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clean energy news and insights

India

**Rooftop Solar Installations in 2021
the Highest-Ever in a Year; Open
Access Solar Installations Up 222%**



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This is a list of major tenders and auctions from February. A comprehensive list can be found on Mercom's Tender and Auction Tracker and Alerts

Foreword



Rooftop solar installations in India were the highest-ever in 2021. However, it was also one of the toughest years for the segment, with the market and regulatory challenges. The year started with multiple revisions to the net metering regulations. Due to the uncertainty surrounding the regulations, the installations were subdued in the first half of the year compared to the strong market demand.

According to Mercom reports, over 1.7 GW of rooftop projects were installed in the calendar year (CY) 2021, showcasing a growth of over 138% compared to CY 2020.

In Q4 2021, 402 MW of rooftop solar was installed in the country. The installations increased by 41% YoY compared to 285 MW in Q4 2020.

2021 was a bounce-back year for the rooftop segment beginning with clarity provided by the Ministry of Power on the net metering policy capped at 500 kW. After which, several states such as Chhattisgarh, Karnataka, Punjab, Gujarat, Rajasthan, Kerala, Haryana, Tamil Nadu, and West Bengal came up with their respective state policies that bolstered industry sentiment.

Even with policy restrictions and price volatility in the market, the economic and environmental benefits of clean energy sources of power, specifically solar is, driving the growth in the rooftop solar segment.

The open access solar market also witnessed a strong year.

In 2021, 1.23 GW of open access solar was installed, showcasing a strong growth of 222% compared to 383 MW in COVID hit 2020. It was the second-best year for open access installations to date.

The first quarter of 2021 saw the most installations due to markets opening after the COVID pandemic. Installations dropped during the second quarter owing to the lockdown caused by the second wave. However, the installations picked up during the third quarter but could not match the pre-lockdown levels due to the rise in raw material prices and overall system costs.

According to Mercom's open access report, the extension to the inter-state transmission system charges waiver on solar and wind energy projects commissioned up to June 30, 2025, will help develop a market for merchant renewable projects that will enormously benefit by selling power through bilateral agreements or exchanges. This is expected to provide a major relief for projects plagued by land acquisition and policy hurdles.

With the demand for alternate power sources increasing from C&I consumers, open access solar projects are emerging across several states. Mitigating carbon footprint, reducing the cost of power, renewable power purchase obligations, and RE100 initiatives, the list of reasons for C&I consumers to go green is piling up, and so is the pipeline of open access solar projects.

On the demand side, every facet of the solar industry showed strength in 2021. Now, we wait for the basic customs duty to take effect and hope the strong momentum from the last year continues into 2022.

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Mercom Capital Group

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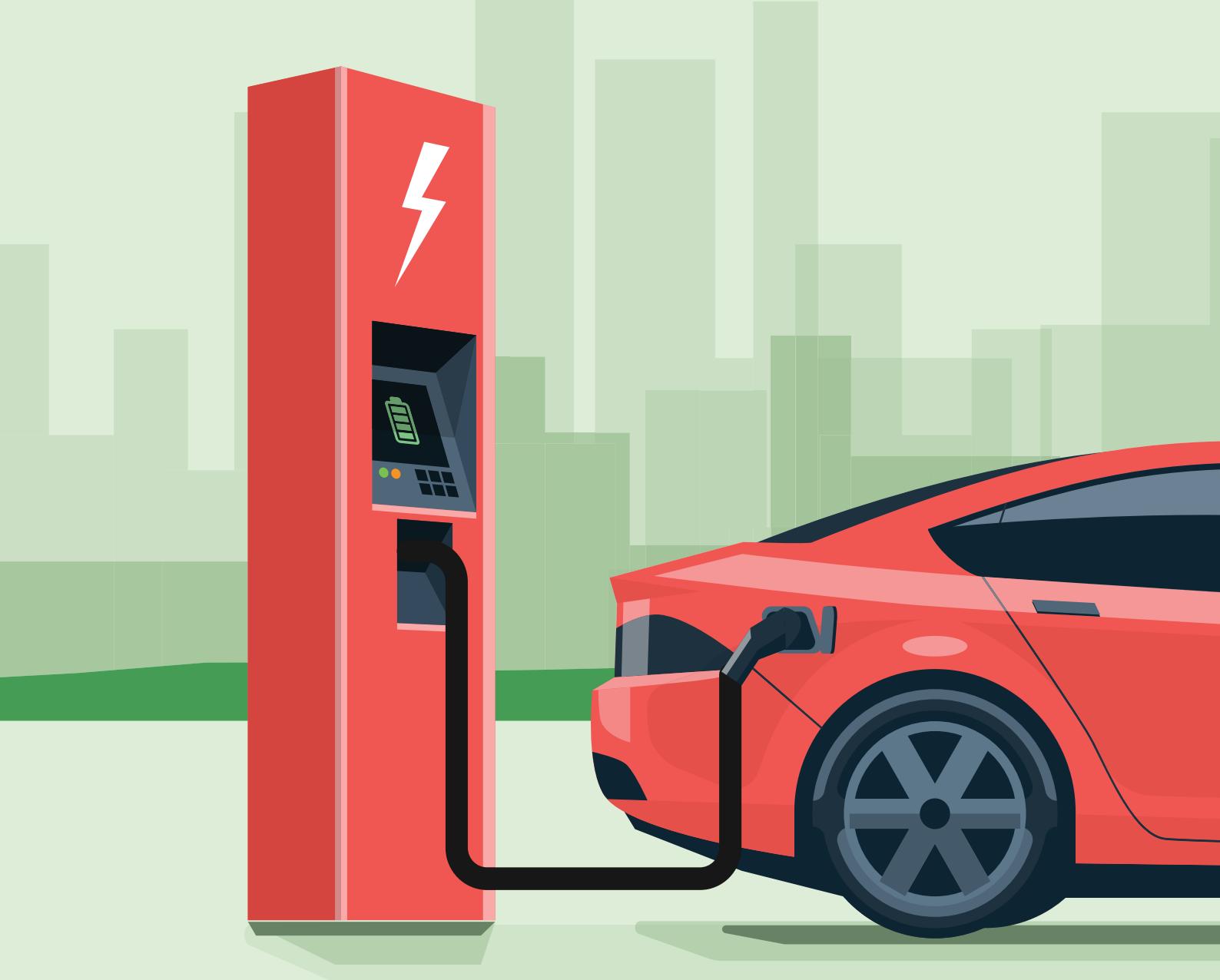
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Delhi to Fight Air Pollution with More EVs

The central government has issued a draft directing the Delhi government to ensure faster adoption of EVs across sectors to help fight the increasing air pollution

By : Harsh Shukla



The Government of India issued a draft notification directing the Transport Department of the Government of National Capital Territory (NCT) of Delhi to increase electric vehicle adoption to curb the increasing air pollution.

The draft notification issued under the Department of Environment and Forests stated that the transport sector is the primary source of air pollution in Delhi, especially PM2.5 emissions. Vehicular emission also accounted for 80% of nitrogen oxides and carbon monoxides in Delhi's air.

The national capital is a hub for personal motorized vehicles in India, with 13.3 million registered vehicles. The growth in vehicle numbers would be a significant challenge for sustainable environmental management.

The notification said aggregators like ride-hailing services, food delivery service providers, e-commerce logistic providers, and courier services have altered vehicle patterns in Delhi,

gaining momentum and expanding their businesses.

So, the central government has directed the Delhi government to ensure that all aggregators and delivery service providers include 10% of electric two-wheelers and 5% of electric four-wheelers in their new onboarded fleet within three months. And within March 31, 2023, the percentage should rise to 50% of electric two-wheelers and 25% of electric four-wheelers.

The Commission for Air Quality Management in NCR and adjoining areas had advised a mandate for zero-emission vehicles for NCR to be finalized and implemented by state governments of Haryana, Uttar Pradesh, Rajasthan, and NCT of Delhi in a time-bound manner.

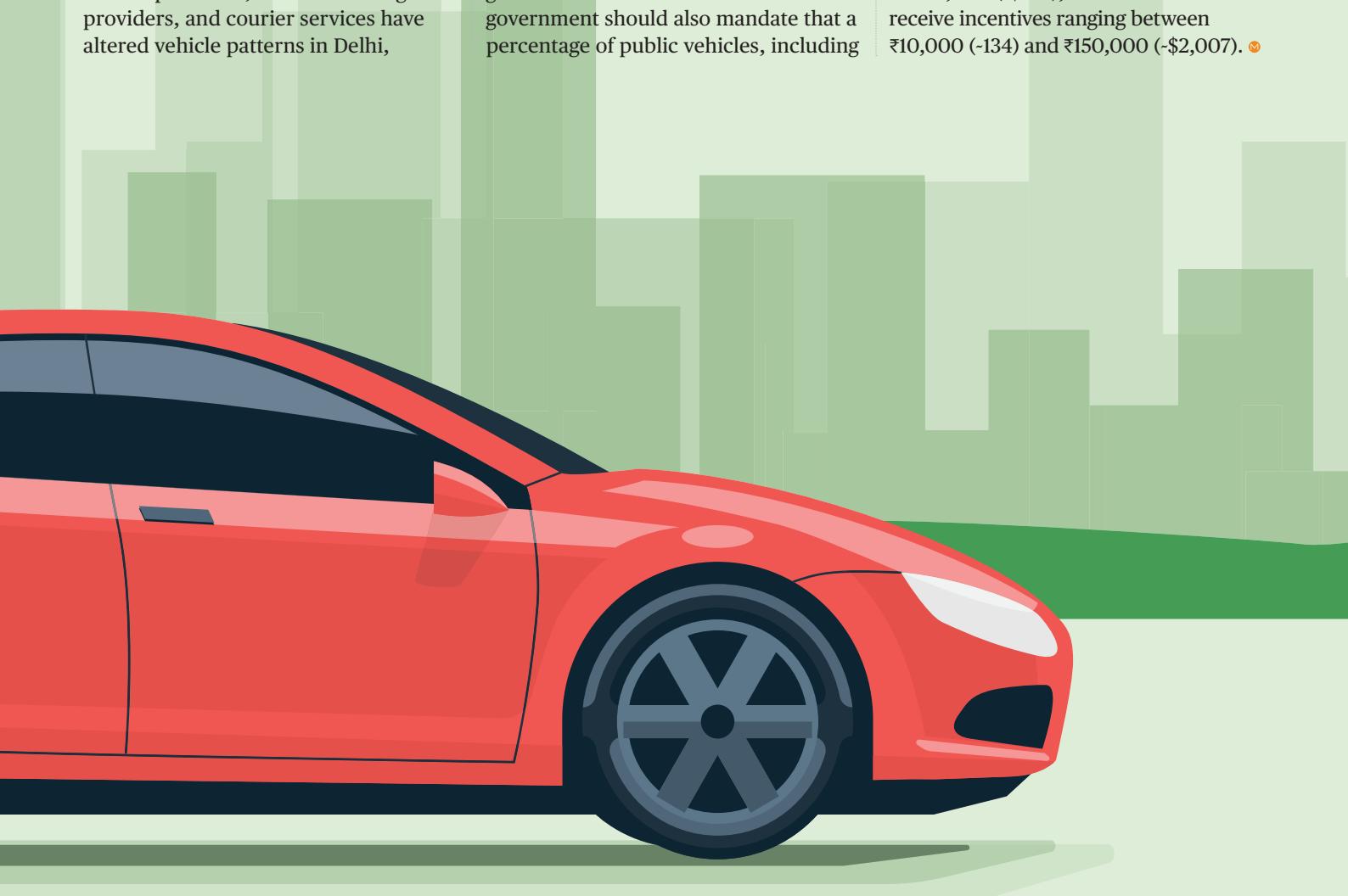
The Commission had further advised that the Government of NCT of Delhi should prioritize early electrification of public transport, paratransit, feeder service, large delivery fleet, and government-owned vehicles. The Delhi government should also mandate that a percentage of public vehicles, including

auto-rickshaws, buses, feeder services, government vehicles, and delivery fleets, be higher than personal vehicles.

With the implementation of the listed regulations, the government aims at reducing the pollution levels across the national capital territory in the coming months.

In November 2021, the Delhi Government announced that only electric vehicles and compressed natural gas (CNG)-vehicles would be allowed entry into the city from November 27 to December 3, 2021, as the air quality in the national capital continues to remain poor.

Mercom had earlier reported that the Delhi Government issued the Delhi Electric Vehicle Policy, 2020, to boost the adoption of electric vehicles in the capital city following the unsatisfactory results of the central government's effort. Under the policy, electric two-wheelers, e-rickshaws, and goods carriers receive purchase incentives of ₹30,000 (-\$401), while electric cars receive incentives ranging between ₹10,000 (-\$134) and ₹150,000 (-\$2,007). ☀





India Added 1.45 GW of Wind Capacity in 2021

As per the data released by the MNRE, the cumulative wind installations In India crossed the 40 GW mark at the end of 2021

By : Harsh Shukla



According to the recent data released by the Ministry of New and Renewable Energy, India added 1.45 GW of wind capacity in 2021, a 30% year-over-year (YoY) increase compared to 1.11 GW installed in the previous year.

India had over 40 GW of installed wind capacity at the end of 2021.

However, capacity additions declined 58% YoY in the fourth quarter (Q4) of 2021 with 212 MW, compared to 500 MW in 2020.

Quarter-over-quarter, installations fell by 45% compared to 384 MW installed in Q3 2021.

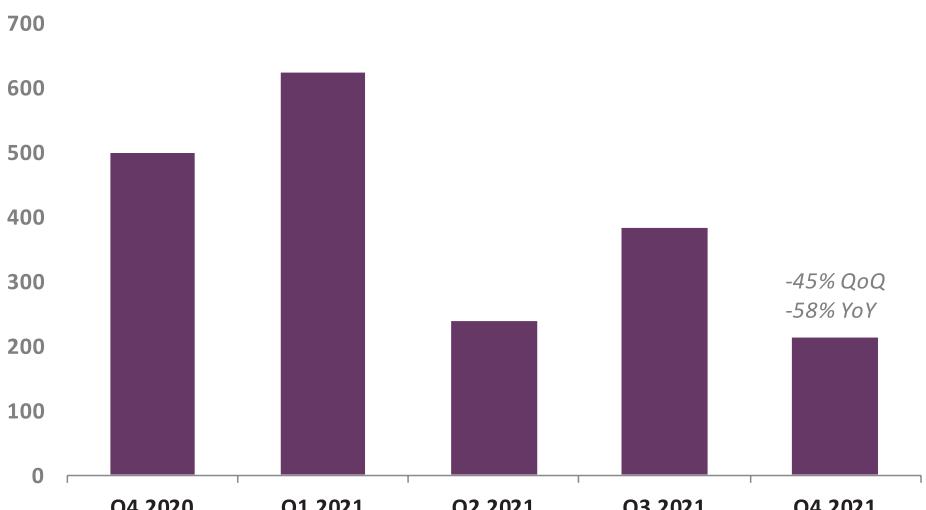
Wind energy accounted for 10.2% of India's total installed power capacity as of Q4, 2021.

Tamil Nadu leads the Indian wind market accounting for 25% of total installations

Tamil Nadu, Gujarat, and Karnataka continued to be major markets for wind installations.

Tamil Nadu added about 418.25 MW of wind capacity in 2021. The state leads the market with 25% of the total installations in

India - Wind Power Installations by Quarter (MW)



Source: MNRE

Mercom India Research

India with over 9.8 GW.

About 815.22 MW of wind capacity was installed in Gujarat during the year. The state has a 22% market share with a total installed wind capacity of 9 GW and is ranked second.

In 2021, about 208.4 MW of wind capacity was added in Karnataka. The state has around 5.07 GW of operational wind capacity and accounted for 13% of the country's

installations.

Maharashtra installed only 12.2 MW of wind capacity in 2021, contributing 13% to the total market share with a cumulative installed wind capacity of 5.01 GW.

Rajasthan has a total capacity of 4.32 GW, making up for 11% of the wind power installations in the country. However, the state did not install any new capacity in 2021.

