should only **be applied to captive power plants** and solely for the power utilized by the **co-located load**. Moreover, considering that **retail supply tariffs** have already been set for the fiscal year **(FY) 2023-24** and the year is coming to a close, the Commission decided **not to determine GSC** for FY 2023-24.

Consumers with a **contracted or sanctioned load** of **100 kW and above**, including those **combining multiple connections** to reach 100 kW within the same electricity division of a power distribution company (**DISCOM**), can **procure power through green energy open access**, according to Telangana State Electricity Regulatory Commission (Terms and Conditions of Open Access), Regulation, 2024. The regulations align with the **green energy open access** regulations issued by the Ministry of Power last June.





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# Major Tender and Auction Announcements in April

This is a list of major tenders and auctions from April. A comprehensive list can be found on Mercom's Tender, Auction Tracker, and Alerts. Please contact [info@mercomindia.com](mailto:info@mercomindia.com) for more information.



## Top Large-Scale Solar Tenders

**NTPC** Renewable Energy invited bids for the engineering, procurement, and construction (EPC) package for a **260 MW** grid-connected solar power project in **Bikaner**, Rajasthan.

REC Power Development and Consultancy (**RECPDCL**) floated a tender to set up **223 MW** Inter-State Transmission System (**ISTS**)-connected solar power projects anywhere

in India.

Rewa Ultra Mega Solar (**RUMSL**) issued an RFP to develop a **170 MW** grid-connected ground-mounted solar photovoltaic project in the **Neemuch** Solar Park in Madhya Pradesh.

**SJVN** Green Energy invited bids to commission a **100 MW** solar power project in the Didwana-Kuchaman District of Rajasthan.