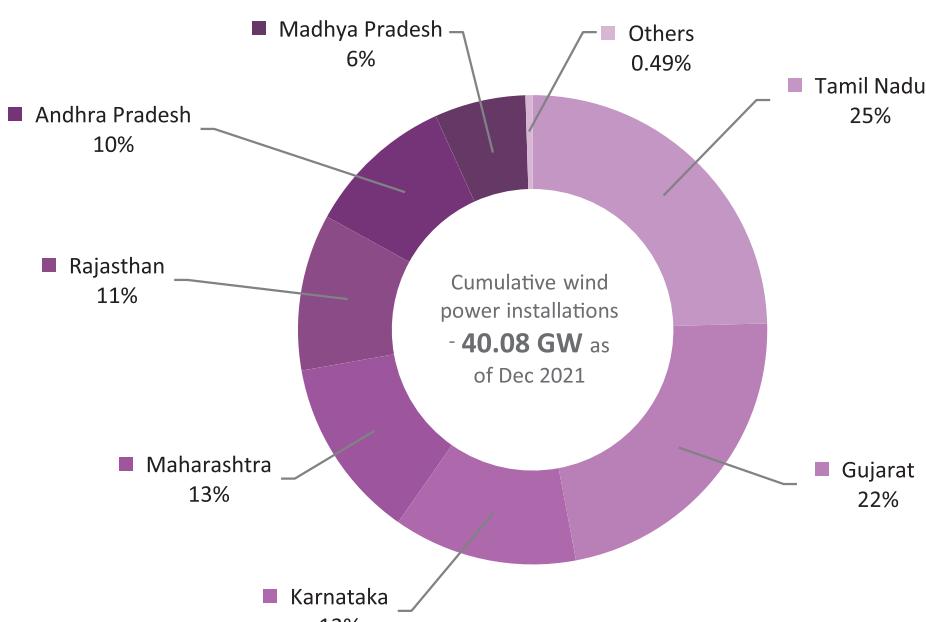
According to the recently published Global Wind Energy Council's (GWEC) report, India has set a target of 140 GW of installed wind capacity by 2030. As of 2021, the country has achieved 28% of the target.

The report notes that the wind industry was mostly affected by the Covid-19 pandemic causing difficulties in supply chain logistics, import of raw materials, and movement between states for workers.

The government has, over the period, taken steps towards unlocking the potential of the wind sector, with interstate transmission systems (ISTS) set up, bundling with other renewable energy sources, and state-level wind energy policies.

Last month, NTPC Renewable Energy invited bids for the development package of the interstate transmission system-connected wind energy projects up to the capacity of 720 MW. The projects can be developed anywhere in India. ☺

India - Cumulative Wind Power Installations by States (%)



Source: MNRE

Mercom India Research

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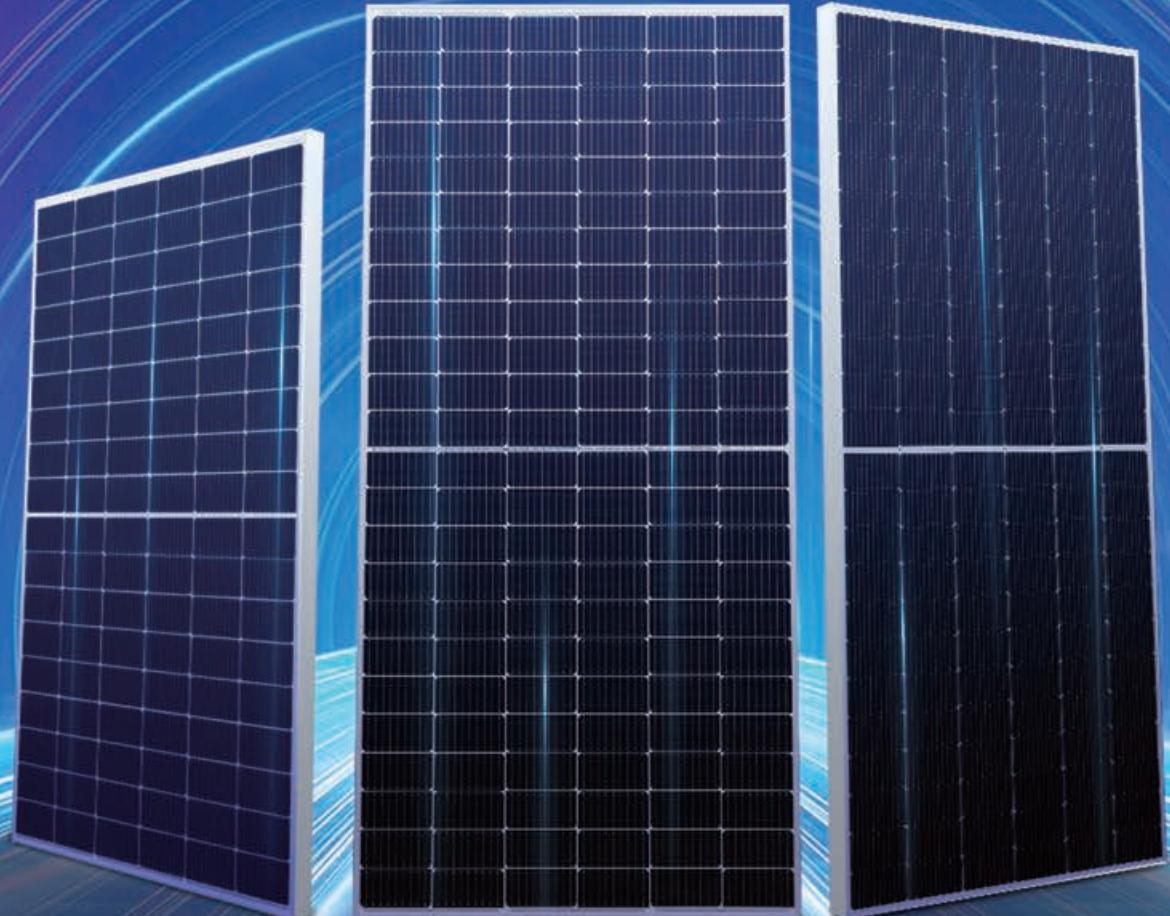
415W+



550W+



560W+



Solar Generation Up 18% With 68.77 BU in 2021

According to data from the CEA, the solar generation alongside the installations grew steadily in Q4 2021

By : Harsh Shukla

India generated approximately 68.77 billion units (BU) of solar power in the calendar year (CY) 2021, an 18% year-over-year (YoY) increase compared to 58.19 BU generated in the previous year, driven by new capacity installations, as per the data released by the Central Electricity Authority of India.

According to Mercom's Q3 2021 India

Solar Market Update Report, India installed 7.4 GW of new solar capacity in the first nine months of 2021, a 335% YoY increase compared to 1.73 GW installed in the same period last year. The cumulative installed capacity at the end of Q3 2021 stood at 47 GW.

India added close to 11.6 GW of new power capacity in 9M 2021. Solar dominated capacity additions,

accounting for close to 60%, followed by thermal power, which contributed 21%.

Solar installations have been growing despite various market challenges.

In the fourth quarter (Q4) of CY 2021, solar generation stood at 17.09 BU, a 6.7% quarter-over-quarter (QoQ) growth compared to 16.02 BU generated in the last quarter. The solar generation increased 20.27% compared to 14.21 BU



in Q4 2020.

Solar generation was back on track in Q4 2021 after a dip of 11.6% QoQ in Q3.

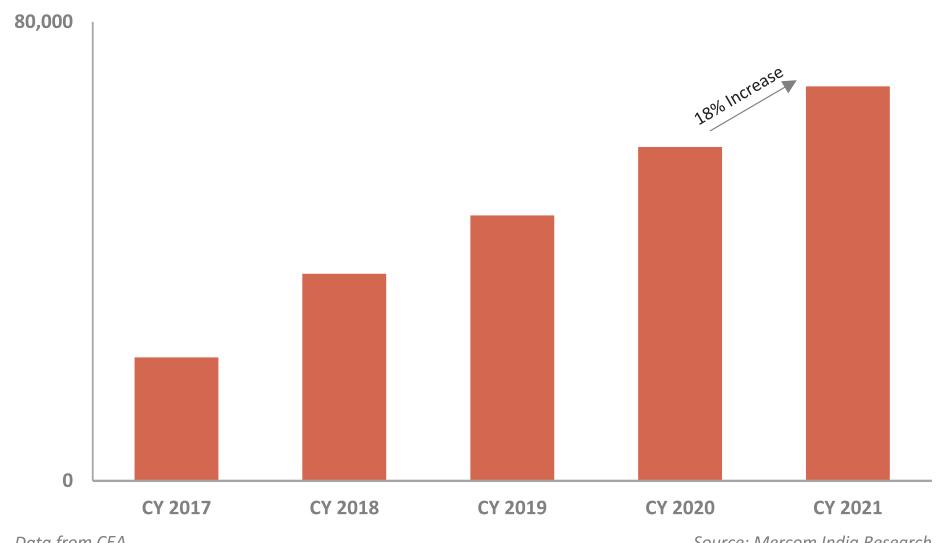
Solar generation grew by 21% and stood at 60.4 BU in the financial year (FY) 2020-21 compared to 50.1 BU in FY 2019-20.

According to data from the Central Electricity Authority (CEA), Ministry of New and Renewable Energy, and Mercom's India Solar Project Tracker, India's installed renewable energy capacity, including large hydro, stood at 150.4 GW, accounting for a share of 38.41% in the overall power mix at the end of Q4 2021.

At the end of Q4 2021, solar became India's leading renewable energy source, surpassing large hydro. Solar accounted for 12.4% of India's total installed power capacity and 32% of the total installed renewable capacity in Q4 2021.

According to the Ministry of Power, India reduced its peak power deficit

India: Solar Electricity Generation 2017-2021 (MU)



to 0.4% in FY 2021 from 16.6 in FY 2008, backed by several policies and infrastructure interventions. However, the peak power deficit had seen a

spike reaching 1.2% in October 2021. The ministry attributed the spike to the annual post-monsoon pressure on power output. ☺





Battery Storage Companies Raise Record \$17 Billion in 2021

According to Mercom's 2021 Funding and M&A Report for Storage, Grid, & Efficiency, corporate funding for battery storage, smart grid, and energy efficiency companies globally stood at \$19.5 billion

By : Harsh Shukla

Global corporate funding, including venture capital (VC), public market, and debt financing, for battery storage, smart grid, and energy efficiency companies stood at \$19.5 billion in 2021, according to Mercom's 2021 Funding and M&A Report for Storage, Grid, & Efficiency. This was a 140% year-over-year (YoY) increase compared to \$8.1 billion in 2020.

In 2021, global VC funding also jumped 290% to \$10.1 billion, compared to \$2.6 billion raised in the same period last year.

"VC investment into battery storage companies exploded in 2021, and for the first time, funding activity reflected the significance of battery energy storage in the energy transition. We expect funding activity to remain robust as substantially more investments are needed to get battery technologies off the ground and into commercial stages at scale," said Raj Prabhu, Chief Executive Officer, Mercom Capital Group.

Battery Storage

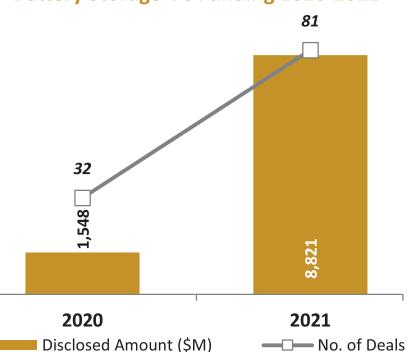
Battery storage companies raised \$17 billion - a record since 2014 - in 101 deals in 2021, a 159% YoY increase.

In 2021, global VC funding for battery storage companies stood at \$8.8 billion in 81 deals, a 470% growth compared to \$1.6 billion in the last year.

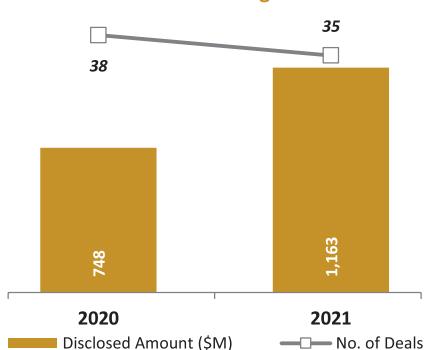
The report noted that the lithium-ion-based battery technology companies received the most VC funding in 2021. Other categories that received funding included energy storage systems, solid-state batteries, flow batteries, thermal energy storage, liquid metal batteries, gravity storage, and metal-hydrogen batteries.

Some of the top VC funding deals

Battery Storage VC Funding 2020-2021



Smart Grid VC Funding 2020-2021



Source: Mercom Capital Group

in 2021 included \$2.8 billion raised by Northvolt, \$2.6 billion raised by SVOLT in two deals, \$590 million raised by Sila Nanotechnologies, \$326 million raised by ProLogium, \$240 million each raised by Nexamp and Form Energy, and \$144 million raised by Ambri.

In 2021, 260 VC investors participated in battery storage deals compared to 105 last year. Breakthrough Energy Ventures was the top investor in 2021.

In 2021, battery storage companies globally raised \$8.8 billion VC funding, a 470% YoY growth

According to the report, announced debt and public market financing increased to \$8.2 billion in 20 deals in 2021. It was the highest amount raised since 2014.

"Plug Power's \$2 billion stock offering and SK Group's 1.6 billion capital investment in Plug Power were the

largest public market financing deals in 2021," the report noted.

In 2021, four battery storage companies went public; two merged with special purpose acquisition companies (SPAC), and two went public through the IPO route.

The sector witnessed 24 corporate merger and acquisitions (M&A) transactions in 2021.

In 2021, there were 37 battery storage project M&A deals compared to 24 in the last years. 3 GW of battery storage projects were acquired in 2021, compared to 2.5 GW in 2020.

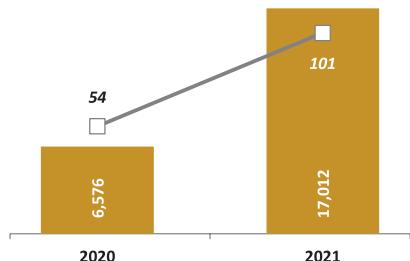
Smart Grid

Global corporate funding for smart grid companies stood at \$2 billion in 38 deals in 2021 compared to \$758 million raised in 41 deals last year.

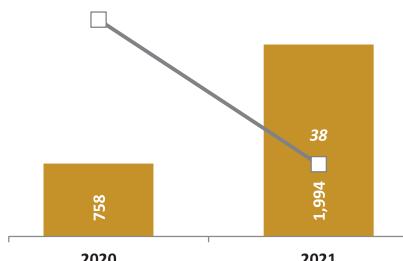
In 2021, smart grid companies raised \$1.2 billion in VC funding in 35 deals, a 55% growth compared to \$748 million raised in 38 deals in 2020.

Some of the top VC-funded companies in 2021 were Aulton with \$232 million, Ample with \$160 million, Volta with \$125 million, Mainspring Energy with \$95 million, and AutoGrid

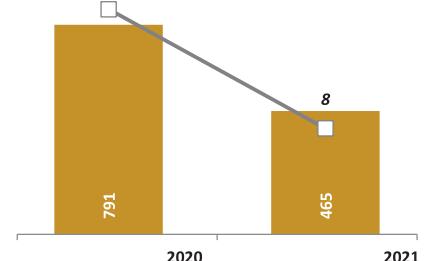
Battery Storage Corporate Funding 2020 - 2021



Smart Grid Corporate Funding 2020 - 2021



Efficiency Corporate Funding 2020 - 2021



Source: Mercom Capital Group



Battery Storage, Smart Grid, and Efficiency Top VC Funded Companies in 2021

Company	Amount (\$M)
northvolt®	2,750
SVOLT	2,580 (2 Deals)
SILA NANOTECHNOLOGIES	590
ProLogium	326
Form energy	240
nexAMP	240
Julton	232

Source: Mercom Capital Group

Systems with \$85 million.

In 2021, 129 investors funded smart grid companies compared to 102 in the last years. Energy Impact Partners, National Grid Partners, bp Ventures, David Helgason, GS Futures, MCJ Collective, and Moore Strategic Ventures were the top VC investors in 2021.

The report stated that smart charging companies secured the largest share of VC funding in 2021 with \$789 million in 18 deals. It was followed by distributed generation and integration companies with \$155 million in six deals and data analytics companies with \$116 million in three deals.

The sector witnessed 19 M&A transactions in 2021 compared to 21 in the last year.

Efficiency

In 2021, energy efficiency companies raised \$122 million in seven deals in VC funding compared to \$291 million raised in 16 deals during the last year.

Global corporate funding, including debt and public market financing, stood at \$465 million in 2021 compared to \$791 million in 2020.

Some of the top VC funding deals included \$72 million raised by Tendril, \$20 million raised by Mysa, \$15 million raised by Cohesion, \$10 million raised by WattBuy, and \$5 million raised by 75F.

In 2021, 29 investors participated in funding deals compared to 52 last year. WIND Ventures was the most active investor in 2021.

The sector witnessed three M&A transactions in 2021 compared to four in 2020. ☈

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Solar's Share in India's Power Mix Rises to 12.4%

Renewables, including large hydro, accounts for 38.41% of the overall power capacity mix as of Q4 2021, as per the data from CEA, MNRE, and Mercom India's Solar Project Tracker

By : Harsh Shukla

India's installed renewable energy capacity, including large hydro projects, stood at 150.4 GW, accounting for a share of 38.41% in the overall power mix at the end of the fourth quarter (Q4) of 2021, according to data from the Central Electricity Authority (CEA), Ministry of New and Renewable Energy (MNRE), and Mercom India's Solar Project Tracker.

The share of renewables increased marginally from the last quarter when the total renewable installations were 148.08 GW, with a share of 38%.

Solar accounts for 12.4% of India's total installed power capacity and 32% of the total installed renewable capacity as of Q4 2021. This increase in the capacity makes solar the top renewable energy source in India, surpassing large hydro. At the end of Q4 2021, large hydro, with a total capacity of around 46.5 GW, accounted for 11.84% of the total installed power capacity mix.

As of Q4 2021, India had approximately 40 GW of wind power installations, representing around 10.2% of the total installed power capacity. Meanwhile, biomass and small hydro accounted for 2.6% and 1.2% of the cumulative installed power capacity, respectively.

Energy from conventional sources

Conventional power sources have a total installed capacity of nearly 242 GW at the end of Q4 2021. It accounted for 61.59% of the total installed power capacity - a slight decrease from 61.92% in Q3 2021.

The segment included electricity generated from thermal-based sources, including coal (51.7%), gas (6.3%), nuclear (1.7%), lignite (1.7%), and diesel made up 0.13% of the cumulative installed power capacity mix.

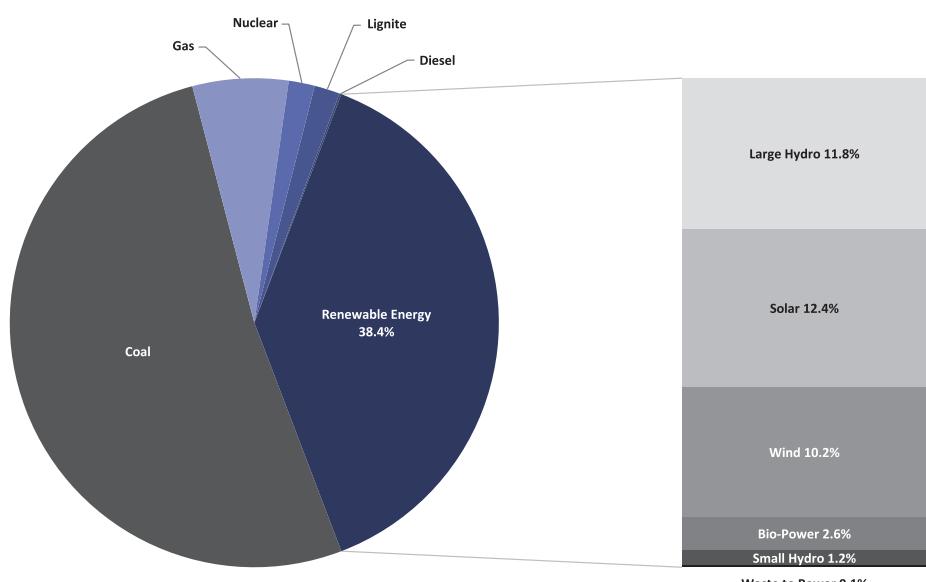
Coal continues to lead the way with over 203 GW of installed capacity at the end of Q4 2021, a marginal increase from 202 GW in Q3 2021. However, its

overall market share declined slightly to 51.7%, compared to 52% in the previous quarter.

According to the International Energy Agency (IEA) report, solar power will witness exponential growth and match coal's share in the Indian power generation mix by 2040 or earlier. The share of coal is expected to decline to 34% in 2040. ☀

India - Cumulative Installed Power Capacity Mix (%)

Renewables (including Large Hydro) comprise ~38.4% of India's total installed capacity, with solar accounting for ~12.4%. Among renewables, solar accounts for ~32% of the installed capacity



Data from CEA, MNRE, Mercom India Solar Project Tracker
(Installed Capacity as on 31 Dec 2021)

Source: Mercom India Research



ALMM and the Solar Demand Supply Gap Conundrum

Industry experts share their opinions with Mercom India on the impact of the ALMM mandate on the sector

By : Arjun Joshi

The Ministry of New and Renewable Energy (MNRE), through its 'Approved List of Models and Manufacturers (ALMM) of Solar Modules Order, 2019' states that only the models and manufacturers included in the ALMM list would be eligible to be used in utility-scale solar projects implemented

by government agencies, open access, and net metering projects installed in the country.

Though the government has implemented the program to boost the domestic solar manufacturing industry, the developers are facing challenges in transitioning. In the days following the implementation of ALMM initially,

developers had expressed concerns about supply, quality, and impact on the cost of the projects.

Mercom spoke with solar developers and manufacturers to understand market sentiments and how they believe the ALMM mandate will impact their businesses.



Developer woes

Even though the industry has been supportive of domestic manufacturing, it claims that it is still in its initial days and is expected to take time to achieve the level of quality and efficiencies currently available with imported modules.

A top executive of a leading developer said to Mercom, “ALMM is the biggest limitation for project development. There are 41 manufacturers in the updated ALMM list, and their capacity is about 11 GW, wherein the requirement is almost 20 GW. Also, only about 3 GW of the ALMM listed modules are rated 400 W or more. Developers require 400 W plus modules for higher efficiencies and cost reduction because the projects demand it. We’re ready to support domestic manufacturing. However, the capacity available right now is not matching the demand. It will take a couple of more years for the capacity to be commissioned under the production linked incentive (PLI) program. If the government starts restricting right away, the developers will be in trouble.”

ALMM regulation is claimed to be lacking the market assessment when it comes to the vast demand-supply gap that has to be met, along with effective pricing.

A top executive of a leading Maharashtra-based developer added, “The domestic modules of quality comparable to tier1 and tier2 of Chinese modules are offered at prices premium to Chinese tier1 modules, which is outlandish. Developers are already bearing the adverse impact on project cost with the rise in component prices. The ALMM restriction couldn’t have come at a worst time.”

With no inspection provisions offered by MNRE for modules manufactured outside the country, their inclusion in the ALMM list is out of the question for the near future.

Developers require 400W plus modules for higher efficiencies and cost reduction

The executive further added that the rushed enforcement of the regulations is in expectation of the Chinese manufacturers setting up production units in India. But this could be unlikely considering the long ongoing political tensions between the two countries.

Another top executive of a leading Gujarat-based developer added the local module manufacturers do not have enough module supplies in India to meet the ever-rising demand at a reasonable price. They are said to be waiting for the basic customs duty (BCD) to take effect to quote higher prices.

“Though the shipping costs are exorbitantly high to import from China, the modules are still cheaper than India. So, module manufacturers are not passing on any cost-benefit to developers or the end consumers,” he further added.

To ensure quality, some developers are paying manufacturers a tolling fee to just assemble the modules while the developers manage the supply of raw materials and deal with the price risk and cost of import.



With several complaints in the past about the supply chain disruption when importing modules and no recourse or compensation offered on faulty imports, the industry does see the new regulation as an effective long-term plan but with no short time recourse until the local manufacturers scale up and offer competitive prices.

Solar developers had earlier told Mercom that they find it challenging to execute solar projects with low tariffs given the ALMM restrictions. According to the developers, the prices of domestic modules – procured from manufacturers enlisted in ALMM – are 20% higher than Chinese modules, which has increased the overall cost of solar projects.

Unfounded claims

In a complete contrast of views, a top solar manufacturer that Mercom spoke to said, "Going by empirical evidence, Indian module manufacturers are operating at 30% capacity. This means there is sufficient capacity to manufacture modules against orders."

He countered the argument that domestic modules are of lower capacity as just a misnomer. He said, "The efficiency of the modules depends on the output of the cells. Most Indian

manufacturers can procure high output cells and supply high wattage modules. However, developers have not approached us to buy these high wattage modules. Most Indian manufacturers can use cells of 7.4W, so you can calculate the output of a module that has 72 of these cells in them."

Developers find it challenging to execute solar projects with low tariffs given the ALMM restrictions

He believes that developers are accustomed to buying modules from Chinese suppliers, and there is a resistance to changing their principle buying pattern. He said, "The change must come about from developers, and they should start to seriously give a thought about their latent dependency on the Chinese. Last year is a perfect example of why solely depending on the Chinese industry is harmful and detrimental for the Indian solar sector. The supply chain issue almost crippled the sector."

Another manufacturer claims that the arguments made by developers that domestic modules are expensive are baseless. He said, "The developers are in a race to outbid each other. Neither the manufacturers nor the government has asked them to quote such low tariffs. Before quoting, they can consider the cost of modules and quote accordingly. Also, these developers had no problems purchasing modules at an exorbitant price from China during the peak of last year's supply chain issues."

It is a delicate dance when it comes to balancing the concerns of both manufacturers and developers and getting the policies right without impeding the industry's growth.

"There is a need for data transparency instead of hearsay when it comes to module prices and manufacturing capacity. Policy decisions made without supporting real-time data are extremely risky. While the shift from imported to domestic modules is inevitable, policy-makers must navigate this transition period carefully in phases without hurting demand. At the end of the day, it comes down to who will pay for higher tariffs and what happens if DISCOMs don't sign PSAs at higher tariffs," said Raj Prabhu, CEO of Mercom Capital Group. ☺

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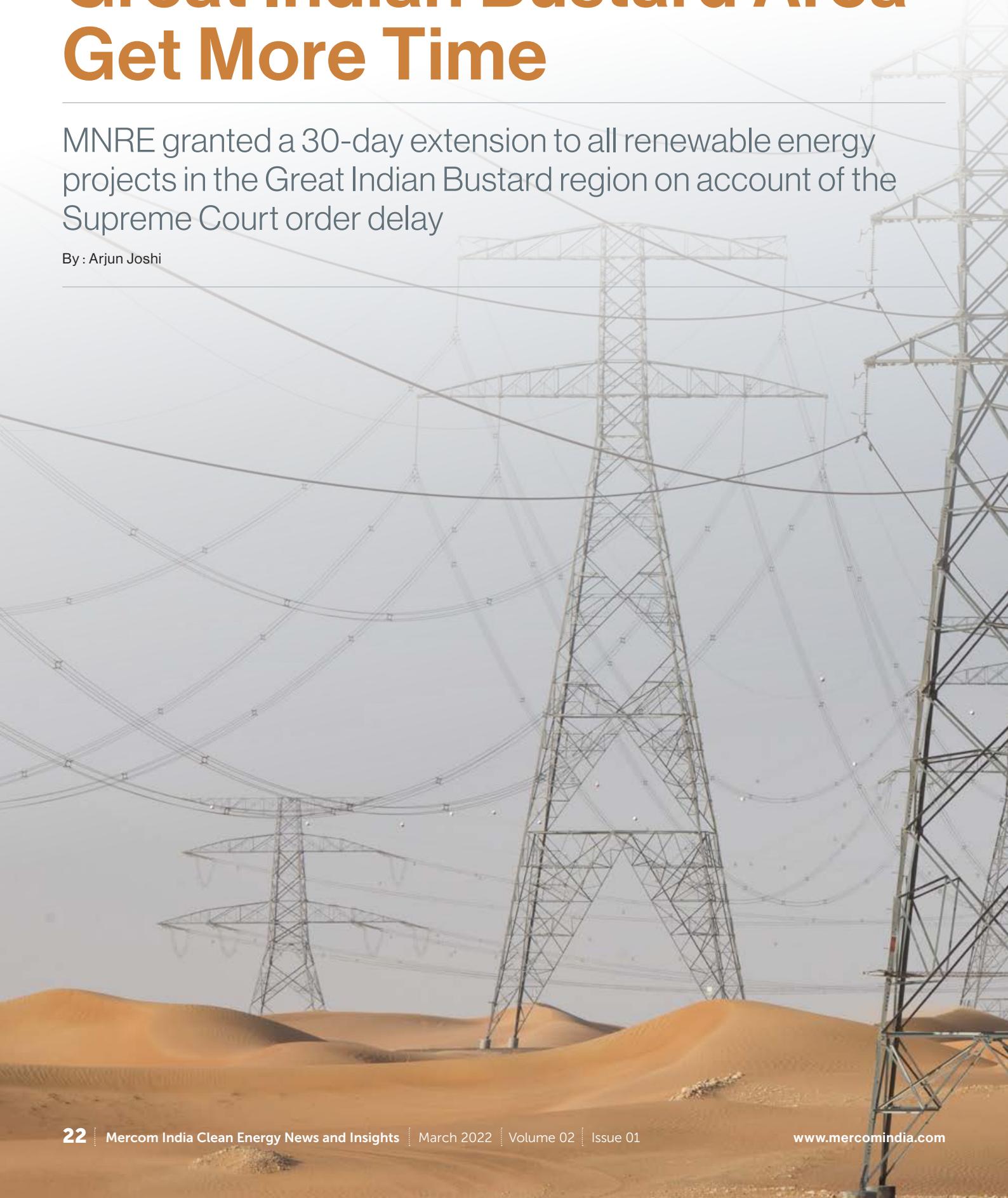
Data as at March 2021



Renewable Projects in the Great Indian Bustard Area Get More Time

MNRE granted a 30-day extension to all renewable energy projects in the Great Indian Bustard region on account of the Supreme Court order delay

By : Arjun Joshi



The Ministry of New and Renewable Energy (MNRE) informed that all renewable energy projects (RE) under implementation, wholly or partly located in the priority or potential territory of the Great Indian bustard (GIB), are to be granted a 30-day extension on the scheduled date of commissioning after the date of judgment by the Supreme Court.

These also include the projects whose commissioning is delayed due to non-completion of project transmission infrastructure on account of the Supreme Court's order.

MNRE has also notified that this relief facilitates renewable energy project development and will not be taken for any other purpose, including claiming interest during construction (IDC) or termination of Power Purchase Agreement (PPA). Renewable Energy Implementing Agencies are requested to accord a requisite extension of the scheduled date of commissioning, keeping in view the above.

Renewable energy projects to be developed in the habitats of the GIB and Lesser Florican in Rajasthan and Gujarat have been stranded awaiting the decision from the Supreme Court.

The Supreme Court had earlier ruled

that the overhead transmission should be shifted underground to protect the endangered species of birds. In April 2021, the Court had directed the authorities to complete moving the transmission lines underground within a year. Until then, diverters were to be hung from the existing powerlines.

MNRE estimates ₹1.5 trillion would be required to lay underground lines

MNRE had filed an interlocutory application in the Supreme Court, jointly on behalf of the Ministry of Power, and the Ministry of Environment, Forest and Climate Change, contesting the Supreme Court's order to convert the overhead cables to underground powerlines wherever feasible.

In its application before the Supreme Court, MNRE said that an expenditure of ₹1.5 trillion (~\$20.15 billion) would be required to lay underground lines, an estimate corresponding with that of solar power developers.

It has been inter-alia prayed that Supreme Court may allow high voltage and extra-high voltage lines, i.e., 66 kV

and above power lines in priority GIB habitat to be laid as overhead power lines with installation of appropriate mitigation measures like bird diverters and laying of overhead transmission lines in future outside the priority area with the installation of appropriate bird diverters.

However, the matter is yet to be decided by Supreme Court. This situation has caused uncertainty among RE developers concerning the action they are required to take.

The Solar Power Developers Association (SPDA), which sought to implead itself in the case before the Court, said that the cost of taking the 33 kV cable underground is around ₹3 million (~\$40,295)/km to ₹5 million (~\$67,159)/km, 132 kV cable about ₹18 million (~\$241,774)/km and 220 kV lines about ₹70 million (~\$940,232)/km to ₹100 million (~\$1.34 million)/km. The cost of laying a 400 kV underground line will be between ₹120 million (~\$1.61 million)/km and ₹150 million (~\$2.01 million)/km.