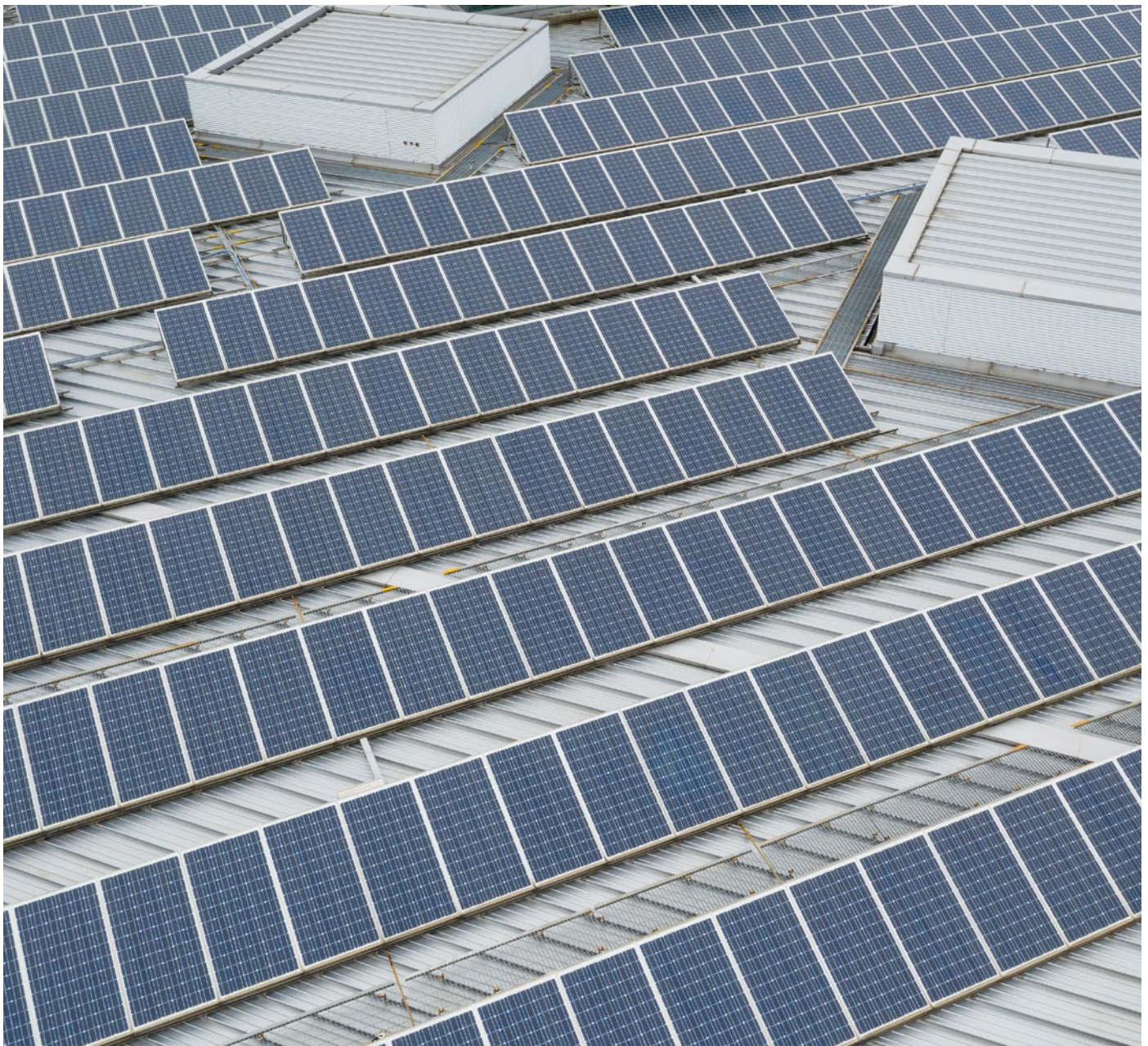
## Rooftop Solar Tenders

Bihar Renewable Energy Development Agency (**BREDA**) invited expressions of interest for the empanelment of agencies for rooftop solar power projects of various capacities under the CAPEX model, with an estimated capacity of **200 MW**, at **government buildings** in the state.

**Southeastern Railway** invited bids to empanel agencies for setting up **8.383 MW** of grid-connected rooftop solar power projects in **Odisha, Jharkhand,**

**and West Bengal** through public-private partnerships on a design, build, finance, operate, and transfer basis.

**Railways** has issued two more tenders, one for installing **1.2 MW** rooftop solar projects at various locations in **Perambur, Chennai**, under the renewable energy service company (**RESCO**) model. Another in **West Bengal** is for solar developers to install **1 MW** grid-connected rooftop solar projects on a design, build, finance, operate, and transfer basis.





# Other Tenders

**NTPC REL** invited bids to supply the BoS package for **1.1 GW** ISTS-connected wind power projects in Bijapur, Karnataka (**Tranche II**).

Gujarat Industries Power Company (**GIPCL**) invited bids for a BoS package for a **500 MW** solar power project at Great Rann of Kutch, **Khavda**, Gujarat.

**NTPC REL** invited bids for the BoS package (excluding land and transmission system) of a **500 MW** state transmission utility (STU)-connected solar power project in Bhadla, Rajasthan.

Rajasthan Electronics and Instruments Limited (**REIL**) invited bids to supply **200,000** Mono PERC solar cells with 5.50Wp power output.

SJVN Green Energy (**SGEL**) rolled out a tender for the **supply and installation of BoS packages**, including power evacuation infrastructure and comprehensive **O&M services for three years** for **400 MW** of solar photovoltaic power projects across four locations in **Maharashtra**.

**SGEL** invited bids for the **outright purchase or lease** of up to 800 acres of land for 28 years with all statutory clearances to set up solar power projects of **200 MW** capacity in **Assam**.

**NGEL** invited bids from **qualified coordinating agencies** to provide all forecasting and scheduling-related services for the **130 MW** Bhadla Solar power project.

**IOCL** invited bids from **technical consultants** for project management consultancy services to set up renewable energy projects at various locations across India.

Damodar Valley Corporation (**DVC**) invited bids for **demarcating the boundary of land** owned by it near Barhi, Hazaribagh district, **Jharkhand**, and conducting a topographical survey and geotechnical investigation to establish a ground-mounted solar

power project.

**NTPC** invited EOI from bidders to set up a **50 MW** ISTS-connected concentrated **solar** power project with a **thermal energy storage system** operational for eight hours during peak and non-solar hours on a build-own-operate basis.

**SJVN** invited bids for the comprehensive operation and maintenance of the **47.6 MW** Khirvire **wind power** project in the Ahmednagar District of **Maharashtra** for five years.

Solar Energy Corporation of India (**SECI**) invited bids for the design, engineering, supply, construction, erection, testing, commissioning, and O&M of a **25 MW solar** power project with a **20 MW/50 MWh battery energy storage system** at Taru, Leh, UT of **Ladakh**, India.