It also argued that laying underground powerlines could cause more significant environmental damage, such as displacement of flora and fauna, leading to the deterioration of biodiversity. ☉

Basic Customs Duty Leaves Domestic Manufacturers in SEZs Stranded

While most domestic manufacturers have responded favorably to the imposition of BCD, starting April 1, manufacturers in the SEZs share a different sentiment

By : Rakesh Ranjan Parashar

With the imposition of Basic Customs Duty (BCD) on solar cells and modules around the corner, the domestic manufacturing sector is uncertain about its impact.

In March 2021, the Ministry of New and Renewable Energy announced BCD on imported solar cells and modules starting April 1, 2022. The BCD on solar modules with HSN Code 85414012 will be 40%, and solar

cells (85414011) are 25%. While the manufacturers unanimously supported BCD on modules, the duty on cells was a surprise.

Manufacturers in the domestic traffic area (DTA) are convinced that the



imposition of BCD on modules will be helpful in competing with the relatively cheap Chinese counterparts.

But others are looking at the downside of the duty imposition.

Developers continue to be apprehensive and believe that the duty would delay projects and increase project costs.

Most domestic module manufacturers continue to depend on imported cells. With the duty on cells eventually driving the price higher, they are worried about the profit margins. Domestic cell manufacturing capacity currently as low as 3 GW may not be able to support the demand. So, the industry expected the government to defer the duty on cells.

A similar concern is shared by the domestic manufacturers in the special economic zones (SEZs), who have so far enjoyed the benefits of various tax exemptions.

SEZs are created as open markets within the economy and are regarded as an international territory for trade and commerce. Local raw materials bought by producers within SEZs are regarded as exports, whereas the goods produced in SEZs and sold in the DTA are

Solar manufacturing units in the SEZs will attract BCD when supplied to developers in India

regarded as imports. So, solar modules manufactured in SEZs and sold in the DTA will qualify for the BCD.

Imposition of BCD - a potential problem for SEZs

The domestic manufacturers with production units in the SEZs are not pleased about the imposition of 40% BCD on solar modules and 25% on solar cells. There is growing concern among the manufacturers in the SEZs, who believe they either have to shut shop or move elsewhere.

The introduction of BCD from April 2022, which seems imminent now, may result in a number of domestic manufacturers moving out of SEZs.

The primary intention behind creating these SEZs was to attract foreign direct investment (FDI) into the

country and promote exports. While the manufacturing units in SEZs enjoy several advantages in the form of tax benefits and exemptions, things are bound to get much more challenging for the manufacturing units with the BCD regime looming large.

Speaking to Mercom, Dhruv Sharma, CEO of Jupiter Solar and President of Indian Solar Manufacturers Association (ISMA), said, "Until the law is changed, the SEZ units will have to pay the duty equivalent to the import duty, which will put them at parity with the Chinese imports and act as a deterrent to their ability to sell in the domestic market."

"The SEZ units will find it extremely difficult to cater to the Indian market in a sustained way because the customers will have a choice to buy it from them or import it from China as the price parity would be the same. To that extent, until the law gets changed, the SEZ units will not operate very freely in the Indian market and will be affected to a great extent by the implementation of BCD," he added.

Currently, there are overall 425 formally approved SEZs in the country across all sectors. Out of the total, 376



SEZs are notified, and 268 SEZs are operational.

As per Section 30 of the SEZ Act, 2005, any goods removed from an SEZ to the DTA will be chargeable to customs duties, including anti-dumping, countervailing, and safeguard duties under the Customs Tariff Act 1975, where applicable, as leviable on such goods when imported.

"The developers understand that BCD will not be postponed and are asking for grandfathering of projects that are getting delayed. The domestic manufacturers are capable of meeting the demands of future projects. The duty is coming, and the domestic manufacturers and customer developers need to work together to benefit everyone," Sharma added.

The need for bringing SEZs at par with DTAs

Recently, In a letter to Union Power Minister R.K. Singh, the National Solar Energy Federation of India (NSEFI) conveyed their worry about the impact of BCD on projects awarded before March 1, 2021. NSEFI argued that the incremental cost under the 'Change in Law' compensation would burden the end consumer with at least ₹0.30 (-\$0.0040) /kWh and up to ₹0.50 (-\$0.0066)/kWh with the use of imported cells and modules for these projects.

Speaking on the predicament of manufacturers in SEZs, Chetan Shah, Chairman and MD at Solex Energy Limited, said, "The SEZs will have to pay 40% duty on modules and thus will have difficulty selling their products in

India from April when the BCD comes into force. More than the modules, it is the cells. Even if the modules are procured from local manufacturers, the manufacturers will have to pay 25% duty on the import of cells, which will increase the cost of the modules by ₹2.50 (-\$0.033)/W to ₹3 (-\$0.039)/W, which is a considerable amount. The customers or developers will not be able to support the increase. So basically, the business will drop unless the government comes out with some solution."

Nearly 40% of the module manufacturing and almost 60% of the cell manufacturing capacity are located in the SEZs. So, the imposition of BCD would adversely affect the units in the SEZs and defeat the whole purpose of the protectionist tax regime.

The stakeholders believe that the government should come out with some solution to make the SEZs at par with the DTAs and ensure a level playing field for everyone. Or else, it will lead to the gradual death of solar manufacturing units in SEZs and have a detrimental effect on the country's domestic manufacturing segment and the overall solar installations.

"Imposing BCD on solar cells will badly affect the business. That's why companies with SEZ units are setting their units outside of SEZs, as the benefits are no longer economically viable. For SEZ units, there is no way out; they will have to denotify their SEZ status or focus only on exports. There is no other way as they are not in a position to cater to the domestic market," Shah noted.

With no solution in sight, the companies considering the movement into the DTA are still treading lightly given the cost involved for movement and operating in both SEZ and DTA at the same time.

The other option at the disposal of the manufacturers is to concentrate purely on exports. Whether or not the government considers these issues and takes steps to solve them has left the SEZ manufacturers in limbo.

BCD on solar cells and the International Market

Echoing similar sentiments, one of the top executives from a leading module manufacturer said, "The recent budget will accelerate the growth of the solar sector in the country. We are yet to calculate the landed cost of modules with the impact of BCD. Other additional taxes and cess would bring BCD to 50% on modules. It is now confirmed that BCD on solar cells will not be postponed, which the industry expected. The BCD on cells will adversely affect the module manufacturers. The manufacturers in the SEZs will struggle because of the implementation of BCD. If there is a BCD on the balance of system (BoS) items like backsheet, EVA, and aluminum, it will further complicate the matter."

China has the largest market share at nearly 90% when it comes to solar cells and modules imported into the country, followed by Hong Kong and Malaysia. As the economies slowly reopen and recover from the pandemic, the supply chain is returning to pre-covid normalcy.

The industry stakeholders have expressed concerns that if domestic manufacturing fails to meet the ever-rising demand, the sector will have no choice but to fall back on imports.

The industry expects policy tweaks to protect the manufacturing units in SEZs from the BCD impact. But the impact of BCD on cells is to be borne by the module manufacturers.

While the recent budget announcements have raised hopes for the domestic manufacturing sector, whether or not it allows enough time for the sector to build reliance and trust in the locally manufactured components has been an ongoing debate. ☉



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Light Can Act as an Efficiency Booster for Lithium-ion Batteries

Engineers at MIT and Kyushu University discover a new method to use light to move charged ions to enhance the battery performance

By : Rakesh Ranjan Parashar



Engineers from the Massachusetts Institute of Technology (MIT) and Kyushu University in Japan have demonstrated how light could improve the efficiency of fuel cells, lithium-ion batteries, and other devices based on the movement of charged ions.

According to the study, light can stimulate electrons to make them more conductive. This can have wide-ranging applications in various devices, including solar cells.

But some devices depend on the movement of ions rather than just the electrons. Lithium-ion batteries are a classic example of this, as they depend on the movement of lithium ions during battery charge and discharge.

Similarly, fuel cells depend on the movement of hydrogen and oxygen ions to create electricity.

The study points out that the materials behind the applications based on the movement of ions are ceramics. Ceramics are made of tiny crystalline grains fired at high temperatures to form a dense structure. But the problem arises because these fast-moving ions are blocked at the grain boundaries.

"What we find is that the ionic conductivity – the rate at which the ions can move and, therefore, how efficient the resulting device can be – is often markedly degraded by the fact that the ions get blocked at these grain boundaries," said Harry L. Tuller, professor of ceramics and electronic materials in Department of Materials Science and Engineering at MIT.

Using the new method, the engineers demonstrated how light could lower the barriers that ions encounter at the grain boundaries.

To prove their point, the researchers demonstrated the use of light on the movement of oxygen ions through a solid electrolyte of ceria and gadolinium.

Speaking on this latest development, William Chueh, associate professor of materials science and engineering at Stanford University, said, "While the movement of electrons under the illumination of light is extensively studied, the movement of ions is only now receiving attention. The work by



Tuller and colleagues demonstrate that illuminating materials for fuel cells, electrolyzers, and batteries can substantially lower the bottleneck on ion movement."

The work could have wide-ranging applications, including boosting the performance of lithium battery electrolytes by increasing their charging rate.

The researchers stated that some devices based on ionic conductivity, like solid oxide fuel cells, must be operated at very high temperatures (about 700 degrees Celsius) for the ions to overcome and move across the grain boundary barriers. And high temperatures, in turn, bring their problems.

"Our dream was to see if we could overcome the barriers using something that doesn't require heat. Could we get the same conductivities with another tool? That tool turned out to be light,

which had not been tested in this context before," said Defferriere, a graduate student at the Department of Materials Science and Engineering at MIT.

The work was supported by the U.S. Department of Energy, the Japan Society for the Promotion of Science, the Swiss National Science Foundation, the U.S. National Science Foundation, and Equinor.

Last December, researchers from MIT announced that they had developed a novel electrode material that they believed could be integrated into a semi-solid battery to store renewable energy cost-effectively.

Earlier, researchers from Helmholtz Institute Ulm and Cheongju University had developed a new lithium-metal battery that claimed to offer an extremely high energy density of 560 watt-hours per kilogram with remarkably good stability. ☺

Rooftop Solar Capacity Additions Soar

As per the recently released report by Mercom India Research, India added 1.7 GW of rooftop solar capacity

By : Rakesh Ranjan Parashar

In calendar year (CY) 2021, India added 1.7 GW of rooftop solar, the highest-ever recorded in a calendar year. Installations were up 138% compared to 2020, according to Mercom India Rooftop Solar Market Report Q4 and Annual 2021.

In 2021, the residential and commercial segments accounted for 35% and 33% of installed rooftop

solar capacity. The industrial segment accounted for 26% of the total installations, and the government segment accounted for 6%.

The country added 402 MW of new rooftop installations in the fourth quarter (Q4) of CY 2021, marking a 10% drop quarter-over-year (QoQ) compared to 448 MW in Q3 CY 2021.

However, the installations during the quarter increased by 41% year-over-year

(YoY) in comparison to Q4, 2020.

According to the report, in Q4 2021, rooftop solar installations accounted for 15% of the total solar installations in the country.

Out of the total installed capacity in Q4 2021, the commercial segment accounted for 44% of the total installations, followed by the industrial, residential, and government sectors, with 41%, 10%, and 5%, respectively.

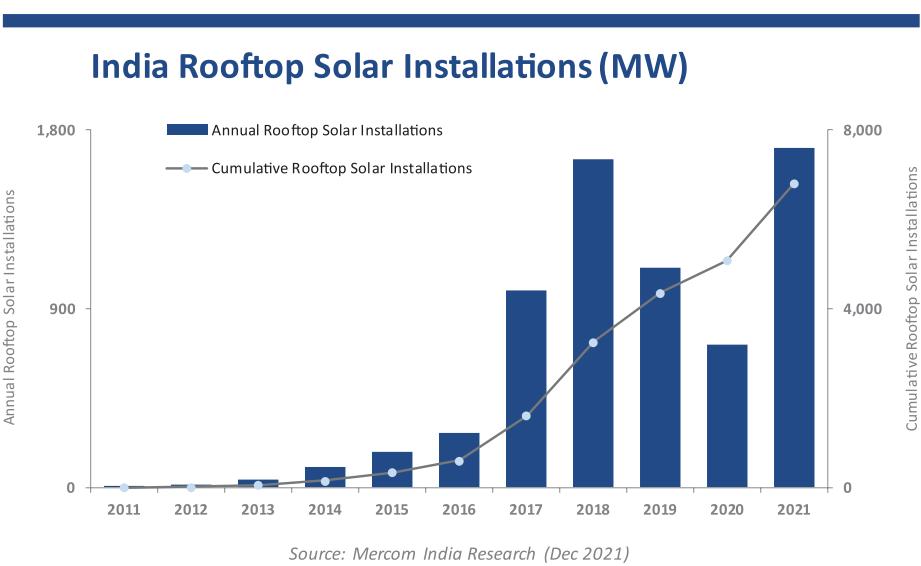


"The rooftop market had its best year, largely due to the pent-up demand from 2020, which experienced a severe decline due to the Covid-19 pandemic. Certainty around the net metering policy helped with consumers' demand across all segments- residential, industrial, and commercial- were responsible for the growth in installations. An increase in component costs will dent demand in 2022, but we still expect positive growth this year," said Raj Prabhu, CEO of Mercom Capital Group.

As per the report, at the end of December 2021, rooftop installations in the country reached 7 GW.

The price rise of components, commodities and raw materials also affected the demand during the year. The increase in goods and services (GST) tax was a huge blow to installers. If not for the policy uncertainties and market volatility, the installations could have been higher.

In 2021, over 1 GW of solar tenders were issued, marking an increase of 56%



YoY. The Kerala State Electricity Board accounted for 27% of the announced tenders, and distribution companies in states like Maharashtra, Jharkhand, West Bengal, and Karnataka accounted for 29%.

In Q4 2021, tenders for rooftop solar projects increased 70% compared to Q3

2021. The tendering activity rose 48% compared to the same period in 2020.

Out of the tendered capacity in Q4 2021, 56% were announced by the Maharashtra State Electricity Distribution Company Limited (MSEDCL) and 11% by the Uttar Pradesh New and Renewable Energy





Development Agency (UPNEDA). Other agencies floated nearly 24% of the tenders.

The report states that the distribution companies (DISCOMs) issued tenders in Kerala, Punjab, Gujarat, Uttar Pradesh, Jharkhand, Haryana, West Bengal, Tripura, and Karnataka under Phase-II of the Ministry of New and Renewable Energy (MNRE) rooftop solar program during 2021.

Among the states, in terms of cumulative installations, Gujarat led the way with 27% of the total installations, followed by Maharashtra and Rajasthan with 14% and 10%, respectively.

At the end of Q4 2021, the top ten states accounted for 83% of the total

cumulative installations.

From Q4 2020 to Q4 2021, Maharashtra registered the highest compounded growth at 26.7%, followed by Uttarakhand and Haryana with 26.6% and 24.7%, respectively.

In Q4 2021, ₹232.19 billion (-\$3.1 billion) was invested in the solar sector, of which about ₹16.88 billion (-\$225 million) went into the rooftop solar segment, which marked a 7% QoQ decline compared to ₹18.07 billion (-\$240 million) invested in Q3 2021.

2021 was a bounce-back year for the rooftop segment, beginning with the clarity provided by the Ministry of Power capping net metering at 500 kW. After that, several states such

as Chhattisgarh, Karnataka, Punjab, Gujarat, Rajasthan, Kerala, Haryana, Tamil Nadu, and West Bengal came up with their respective state policies that bolstered the industry sentiment.

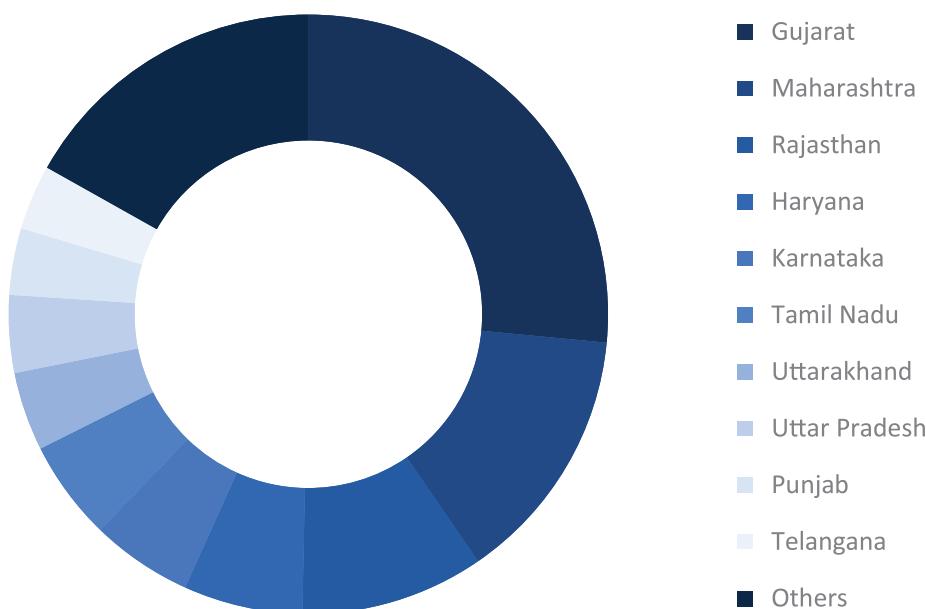
The report also includes a comprehensive analysis of the net metering policies in all the states and union territories.

Key Highlights from Mercom India Rooftop Solar Market Report Q4 & Annual 2021:

- In CY 2021, India added 1.7 GW of rooftop solar capacity, the highest in any calendar year to date
- Cumulative rooftop solar installations are over 7 GW as of Q4 2021
- The top 10 states accounted for 85% of the total rooftop solar installations in CY 2021
- In Q4 2021, 44% of rooftop solar installations came from the commercial segment, followed by 41%, 10%, and 5% in the industrial, residential, and government segments
- In Q4 2021, 68% of total rooftop solar installations were under the CAPEX model, while installations under the OPEX/RESCO models contributed to the remaining 32%
- Gujarat was the top state for cumulative rooftop solar installations, followed by Maharashtra and Rajasthan
- YoY rooftop solar system costs have increased by 14.75%

The Mercom India Rooftop Solar Market Report Q4 and Annual 2021 is 55 pages and covers all facets of India's rooftop solar market. For the complete report, visit our website. ☺

Top 10 States with Cumulative Rooftop Solar Installations





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Adani Joins the List of Winning Bidders for PLI

In the updated list of successful bidders announced by IREDA, Reliance New Energy Solar and Adani Infrastructure's PLI awards were modified

By : Rakesh Ranjan Parashar

The Indian Renewable Energy Development Agency (IREDA) announced an updated list of successful bidders for setting up manufacturing capacities for a minimum of 10 GW of vertically-integrated high-efficiency solar modules under the production-linked incentive (PLI) program.

According to the updated list, Reliance New Energy Solar's PLI award amount was increased to ₹19.17 billion (~\$254.24 million) from the earlier ₹11.90

the same at ₹18.75 billion (~\$252 million) for a capacity of 4 GW.

According to IREDA sources, Jindal India Solar Energy, which was awarded a PLI of ₹13.90 billion (~\$186.8 million), decided to opt out of the bidding process. IREDA also announced the updated list of beneficiaries.

Background

In November 2020, the central government had approved the PLI program for ten critical sectors to

photovoltaic (PV) modules, advanced chemistry cell (ACC) batteries, and automobiles and auto components.

The Union Cabinet in April 2021 approved the implementation of the PLI program with an outlay of ₹45 billion (~\$605 million), which has now been increased to ₹195 billion (~\$2.61 billion), in the 2022 budget announcement.

Following the approval for the PLI program, IREDA invited bids to set up 10 GW of high-efficiency solar module manufacturing capacities in

Updated List of Winners for Setting Up Manufacturing Facilities for Vertically-Integrated High-Efficiency Solar Modules Under the Production-Linked Incentive (PLI) Program

Bidder's Name	Marks for the 'Extent of Integration'	Marks for 'Manufacturing Capacity'	Total Marks	Bidder's Manufacturing Capacity	Eligible Capacity (for PLI)	PLI for 1st Year		PLI for 2nd Year		PLI for 3rd Year		PLI for 4th Year		PLI for 5th Year		Total PLI for Five Years	
						MW	MW	₹ in billion	\$ in billion	₹ in billion	\$ in billion						
Shirdi Sai Electricals	50	50	100	4,000	2,000	5.25	0.070	4.50	0.060	3.75	0.050	3.00	0.040	2.25	0.030	18.75	0.249
Reliance New Energy Solar	50	50	100	4,000	2,000	4.50	0.060	4.95	0.066	4.41	0.059	3.51	0.047	1.80	0.024	19.17	0.255
Adani Infrastructure	50	50	100	4,000	2,000	10.08	0.134	8.64	0.115	7.20	0.096	5.76	0.077	4.32	0.057	6.63*	0.088

Note: \$1 = ₹ 75.27

* Note: Adani Infrastructure applied for a PLI of ₹36 billion (~\$0.48 billion) of which ₹6.63 billion (~\$0.09 billion) has been allotted.

Source: IREDA

Mercom India Research

billion (~\$160 million) for a capacity of 4 GW. Adani Infrastructure was awarded a PLI of ₹6.63 billion (~\$87.93 million) out of the total quoted amount of ₹36 billion (~\$477.44 million) for a capacity of nearly 737 MW under the bucket filling method, according to Mercom sources.

Shirdi Sai Electricals PLI award stayed

enhance India's manufacturing capabilities and exports under the Atmanirbhar Bharat initiative.

The government had said that it would allocate ₹1.45 trillion (~\$19.61 billion) for the ten critical sectors over the next five years. These critical sectors include- high-efficiency solar

May 2021. The tender had received a strong response from the bidders and was oversubscribed by 5.48 times. The bidders had quoted a total capacity of 54.8 GW for polysilicon, ingot-wafer, cell, and module manufacturing. In November last year, IREDA announced the list of successful bidders. ☉

Supreme Court Rebukes Andhra DISCOMs for Terminating PPAs Unilaterally

The Apex Court, while listening to the arguments put forward by the state DISCOMs, ruled that the termination of PPAs unilaterally was against the public interest

By : Rakesh Ranjan Parashar



The Supreme Court of India, in a recent order, rebuked the Andhra Pradesh distribution companies (DISCOMs) attempting to terminate the power purchase agreement (PPA) unilaterally after the project developer had set up the project.

The Apex Court has said that the state regulatory commission must be guided by public interest while approving the tariffs for power purchase. It also added that DISCOMs must not be terminating PPAs, considering huge investments made by project developers.

DISCOMs need to be mindful that valuable public resources, including thousands of acres of land, would go to waste. Such a decision by DISCOMs to terminate PPAs is against public interest and the public good.

The state DISCOMs had filed an appeal with the Supreme Court challenging the ruling passed by Appellate Tribunal for Electricity (APTEL). The APTEL had directed the state Commission to pass an order to determine the capital cost as requested by Hinduja National Power Corporation

(HNPCL) and approve the amended and restated PPA.

Background

The Andhra Pradesh State Electricity Board (APSEB) had signed an initial PPA with HNPCL on December 9, 1994. Later, the parties agreed to amend the PPA, and the amended and restated PPA was signed on April 15, 1998, to procure 1,040 MW of power from HNPCL.

From 1998 to 2007, the amended and restated PPA for the sale of power by HNPCL to APSEB was not implemented. Then, in 2007, HNPCL approached the Andhra Pradesh government to revive the power project, structuring it as a merchant plant, offering 25% of the power generated to the state and the remaining 75% to third parties.

After that, in 2012-13, the Central Power Distribution Company of Andhra Pradesh, on behalf of the state's DISCOMs, started the process of procurement of power to meet the baseload requirements.

In the bidding process, HNPCL emerged as the second-lowest bidder. In December 2021, the Andhra Pradesh government accepted HNPCL's proposal

to purchase 100% power from the project per the amended and restated PPA.

Later, on June 2, 2014, the Andhra Pradesh Reorganisation Act came into being, and the state of Andhra Pradesh was bifurcated into Andhra Pradesh and Telangana.

Then, in 2015, HNPCL filed an application, increasing the project's capital cost to ₹80.87 billion (-\$1.08 billion), which the DISCOMs disputed.

Later, in 2016, the state Commission fixed the provisional tariff of ₹3.61 (-\$0.048)/kWh for the supply of power by HNPCL to the state DISCOMs. Thereafter, the state Commission dismissed the petition filed by HNPCL for the determination of tariff.

Aggrieved by this, HNPCL approached APTEL, which directed the parties to maintain the status quo prior to January 2018.

The DISCOMs, in their appeal, submitted that the PPA was not a valid document until the state Commission approved it. The DISCOMs added that HNPCL's contention that it had made huge investments based on the assurance given by the DISCOMs was





erroneous. The DISCOMs further argued that since the reinitiation of the project in 2007 as a merchant power project, HNPCL was free to sell power to third parties in the market.

Supreme Court's analysis

The Court observed that after the bifurcation of Andhra Pradesh, a continuation agreement was signed between the DISCOMs and HNPCL in 2016. The DISCOMs had agreed to amend the restated PPA as per the continuation agreement. Later, the state government in 2016 approved the procurement of 100% of power from HNPCL at a tariff of ₹3.82 (-\$0.051)/kWh from August 1, 2016.

The Court added that the state Commission would consider all the factors while approving the tariff at which the DISCOMs would procure the power from HNPCL.

The Apex Court said that HNPCL had revived the project as a merchant power project in 2007 and had offered 25% of the power to the state. But it was the state which offered to purchase 100% of power from HNPCL.

The Court added that the determination of the capital cost and tariff would always be in the regulatory control of the state Commission.

The Court ruled that the state DISCOMs of Andhra Pradesh should start purchasing 1,040 MW of power from HNPCL at ₹3.82 (-\$0.051)/kWh as per the order passed by the APTEL until the state Commission decides the case.

The Apex Court directed the state Commission to decide the case regarding the capital cost and the approval of the amended and restated power purchase agreement (PPA) within six months from the date of the order.

Speaking on the Supreme Court order, Aditya K. Singh, Associate Partner at Link Legal, said, "This order will significantly impact the renewable industry as well. The Supreme Court has given a different angle to the definition of 'public interest.' Various electricity commissions have been using the term 'public interest' to pass orders against developers without realizing that a developer's interest is also linked to 'public interest.' The Supreme Court has also rightly recognized that the termination of PPAs by DISCOMs also goes against the 'public interest.'

The Supreme Court order acquires more relevance for the renewable industry. It clarifies that once signed PPAs cannot be terminated, it becomes a binding document for all the parties.

**The Court clarified
that once signed,
PPAs cannot be
terminated, and it
becomes a binding
document for all
the parties**

Previously Punjab and Andhra Pradesh have set bad examples of trying to renegotiate PPAs.

Last November, the Punjab Government passed a Bill to revise the long-term PPAs between the Punjab State Power Corporation and the renewable energy generators. The Bill seeks to reduce the tariffs for renewable energy projects approved by the state electricity regulatory commission.

In 2019, Chief Minister of Andhra Pradesh YS Jaganmohan Reddy had announced that the government would review the PPAs signed between the state's DISCOMs and power generators. The decision had alarmed power producers, investors, policymakers, and legal experts.

However, the Andhra High Court had quashed the state government's order and letter issued to renewable developers to reduce their quoted tariffs. Considering the health of DISCOMs in the state and the fact that developers need liquidity to keep the projects in operation, the High Court had directed them to immediately pay ₹2.43 (\$0.034)/kWh and ₹2.44 (\$0.034)/kWh to wind and solar developers respectively. However, this is only an interim relief. The Court has said that the interim arrangement is being suggested to balance the interests of both parties.

But the court case is yet to be settled, and developers are yet to receive the payments per the tariffs signed in the PPA. ☰

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Perovskites Withstand Heat to Offer an Alternative to Silicon Solar Cells

Researchers at the King Abdullah University of Science and Technology have achieved a significant milestone by performing the first-ever damp heat test for perovskite solar cells

By : Rakesh Ranjan Parashar



Researchers at the King Abdullah University of Science and Technology (KAUST) claimed to have achieved a significant milestone through the first-ever successful damp-heat test of perovskite solar cells.

The damp-heat test is an accelerated environmental aging test aimed at determining the ability of solar panels to withstand prolonged exposure to high humidity and elevated temperatures.

The experiment was performed under a controlled environment with humidity in the region of 85% and a temperature of 85 degrees Celsius. It was ideal for replicating the outdoor test conditions to evaluate factors such as corrosion and delamination.

According to the study, the new technology must meet the requirements of stability and scalability before it can

be commercialized.

Developed through a film-coating process, perovskites are vulnerable to the infiltration of external agents like moisture, thus compromising the ability of the solar cells to deal with heat.

The researchers at KAUST found that introducing a 2-D passivation layer blocked the moisture, enhanced solar cells' efficiency, and prolonged the lifetime of the perovskite solar cells.

The study points out that the technology used in perovskites is thin-film technology. Unlike silicon wafers, perovskite ink can be coated directly on a glass substrate, coupled with antisolvent extraction, then thermal annealing to crystallize the perovskite film.

The perovskite ink is formulated from a mixture of salts in a polar aprotic solvent at a low temperature.

One of the main advantages of perovskites is that the cells can be made without using an energy-intensive environment with temperatures exceeding 1,000 degrees Celsius, which is typical for semiconductors like silicon.

"It's a very simple way to make solar cells. While the optoelectronic properties are not unique, they are excellent. They're on par with very high-quality traditional semiconductors. That's quite remarkable," said Steefan De Wolf, professor at KAUST.

As the stability of the cells has been achieved, another thing that comes into the picture is scalability.

Most solar cell applications cater to the utility-scale sector and the rooftop segment. While the latter is not prominent in Saudi Arabia, utility-scale projects are being pursued in the kingdom on a large scale. ☀

New Boost to Livelihood Applications Powered by Renewables

To promote decentralized livelihood applications, MNRE has come out with the framework to promote and develop decentralized renewable energy-based applications to help consumers

By : Rakesh Ranjan Parashar

The Ministry of New and Renewable Energy (MNRE) has issued the framework to promote and develop decentralized renewable energy-based livelihood applications.

Decentralized renewable energy livelihood applications are solutions powered by renewable energy, which are used for earning a livelihood, such as solar dryers, solar mills, biomass-powered cold storage, solar charkha and loom, and biomass pellet making machines, among others.

According to the Ministry, several livelihood applications could be integrated with decentralized renewable energy sources to not only provide clean energy but also help in increasing the productivity and income of the consumers. It can reduce and eventually eliminate the reliance of livelihood on diesel, particularly in rural areas, and supplement the grid supply.

Backed by the successful application of decentralized renewable energy-based solutions across agriculture, agro-processing, dairy, poultry, fisheries,

tailoring, etc., the MNRE intends to replicate it in larger quantities in the overall spectrum of livelihood activities throughout India.

Earlier in October 2020, MNRE had proposed the policy framework to promote decentralized renewable energy systems for livelihood generation in rural India.

The major objectives to promote decentralized renewable energy livelihood applications include:

- Enable a market-oriented ecosystem to attract the private sector



- investment for the development and deployment of reliable and affordable decentralized renewable energy-based livelihood applications
- Unlock easy access to end-user finance to increase adoption of decentralized renewable energy-based livelihood solutions by linking them to existing financing programs or through new financial programs
- Leverage quality control standards and a robust monitoring & evaluation framework to ensure long-term performance sustainability of decentralized renewable energy-based livelihood solutions
- Promote high-quality products and their long-term management
- Promote skill development for strengthening the service infrastructure
- Encourage innovation and R&D to develop cost-effective decentralized renewable energy livelihood applications

- Establish energy-efficiency benchmarks for high-potential decentralized renewable energy livelihood products
- Collaborate with ministries to include decentralized renewable energy-based livelihood applications in their programs
- Creation of livelihood opportunities in technology innovation value chain of decentralized renewable energy applications

The Ministry will assess the potential for the deployment of decentralized renewable energy livelihood applications across various sectors and different regions of the country. The demand assessment activity will help map the needs of the beneficiaries and find the right decentralized renewable energy livelihood application.

The Ministry will develop a list of decentralized renewable energy applications updated regularly.

Research and development

Institutions at the central and state level will be required to support the development of new devices and applications. Also, efforts will be made to encourage the participation of the private sector, technology incubation centers, bilateral and multilateral agencies, and NGOs involved in research and development activities.

The technology transfer support for innovators will be arranged through existing government programs that provide necessary technical and financial support.