**IOCL** invited expressions of interest to **empanel** vendors/contractors for **solar** power projects at its locations and retail outlets.

INKEL issued a tender for **module mounting structures** for a **3.5 MW** solar power project in Mylatty of **Kasaragod** district in the state.

**IOCL** issued a tender for a **green hydrogen** generation unit (GHGU) of **10 KTA** capacity on a build-own-operate basis at its Panipat Refinery Petrochemical Complex.

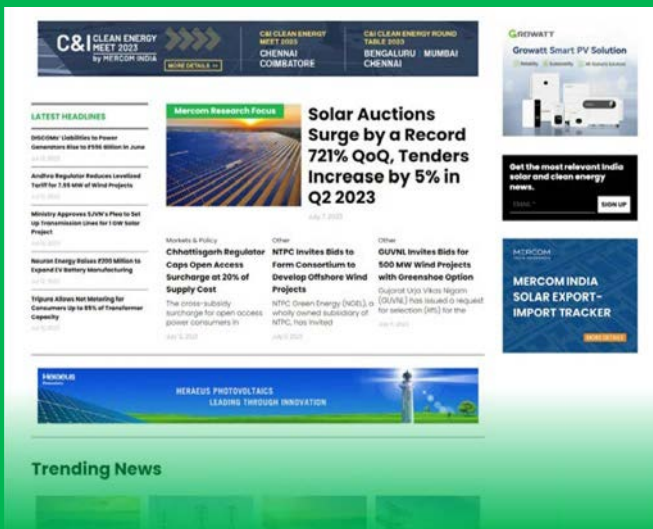
Rajasthan Electronics and Instruments Limited (**REIL**) issued a tender for the selection of a **charge point operator** to set up electric vehicle (**EV**) charging stations across eight New Delhi Municipal Council (**NDMC**) sites.

Indian Oil Corporation (**IOC**) issued a tender for the EPC of a **1 MW** grid-connected **solar open access** captive power project at its Northern Region Pipelines in Kurukshetra, **Haryana**.





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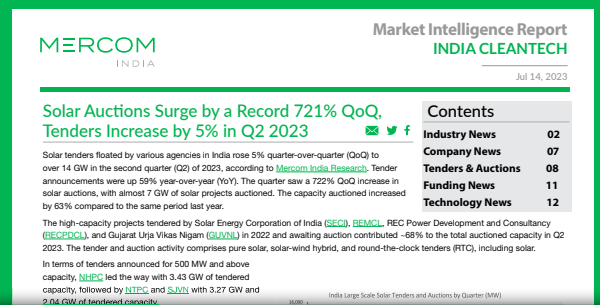
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# Auctions

**Sprng** Energy, **AMPIN** Energy Transition, **Juniper** Green Energy, **ReNew** Solar Power, and **Avaada** Energy have won **NTPC's** auction for the supply of **1,000 MW** power from ISTS-connected wind-solar hybrid power projects anywhere in India under **Tranche V**.

**Swelect** Energy Systems, **Grew** Energy, and **ReNew** Photovoltaics (ReNew) were declared winners in SECI's auction to manufacture, test, package, forward, supply, and transport **400 MW domestically** manufactured solar modules.

Amara Raja Infra (**ARIPL**) has secured the **BoS** supply contract for a **500 MW** solar power project in

Andhra Pradesh's **Kurnool** district from renewable energy company **Greenko**.

**Ahasolar** Technologies was awarded the consultancy contract for setting up a **52 MW** solar power project at Prayagraj, Uttar Pradesh, by Bharat Petroleum Corporation (**BPCL**).

Power Grid Corporation of India (**POWERGRID**) won the contracts to establish three ISTS projects on a BOOT basis to evacuate **18 GW** of power from various renewable energy zones (**REZ**) in **Rajasthan** and **Gujarat**.





# MERCOM INDIA RENEWABLES SUMMIT 2023

APRIL 26th + 27th New Delhi

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Mercom India Renewables Summit is our flagship event and brings together industry leaders to share insights and advance the course of India's solar industry. With extensive opportunities to network and exchange ideas, Mercom India Renewables Summit is the go-to event to engage stakeholders at all levels.

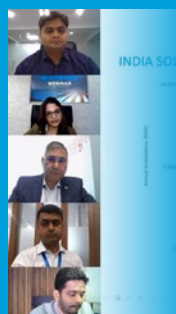
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