To promote innovation in the sector while also ensuring that only good quality products are scaled up, guidelines and standards for the system components will be specified. A technical and skill sub-committee including representatives from industry, R&D, and academia will be constituted to assess the requirement, development, and maturity of decentralized renewable



energy livelihood applications.

Scaling up of decentralized renewable energy livelihood applications

The field demonstration of new decentralized renewable energy livelihood applications will be carried out to determine the impact of technology innovation on the ground. In line with the guidelines issued by MNRE for innovative solar pumps, similar modalities will be worked out to run pilot projects under the existing or new programs.

Incubation and pilot support for decentralized renewable energy-based livelihood enterprises will be facilitated through collaborations with various organizations.

As per the new framework, to maintain the long-term sustainability of the installations, a robust after-sales service will be encouraged through appropriate incentives. Also, a

Decentralized renewable energy-based livelihood solutions will be considered under priority sector lending

monitoring platform will be developed, in collaboration with relevant partners, to track the long-term performance of the supported installations.

Access to finance

In partnership with financial institutions, a financing facility offering a first loss default guarantee with partial risk coverage will be designed to help entrepreneurs and end-users get access to credit. Such a facility would encourage financing to women, self-help

groups, and collectives.

Acquisition of assets is particularly challenging for micro-businesses, marginalized groups, and women. Therefore, enterprises with OPEX-based financial models such as pay-as-you-go and rental models will also be supported for credit facilitation.

Further, to enable end-user financing, decentralized renewable energy-based livelihood solutions will be recognized under the existing provisions of the priority sector lending. Preference will be given to decentralized renewable energy-enabled variants of technologies under the existing programs like the Rural Innovation Development Fund.

In collaboration with relevant partners, MNRE will commission the development of rapid assessment tools, which bankers and financiers could use to assess the economic viability of decentralized renewable energy livelihood solutions for various end-users.





Skill development

According to the framework, efforts will be made for developing and implementing skills and training programs for decentralized renewable energy livelihood applications with Skill Council for Green Jobs, IITs promoting technology-led development, National Institute for Rural Development, and other organizations. In addition, efforts will also be made with the governing bodies of other sector skill councils to integrate training modules for decentralized renewable energy technologies across sectors.

Also, existing community-level institutional platforms will be mobilized with the support of technology providers to build the capacity of potential users and buyers on basic troubleshooting of the equipment to boost the adoption of decentralized renewable energy technologies.

Public awareness

In collaboration with relevant partners, MNRE will release a digital catalog/portal of decentralized

renewable energy-powered livelihood solutions updated regularly, which various stakeholders could use for awareness creation. Decentralized renewable energy for livelihood innovators or technology providers will be able to share their product information through the portal, which will be reviewed and updated regularly.

Under their existing programs, central and state government ministries and departments may take up public awareness campaigns to scale up the adoption of decentralized renewable energy livelihood applications. Proactive information exchange with the state nodal agencies for disseminating information and cross-fertilizing the ideas across states will be encouraged.

Programs of various departments

MNRE would coordinate with the ministries to integrate decentralized renewable energy-based livelihood applications into their implementation and act as a platform for knowledge exchange and feedback. An inter-ministerial coordination committee

on decentralized renewable energy-based livelihood applications will be constituted under the chairmanship of the secretary of MNRE. The committee will meet at least once every six months. Each member ministry will appoint a focal point of contact for inter-ministerial coordination within the committee.

Implementation cell

The Ministry has indicated that state nodal agencies may form an implementation cell for decentralized renewable energy-based livelihood applications bringing the state departments engaged in implementing such applications on a common platform.

Last October, MNRE issued a downward revision of benchmark costs excluding taxes for decentralized and off-grid solar systems for the financial year (FY) 2021-22. The amended benchmark costs included the total cost of the system and its installations, commissioning, transportation, insurance, warranty, monitoring, and maintenance for five years. ☉

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India Announces Green Hydrogen Policy

The Ministry of Power announced the 'Green Hydrogen Policy' with a set of guidelines and policies to promote the production of hydrogen in the country

By : Rakesh Ranjan Parashar



In line with the National Hydrogen Mission launched last year, the Ministry of Power announced a 'Green Hydrogen Policy' to help India meet the production target of 5 million tons of green hydrogen by 2030 and the related development of renewable energy capacity.

As per the new policy, green hydrogen and green ammonia will be defined as ammonia and hydrogen produced by electrolysis of water using renewable energy that has been banked and hydrogen and ammonia produced from biomass.

The policy states that the waiver of interstate transmission charges will be granted for 25 years to the producer of green hydrogen and green ammonia for projects commissioned before June 30, 2025.

Also, green hydrogen and green ammonia can now be produced from using renewable energy from a co-located renewable energy project or remotely located renewable energy projects, whether set up by the same developer or third party or procured from the power exchange.

The green hydrogen or green ammonia plants will be granted open access within 15 days of the receipt of the application.

The banking will be permitted for 30 days for the renewable energy used for making green hydrogen and green ammonia.

The banking charges will be determined by the state commission, which should not be more than the differential cost between the average cost of the renewable energy bought by the distribution licensee during the previous year and the average market clearing price in the day-ahead market (DAM) during the month in which the energy has been banked.

Green hydrogen or green ammonia plants will be granted open access within 15 days

Land in renewable energy parks will be awarded to green hydrogen and ammonia manufacturing units.

The government also proposes to set up manufacturing zones for the green hydrogen and green ammonia manufacturing plants.

Speaking on the Green Hydrogen Policy, Mayank Bansal, Chief Commercial Officer at ReNew Power, said, "Currently, manufacturing green hydrogen is a costly proposition, and in cognizance of this, the government has correctly waived off ISTS charges for 25 years, which will help in bringing down the cost of green hydrogen. The government has also allowed banking of power for 30 days, which will help improve the utilization of capital-intensive electrolyzer assets."

"We believe that more clarity is needed on the application of cross-subsidy surcharge and additional cross-subsidy surcharge since the policy allows production at different locations by different parties. Further, the decision to include biomass as a fuel for the generation of green hydrogen is a step in the right direction," Bansal further added.

The green hydrogen and green ammonia manufacturers will also be allowed to set up bunkers near ports to store green ammonia for export by shipping. The respective port authorities will provide the land for storage.

Renewable energy consumed in green ammonia and green hydrogen production will count towards the

consuming entity's renewable purchase obligation (RPO) compliance. The renewable energy consumed beyond the RPO target of the producer will be considered towards RPO compliance for the distribution company (DISCOM) in whose area the project is located.

The DISCOMs may also procure and supply renewable energy to the manufacturers of green ammonia and green hydrogen in the states. The DISCOMs will only charge for the cost of renewable energy procurement and the wheeling charges as determined by the state commissions.

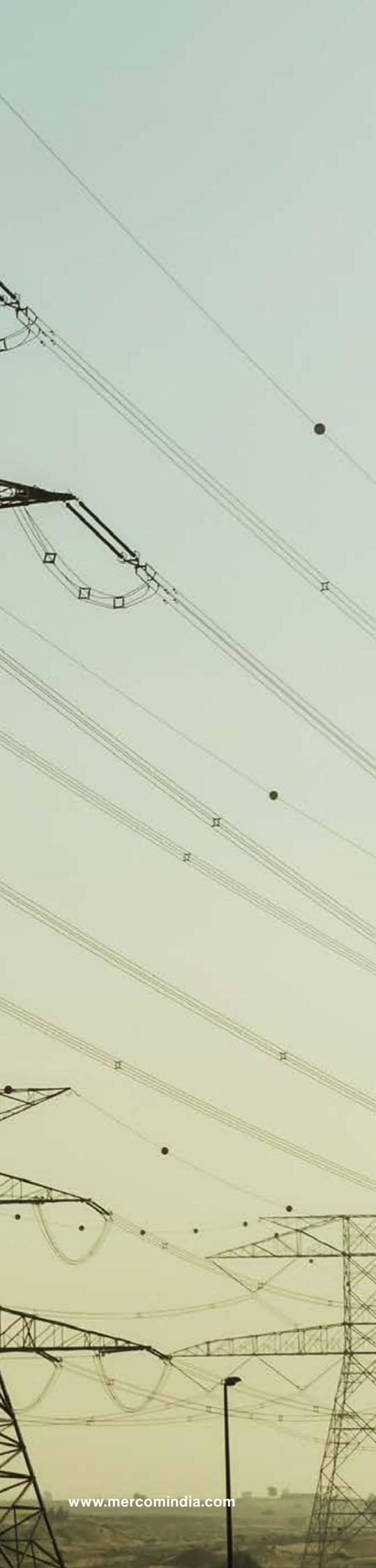
The Ministry of New and Renewable Energy (MNRE) will set up a portal for all clearances and permissions required for manufacturing, transportation, storage, and distribution of green hydrogen and green ammonia.

MNRE might aggregate demand from various sectors and consolidate bids to procure green hydrogen and green ammonia to achieve competitive prices.

Recently, MNRE signed a strategic partnership agreement with the International Renewable Energy Agency (IRENA), signaling its intent to further strengthen its collaboration with IRENA in renewable energy. MNRE and IRENA would work closely to assess the potential role green hydrogen could play as an enabler of the transition in India as a new source of national energy exports.

Earlier, the Indian Renewable Development Agency (IREDA) launched a program to promote the manufacture and deployment of infrastructure for emerging technologies and green mobility. The emerging technologies include battery energy storage systems (BESS), projects involving the production of green hydrogen (electrolyzers), fuel cells, manufacturing and assembling plants of electric vehicles, and waste recycling units. ☈





Southern Region Gets Transmission System to Evacuate 8 GW of Solar

CERC approved the transmission system for 8 GW of renewable power in a bid to match the transmission systems with the progress of project development

By : Rakesh Ranjan Parashar

The Central Electricity Regulatory Commission (CERC) recently approved the execution of the proposed transmission system for the evacuation of 8 GW of power from solar energy zones and wind energy zones in the southern region.

CERC directed the Central Transmission Utility of India Limited (CTU) to ensure that the transmission system matches the progress of generation projects. The transmission charges and treatment of the mismatch between the commercial operation date of the generating stations and the transmission system should be governed by the CERC Regulations, 2020.

The central regulator said that if the generating projects are not commissioned, and the transmission system is commissioned, the CTU may seek appropriate remedies such as grants and subsidies from the Government of India or the state governments until the

associated generating projects achieve the commercial operation date.

CTU must submit a quarterly progress report regarding the execution of the transmission program to the Union Ministry of Power and the Central Electricity Authority (CEA).

The Power Grid Corporation of India Limited (PGCIL) had filed a petition to execute transmission infrastructure for 18.5 GW of solar and wind energy zones in the southern region. After filing the petition, CTU became a separate entity carved out of PGCIL.

Background

In 2018, the Ministry of New and Renewable Energy constituted a sub-committee to identify interstate transmission system (ISTS) connectivity for renewable energy projects from the potential solar energy zones and wind energy zones of about 50 GW and 16.5 GW, respectively.

Out of 66.5 GW potential, 18.5 GW



was envisaged to be developed in the southern region, including 10 GW of solar generation and 8.5 GW of wind generation.

The Tamil Nadu Generation and Distribution Corporation (TANGEDCO), in its submission, said that the gestation period for the development of generation projects was relatively shorter as compared to the transmission systems.

The Power System Operation Corporation (POSOCO) stated that as more than 70% of solar dispatch was considered in the southern region, solar generation dispatch in other regions should also be around this value. However, lesser solar generation (around 4,435 MW) was considered in the northern region. In contrast, the northern region's total installed solar generation capacity was expected to be around 35 GW by 2021-22.

The Solar Energy Corporation of India (SECI), in its submission, stated that it had so far awarded renewable projects for a total capacity of 25.04 GW, of which 14.24 GW was of solar and 10.8 GW was for wind/hybrid.

The nodal agency added that the

transmission infrastructure development needed to be started much ahead of the generation projects as the gestation period of renewable projects was much shorter than the development of transmission facilities.

POSOCO said that it was evident from CTU's affidavit that 10.5 GW out of the proposed 18.5 GW was put on hold due to non-receipt of long-term access (LTA) applications.

Commission's analysis

The Commission observed that CTU had proposed the transmission system for 10.5 GW of solar and wind energy zones in the southern region - Koppal (2.5 GW), Karur (2.5 GW), Gadag Part-A (2.5 GW), Gadag Part-B (2.5 GW), and Tuticorin-II (500 MW).

It noted that SECI had supported the petitioner's proposal. On the other hand, TANGEDCO, the Karnataka Power Transmission Corporation, and the Tamil Nadu Transmission Corporation (TANTRANSCO) opposed the proposal and suggested several modifications before implementing the transmission program.

The central regulator noted that CTU had submitted that it was seeking approval to undertake the execution of a transmission system for only 8 GW in the solar and wind energy zones in the southern region, namely, Koppal (2.5 GW), Karur (2.5 GW), Gadag (2.5 GW) and Tuticorin-II (500 MW).

It observed that the scaling down of the transmission system from 18.5 GW to 8 GW raised a serious question on the entire transmission planning and approval process. There was a gross lack of due diligence by statutory planning agencies such as CTU and intermediary agencies like SECI and the competent authority that approved the program for 18 GW.

The regulator, however, approved the execution of the proposed transmission system for 8 GW of power from the southern region's solar and wind energy zones.

In May last year, CERC had passed an order granting regulatory approval to PGCIL for setting up transmission systems under the second phase of its transmission program for solar energy zones in Rajasthan. ☈

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Solar Industry Uncertain About GST Rates

The industry is confused around the rate of applicable GST and also the description of solar components used in the GST notification

By : Rakesh Ranjan Parashar

The GST council, in September 2021, announced the GST increase for 'specified renewable energy parts,' from 5% to 12%, which came into effect the following month.

With the rising ambiguity around managing the project costs with the increase in the GST rate, many developers have raised their concern to the government, requesting an immediate solution.

It is in the realm of speculation that the Ministry of Finance might consider revising the GST rates or make it limited to only 'renewable power generating systems' since electricity is outside the ambit of GST.

The increase in GST rate is aimed to address the issue of inverted duty structure for solar cell and module manufacturers to make them competitive. In an inverted tax structure, the tax rate on inputs used is higher than the tax rate on the outputs for sale.

With the increase in GST from 5% to 12% on renewable energy equipment, at the project level, the new effective rate of GST on wind and solar power comes to around 13.8%.

The confusion is around using the word 'solar power generating systems,' which was all-encompassing and included solar power projects. The term 'solar power generator' in the new notification is restrictive.

The stakeholders believe that the increase in GST is only on solar energy equipment and is not intended to

increase the GST rates further. Clarity from the government is sorely needed on this topic. Under the existing regime, 70% of the gross value of the contract was considered for the supply of goods, attracting a 5% rate - which is now 12%.

The new effective rate of GST hike on wind and solar projects is about 13.8%

This is in the case of a contract of supply for solar power generating systems. The remaining 30% is for the supply of taxable services, attracting a GST rate of 18%.

Speaking to Mercom, a top executive from one of the leading developers, said, "The government can increase the GST on modules, but projects must not suffer. The suggested rate was 70% of the project cost at 5% GST and 30% of the project cost at 18% GST. At the project level, it is recommended to keep the same formula. Now the GST rate is 12% on the solar power generator, and there is no clarity on the rest. So, what is meant by solar power generator - module or project? And then, the rest of the components will have their respective GST rates - inverters at 18%, cables at 28%, and so on."

With global solar supply chain

disruptions, a rise in the price of components, and various other challenges, the solar sector is already facing a tough environment, and the increase in GST rates is expected to exacerbate the problem further. Confusion around taxes and unexpected increases has always spooked international investors who are crucial to help fund the renewable aspirations of the country.

The increase in the GST rate will affect the economic feasibility of renewable energy projects and will have a detrimental effect on the ongoing and upcoming projects. Though the developers can always claim compensation under the 'Change in Law' clause, they don't want to get into the legal quagmire as GST claims have taken years to resolve.

With the Basic Customs Duty (BCD) implementation right around the corner, the developers are hoping GST will not make projects more expensive while the industry is pushing hard to meet the renewable energy target set for the country.

The average cost of large-scale solar projects in the fourth quarter of 2021 (Q4 2021) was approximately ₹43 million (-\$566,008)/MW, according to Mercom's recently released 2021 Q4 and Annual India Solar Market Update. The average cost increased by 21.6% compared to the same period last year when it was ₹35.3 million (-\$488,255)/MW and a 1% rise from the previous quarter when the cost was about ₹4.24 million (-\$559,828)/MW. ☀

GST

TAX

28

5%

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ECONOMIC DATA
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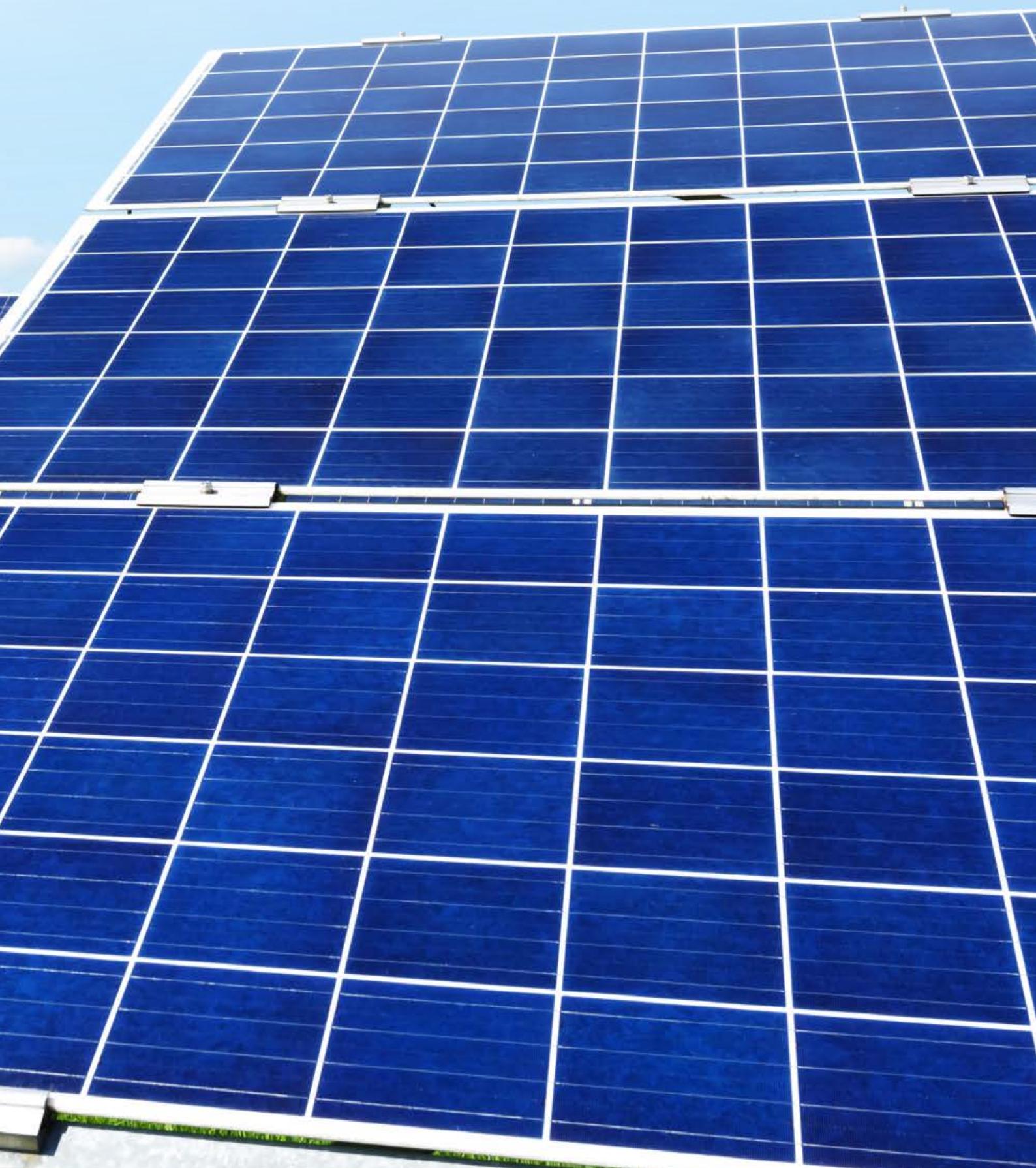
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2021, the Second - Best Year for Open Access Solar Installations

Mercom India Research's latest report reveals that India added 1.2 GW of new solar open access capacity, with 1.5 GW in pipeline at the end of 2021

By : Rakesh Ranjan Parashar





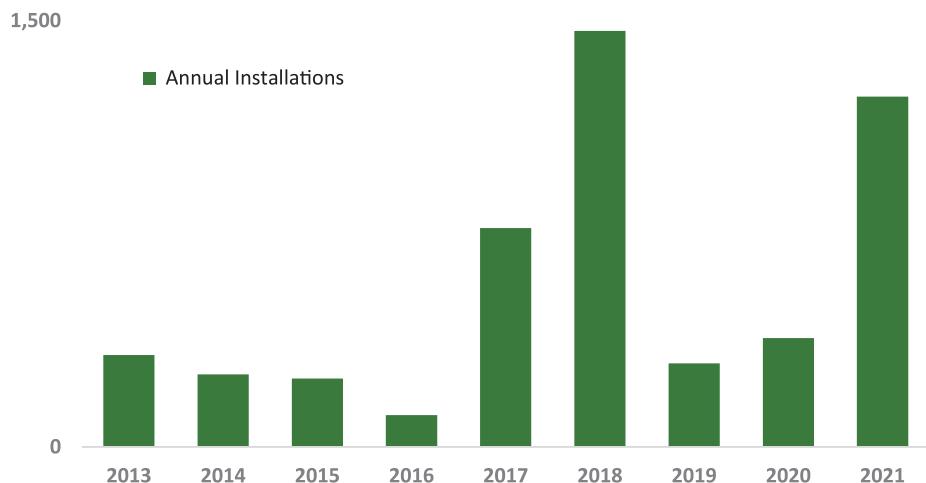
India added 1.2 GW of new solar open access capacity in the calendar year (CY) 2021, marking a growth of 222% year-over-year (YoY), making it the second-best year for open access in the country, according to Mercom India Research's newly released report 'Mercom India Solar Open Access Market Report Q4 & Annual 2021.'

As of December 2021, the cumulative installed solar capacity in the open access market crossed 5 GW.

The development pipeline of solar open access projects stood at 1.5 GW at the end of 2021. Of the pipeline, 75% is spread across the three states - Karnataka, Haryana, and Uttar Pradesh.

During CY 2021, Uttar Pradesh was the top state, followed by Tamil Nadu and Maharashtra. The top five states accounted for 80% of total installations

Solar Open Access Installations (MW)



Source: Mercom India Research (Dec 2021)



during the year.

The country added 298 MW of new solar open access capacity in the fourth quarter (Q4) of CY 2021, a 75% increase compared to the same period in 2020.

The top five states with the highest QoQ growth are Telangana (329%), Karnataka (102%), Andhra Pradesh (88%), Maharashtra (52%), and Uttar Pradesh (4%).

In Q4 2021, Uttar Pradesh was the top state in terms of installations, accounting for 38% of the total capacity installed during the quarter. The robust policy and regulatory framework, including favorable banking policies, exemption of additional surcharge, the state's willingness to adopt group captive business models, access to useable land, and efficient power evacuation facilities, drove the growth of the open access segment in the state.

The second highest capacity was installed in Maharashtra. The top five states accounted for 90% of the total installations during the quarter.

As for the cumulative open access solar installations, Karnataka continues to be the top state as of December 2021, accounting for 38% of the installations.

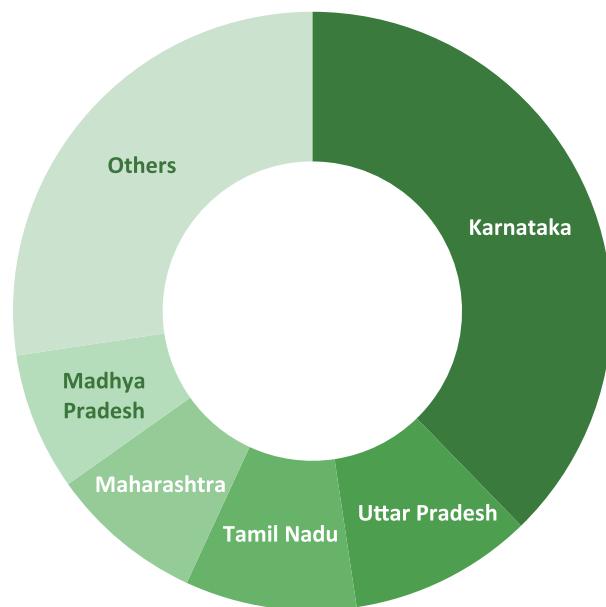
The report also points out that various short-term markets, such as the Day-Ahead Market (DAM), Green Term-Ahead Market (GTAM), Term-Ahead Market (TAM), and Real-Time Market (RTM), experienced a surge in activity in CY 2021.

The demand for open access solar is growing, reflected in the robust pipeline of projects

The IEX resumed renewable energy certificate (REC) trading in November 2021 after a gap of nearly 16 months after getting permission from the Central Electricity Regulatory Commission (CERC) and the Appellate Tribunal for Electricity.

Mitigating carbon footprint, reducing the cost of power, renewable power purchase obligations, and RE100 initiatives, the list of reasons for C&I consumers to go green is piling up.

Top 5 States: Cumulative Solar Open Access Installed Capacity (%)



Source: Mercom India Research (Dec 2021)

The demand for open access solar is growing, reflected in the robust pipeline of projects," commented Priya Sanjay, Managing Director at Mercom India.

In October last year, CERC approved the introduction of the Green Day Ahead Contract (GDAC) at IEX and PXIL in the integrated day-ahead market (IDAM) in a restricted manner.

The report also includes trading data of buy bids, sell bids, cleared volume, cleared price, and the number of participants in the market during Q4 2021.

The report has expanded its analysis coverage to include two new markets - Himachal Pradesh and Kerala. It also covers the current policies related to the open access market, amendments, price trends, and emerging business models.

The report gives a detailed account of banking policies in the top five states and reviews the policies driving the growth in these states.

Key Highlights from Mercom India Research's 'India Solar Open Access Market Report Q4 & Annual 2021'

- In calendar year (CY) 2021, 1.2 GW of solar open access was installed, a 222% growth compared to 383 MW installed in 2020

- India added 298 MW of solar open access capacity in Q4 2021; installations were up 75% YoY
 - Uttar Pradesh had the maximum installations with 113 MW and accounted for 38% of the total capacity additions in Q4 2021
 - As of December 2021, the total installed solar capacity in the open access market crossed 5 GW
 - The top five states contributed 80% of all open access installations in CY 2021 and 90% during the quarter
 - The top five states accounted for 73% of the cumulative solar open access installations at the end of December 2021
 - Karnataka continues to be the top state as of December 2021, accounting for 38% of the country's cumulative open access solar installations
 - Trading renewable energy through the newly introduced green day-ahead market saw a 5% increase in volume between November and December 2021
- Mercom India Solar Open Access Market Report Q4 & Annual 2021 is 59 pages and covers vital information and data on the market. For the complete report, visit our website. ☈

Industry News and Policy Briefs



Sterling and Wilson Renewable Energy (formerly Sterling and Wilson Solar), the solar engineering and construction arm of the **Shapoorji Pallonji Group**, recorded a total income of ₹15.02 billion (-\$198.62 million) in the third quarter (Q3) of the financial year (FY) 2022. This represented an 11.5% year-over-year (YoY) increase compared to a total income of ₹13.47 billion (-\$178.11 million) in Q3 FY 2021.

Virescent Renewable Energy Trust, a renewable energy infrastructure investment trust by Virescent Infrastructure, signed a share purchase agreement to acquire 100% shareholding and management control in Godawari **Green Energy Limited** for ₹6.65 billion (-\$98.11 million). Godawari Green Energy operates a 50 MW concentrated solar power project (parabolic trough) in the Nokh village, located in Jaisalmer district, Rajasthan.

Gujarat-based power company **Torrent Power Limited** announced that it has entered into a share purchase agreement with **Blue Diamond Properties and Balrampur Chini Mills** to acquire 100% equity share capital of **Visual Percept Solar Projects** - a special purpose vehicle (SPV). The acquisition value is estimated at ₹1.63 billion (-\$21.71 million).

Virescent Renewable Energy Trust raised ₹6.5 billion (-\$87 million) through domestic bond issuance across 7.33-year (₹1.5 billion (-\$20 million)) and 10-year (₹5 billion (-\$67 million)) tranches.

Tata Power recorded revenue of ₹110.15 billion (-\$1.47 billion) in Q3 FY 2022, a 42% YoY increase compared to ₹77.56 billion (-\$1.03 billion) in the same period last year. The company attributed the rise in revenue to the expanded operation of Odisha distribution companies (DISCOMs), higher project execution by Tata Power Solar Systems, and all other businesses' strong performance.



Projects worth ₹308.02 billion (-\$4.12 billion) have been approved to date under the Integrated Power Development Program (IPDS), Minister of Power and New and Renewables Energy, R.K. Singh, said in the Rajya Sabha. The central government launched the **IPDS Program in 2014** to strengthen sub-transmission and distribution networks in urban areas of the country.

Gujarat-based power company **Torrent Power** announced the financial results for the first nine months (9M) and Q3 FY 2022. The company's total revenue from operations for 9M FY 2022 stood at ₹105.14 billion (-\$1.41 billion), up by 16% from ₹90.89 billion (-\$1.21 billion) in 9M FY 2021.

Three subsidiaries of **Adani Green Energy - Adani Green Energy (UP), Prayatna Developers, and Parampujya Solar Energy** have raised ₹6.123 billion (-\$82.04 million) through their maiden domestic bond issuance on a private placement basis.



MOST INSIGHTFUL RESEARCH ON THE INDIAN SOLAR MARKET

Solar Project Tracker

Solar Tender Tracker

Solar Quarterly Market Report

Solar Import/Export Tracker

Solar Regulatory Updates and Alerts

Solar Component Price Tracker

Global Solar Funding & M&A Reports

Solar Market Leaderboard Report & Tracker

Battery Storage, Funding & M&A Reports

Custom Research Reports & Advisory

Rooftop Solar Market Report

Solar Open Access Market Report & Tracker



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News in Brief



Indian multinational pharmaceutical company **Cipla** entered into a share subscription and shareholder's agreement and a power purchase agreement (PPA) to acquire a 32.49% stake on a fully diluted basis in **AMP Energy Green Eleven**. **Amp Energy** will commission a 10 MWac (16 MWdc) captive open access solar project in Osmanabad to supply power to Cipla under a long-term PPA of 25 years.

The Supreme Court of India, in a recent order, rebuked the **Andhra Pradesh distribution companies** attempt to terminate the **power purchase agreement (PPA)** unilaterally after the project developer had set up the project. The Apex court said the state regulatory commission must be guided by public interest while approving the tariffs for power purchase.

Renewable energy company **Adani Green Energy** generated ₹26.55 billion (-\$355.04 million) as revenue from the power supply in 9M FY 2022, a 56% increase compared to ₹24.74 billion (-\$330.83 million) compared to the last year.



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Policy Briefs

States



The **Haryana Electricity Regulatory Commission** set ₹1.08 (‐\$0.014)/kWh as the additional surcharge for the consumers of the **Uttar Haryana Bijli Vitran Nigam** and the **Dakshin Haryana Bijli Vitran Nigam** availing power under the open access mechanism. The additional surcharge will continue to be effective until amended or revised by the state Commission.

To simplify the short-term power procurement process, the **Andhra Pradesh Electricity Regulatory Commission** issued the 'Terms and Conditions for Short-term Procurement and Sale of Power, Regulations, 2022.' The regulations will apply to the state's three distribution companies (DISCOMs).

The **Telangana State Authority for Advance Ruling** clarified that liquidated damages recovered by a solar developer from an engineering, procurement, and construction (EPC) service provider for the delay in commissioning of a project attract 18% Goods and Services Tax (GST).

Center

Union Finance Minister Nirmala Sitharaman presented the **2022-23 budget** in the parliament. The Budget has allocated an additional ₹195 billion (‐\$2.61 billion) for the production-linked incentive (PLI) program to set up vertically-integrated high-efficiency solar module manufacturing capacities.



The **Ministry of New and Renewable Energy** issued a fresh notification extending the self-certification of solar photovoltaic (PV) inverters under the **Bureau of Indian Standards (BIS)** from December 31, 2021, to June 30, 2022. The extension was granted as the industry had sought more time for compliance, considering the issues relating to testing and the level of preparation of test labs.

The **Ministry of Power** issued amendments to the short-term power procurement (for more than one day to one year) by distribution licensees through tariff-based bidding process guidelines. The guidelines have been amended to address the issue of the sale of power by generators in the market without the consent of the procurer. The government had notified the guidelines initially on March 30, 2016.

The **Government of India** issued a draft notification directing the **Transport Department of the Government of National Capital Territory (NCT) Delhi** to increase electric vehicle adoption to curb the increasing air pollution. The draft notification issued under the Department of Environment and Forests stated that the transport sector is the primary source of air pollution in Delhi, especially PM 2.5 emissions.



The **Central Electricity Regulatory Commission** published draft regulations for renewable energy certificates. Renewable generators, captive power projects, distribution companies (DISCOMs), and open access consumers will now be eligible to issue renewable energy certificates.

The **Ministry of New and Renewable Energy** informed that all renewable energy projects under implementation, wholly or partly located in the priority or potential territory of the Great Indian bustard (GIB), are to be granted a 30-day extension on the scheduled date of commissioning after the date of judgment by the Supreme Court.

Major Tender and Auction Announcements in February

This is a list of major tenders and auctions from February. A comprehensive list can be found on Mercom's Tender and Auction Tracker and Alerts. Please contact info@mercomindia.com for more information.



Auctions

The Indian Renewable Energy Development Agency (**IREDA**) announced an updated list of successful bidders for setting up **manufacturing** capacities for a minimum of **10 GW** of vertically-integrated high-efficiency solar modules under the production-linked incentive (**PLI**) program.

Project Eight Renewable Power Private Limited (**Ayana Renewable Power**) and SolarOne Energy Private Limited (**Fortum**) were declared winners in the Solar Energy Corporation of India's (**SECI**) auction for 1,200 MW interstate transmission system (ISTS)-connected solar power projects (**Tranche-X**) in Karnataka. Ayana won **300 MW** solar capacity quoting a tariff of **₹2.35** (-\$0.031)/

kWh. Fortum secured **300 MW** capacity at **₹2.36** (-\$0.032)/kWh for the remaining capacity for the **Gadag** substation.

Project Eight Renewable Power (**Ayana Renewable Power**) and SolarOne Energy (**Fortum**) were declared winners in the Solar Energy Corporation of India's (**SECI**) auction for **1,200 MW** interstate transmission system (ISTS)-connected solar power projects (**Tranche-X**) in Karnataka. Ayana won **300 MW** solar capacity quoting a tariff of **₹2.36** (-\$0.0316)/kWh. **Fortum** secured **300 MW** capacity at **₹2.37** (-\$0.0317)/kWh out of the quoted 400 MW. The total 600 MW capacity was for the **Koppal** district substation.

Rooftop Solar Tenders

Madhya Gujarat Vij Company Limited (**MGVCL**) issued a tender to empanel vendors to install **700 MW** of rooftop solar projects for residential consumers in urban areas.

Madhya Gujarat Vij Company Limited (**MGVCL**) invited bids to empanel vendors for the design, supply, erection, testing, and commissioning of **300 MW** of grid-connected rooftop solar projects for residential consumers in rural areas of the state.

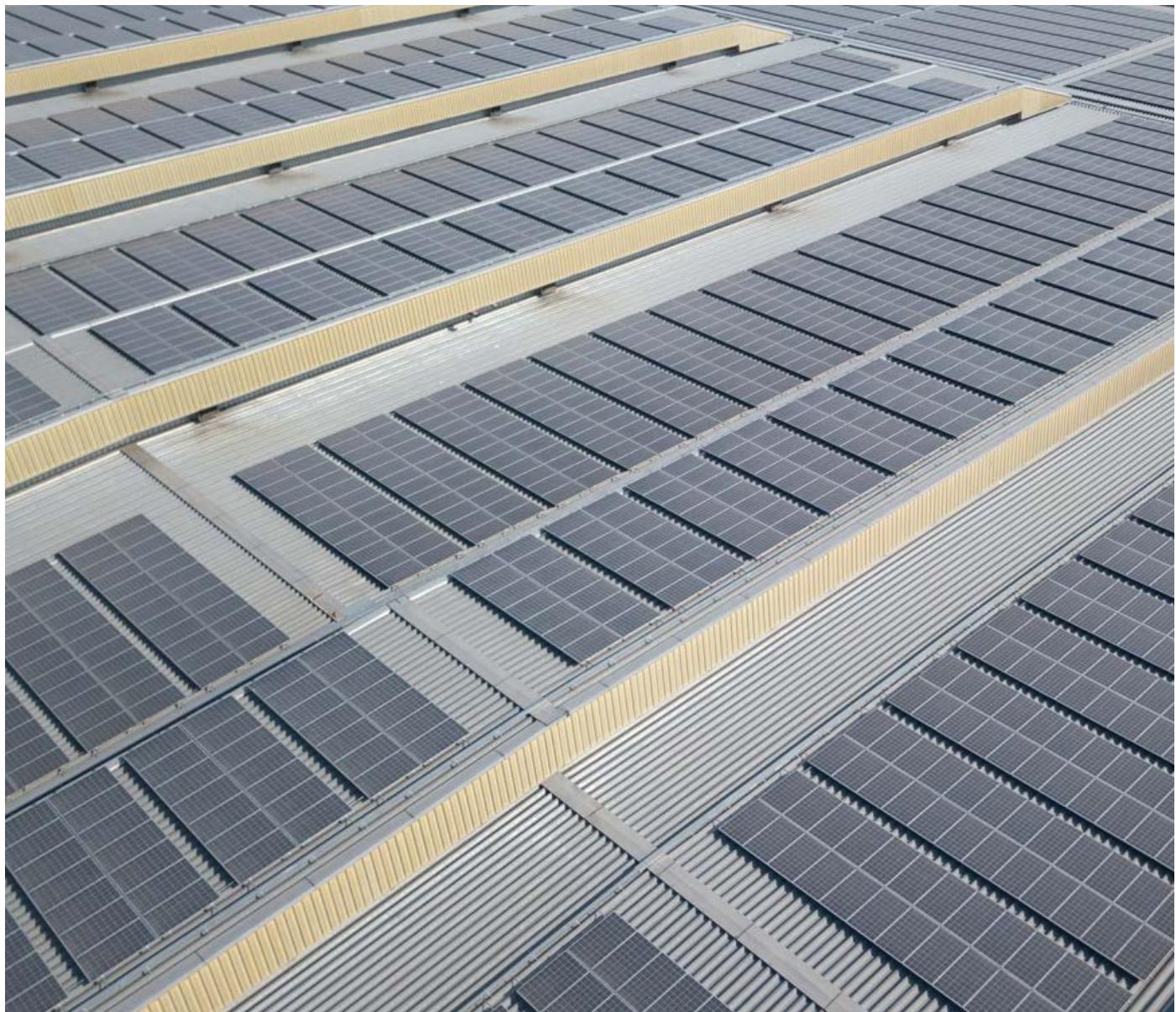
The Telangana State Renewable Energy Development Corporation (**TSREDCO**) invited bids to empanel vendors to install **50 MW** of grid-connected residential rooftop solar projects under.

TP Central Odisha Distribution Limited (**TPCODL**) invited bids to empanel vendors to install **20 MW** of grid-connected residential rooftop solar systems.

Gujarat Power Corporation Limited (**GPCL**) issued an EPC tender to install a minimum of **1 MW** of rooftop solar projects at Sun Temple and Modhera town and the surrounding project affected area in the Mehsana district of the state.

The Tripura Renewable Energy Development Agency (**TREDA**) issued an EPC tender to develop **1 MW** of grid-connected rooftop solar projects under the **RESCO** model at various government buildings in the state.

The Agency for New & Renewable Energy Research and Technology (**ANERT**) invited EoIs from contractors to conduct a **site survey** to install solar power projects in the premises of public buildings under the Thiruvananthapuram Corporation.





Top Large-Scale Solar Tenders

Maharashtra State Electricity Distribution Company Limited (**MSEDCL**) issued a request for selection (RfS) to procure **865 MW** of solar power from existing and new projects to be developed in the state. MSEDCL has set a ceiling tariff of **₹3.10** (~\$0.041)/kWh for the tender.

MSEDCL invited bids to procure **445 MW** of power from decentralized solar projects of 500 kW to 2 MW capacity under Component A of the Pradhan Mantri Kisan Urja evam Utthan Mahabhiyan (**PM-KUSUM**) program.

Solar Energy Corporation of India Limited (**SECI**) issued global engineering, procurement, and construction (EPC) tender to install a **100 MW floating** solar project at Getalsud Dam in Ranchi, **Jharkhand**.

Jammu and Kashmir Energy Development Agency (**JAKEDA**) invited expressions of interest (EoIs) to install **5 MW** of ground-mounted solar projects of 500 kW - 2

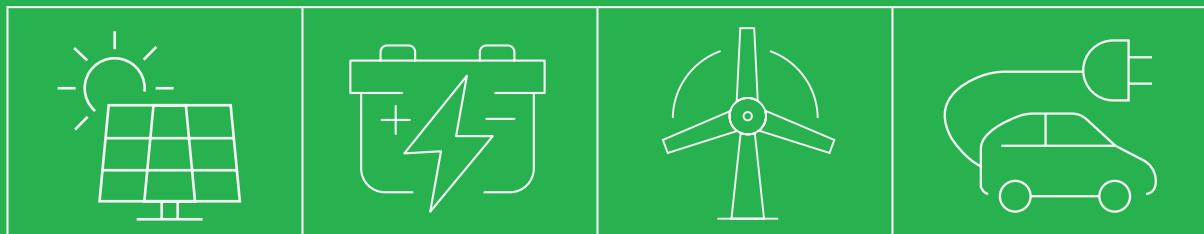
MW capacity within a radius of 5 km from substations notified by the Jammu Power Distribution Corporation Limited (**JPDCL**) and the Kashmir Power Distribution Corporation Limited (**KPDC**).

Chandigarh Renewable Energy and Science and Technology Promotion Society (**CREST**) issued an EPC tender to install **2 MW** of grid-connected **floating** solar projects with high power evacuation systems in **Chandigarh**.

Paschim Gujarat Vij Company Limited (**PGVCL**) invited bids to design, supply, install and commission solar projects of an aggregate capacity of **1.125 MW** for various agricultural feeders along with the associated 11 kV line and the remote monitoring system under the renewable energy service company (**RESCO**) model.

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QUALITY CONTENT INSIGHTS



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Other Tenders

REC Power Development and Consultancy Limited (**RECPDCL**) issued global tenders to build two interstate transmission (**ISTS**) projects on a build, own, operate, and transfer basis to evacuate **21.5 GW** of renewable energy.

PFC Consulting, a wholly-owned subsidiary of Power Finance Corporation (**PFC**), invited bids to develop an **ISTS** project to evacuate **20 GW** of power from the renewable energy zone in **Rajasthan** under **Phase-III, Part-A1**.

Power Grid Corporation of India Limited (**PGCIL**) invited bids for the transmission line package for the Gadag-Koppal 400 kV DC line, the extension of 400 kV **Gadag** power station, and the extension of 400 kV Koppal power station associated with the transmission program for the solar energy zone in Gadag (**1,500 MW**), **Karnataka**.

NTPC Renewable Energy invited bids for acquiring land and an extra-high voltage (EHV) transmission system package for the development of **500 MW** state transmission utility (**STU**) connected solar projects in **Rajasthan**.

NTPC invited bids for the comprehensive maintenance of the 250 MW solar project at Ananthapuram in **Andhra Pradesh** and the **5 MW** solar power project in Andaman for three years.

NTPC invited bids for the appointment of consultants for the third verification of verified carbon standard (**VCS**) registered **solar** and **wind** power projects for the period from October 1, 2020, to December 31, 2021.

Assam Power Generation Corporation Limited (**APGCL**) invited bids from consultancy firms to conduct a **feasibility study** and prepare a detailed project report (**DPR**) to develop a **70-90 MW floating** solar project in the Karimganj district of the state.

RECPDCL, a wholly-owned subsidiary of REC Limited, invited bids to select a consultant for providing **consultancy services** to develop a **floating** solar project in the **Delhi NCR** region.

NTPC invited bids from consultancy firms to conduct **site surveys** for exploring the potential to develop solar photovoltaic (PV) projects at its Tanda Thermal Power Project in Ambedkar Nagar, **Uttar Pradesh**.

The Singareni Collieries Company invited bids from consultancy firms to carry out a **feasibility study** and prepare a **DPR** to develop **solar** power projects.

The Gas Authority of India Limited (**GAIL**) invited bids to appoint a consultant for a detailed **feasibility survey** for a **greenfield solar** project and **green hydrogen** and **ammonia** plant in **Odisha**.

SJVN floated two tenders for land procurement to set up **solar** projects in Himachal Pradesh and Punjab. In the first tender, SJVN has invited bids for the purchase or lease of up to **500 acres** of land for 28 years to set up solar power projects in the state of **Himachal Pradesh**.

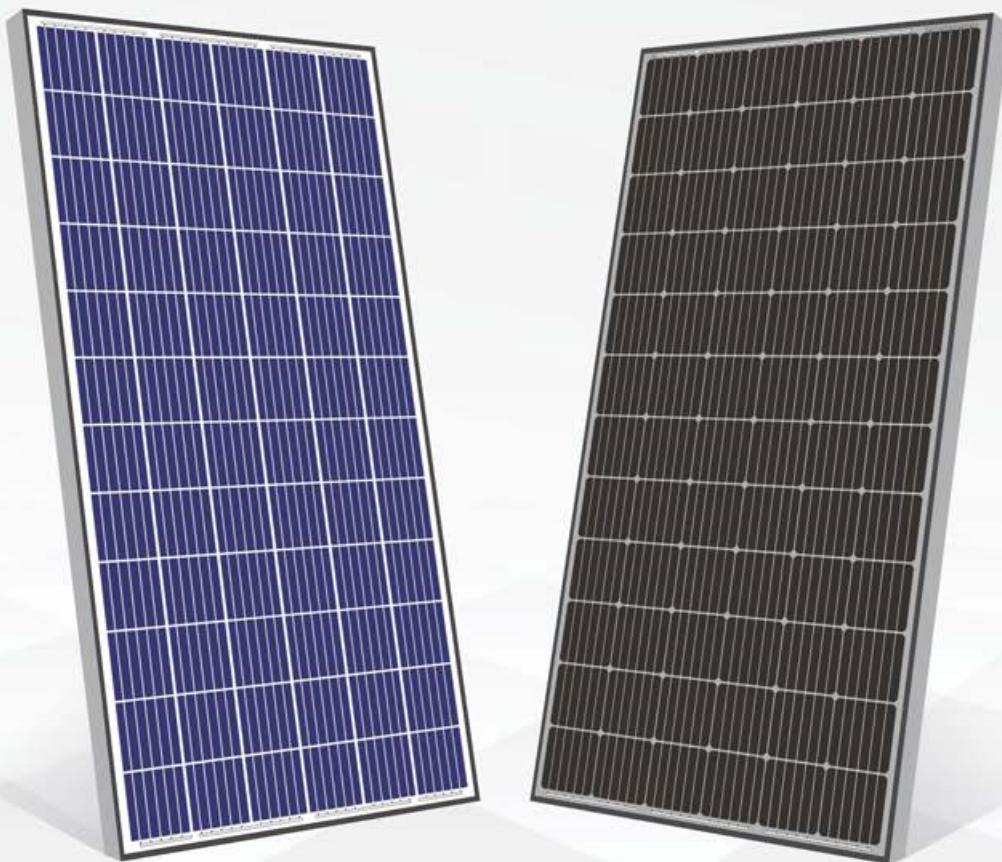
Rajasthan Electronics and Instruments invited bids for the supply of 200,000 monocrystalline or multicrystalline **solar cells** of wattage output greater than or equal to **4.62W**.

Rashtriya Chemicals and Fertilizers issued a notice inviting tender for **consultancy** services to facilitate renewable energy certificates (**REC**) purchase to meet its renewable power purchase obligation (**RPO**) targets.

Rajasthan Electronics and Instruments Limited (**REIL**), a joint venture between the Government of India and the Government of Rajasthan, issued terms of reference for appointing a **consulting** firm for the Bureau of Indian Standards (**BIS**) certification of **solar photovoltaic (PV) modules**.



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