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India

628 MW of Solar Open Access Capacity Installed in 1H 2021

This quarter, over 50% of the open access solar installations were in Uttar Pradesh



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Major Tender and Auction Announcements in September

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

Foreword



The Indian solar sector has rallied strongly in the first half of 2021. The rooftop market, which has struggled ever since the COVID-19 pandemic forced shutdowns, has bounced back strongly.

In Q2 2021, 521 MW of rooftop solar was installed compared to 341 MW installed in the previous quarter, a 53% increase quarter-over-quarter (QoQ). Rooftop additions were up 517% year-over-year (YoY) compared to 84.5 MW in the COVID hit Q2 2020. The cumulative rooftop solar installations crossed the 6 GW mark during the quarter.

Q2 2021 was an outlier, and the exponential growth is attributable to the installations of more than 300 MW of residential rooftop solar capacity in Gujarat.

Unlike the first pandemic wave, where the industry was unprepared for what was to come, the challenges were well-managed this year. Also, the lockdown during the quarter was targeted based on the surge in COVID cases.

Construction activity was affected by labor issues to a lesser degree, and the solar supply chain was disrupted but was not as widespread compared to 2020. The module prices surged due to the supply-demand gap, adding more financial burden on installers.

Open access is another important market, especially for businesses.

In 1H 2021, India added about 628 MW of open access solar, a 12-fold (1,230%) increase compared to 47 MW installed in 1H 2020. As of June 2021, the cumulative installed, open access solar capacity was 4,542 MW. The pipeline of projects under development and pre-construction phase is estimated to be approximately 1.1 GW. Over half of the open access solar installations (106 MW) this quarter were in Uttar Pradesh.

It is a positive development in the open access solar market that the government has drafted policies to promote it. But most states have been finding novel ways to restrict the growth of open access solar projects. The general trend is that state policies incentivize the market in the first few years and later follow up with restrictive regulations. Karnataka, Andhra Pradesh, and Haryana are apt examples of states that initially encouraged open access solar but later pulled back.

Though the policy has been inconsistent, the market demand has been growing. The RE100 initiative has been one of the greatest drivers of the open access market. Corporations and industries have pledged to reduce their carbon footprint and achieve net-zero emissions in the next few decades. Climate change and the pressure to fulfill renewable purchase obligations will only create more demand for renewables, especially solar. The recent government policy of capping net metering facility for loads up to 500 kW also has forced many consumers to procure from open access solar projects rather than installing rooftop solar projects over 500 kW capacity.

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Energy Storage Technology That Could Reduce Charging Time to Minutes

MXenes can bridge the gap between the rapid charging advantages of supercapacitors with the density of lithium-ion batteries

By : Arjun Joshi

Researchers from Tulane University developed an energy storage technology that could reduce charging time to a matter of minutes compared to lithium-ion batteries. The study was funded by the Department of Energy's Energy Frontier Research Center as part of the Fluid Interface Reactions, Structures, and Transport (FIRST) Center.

The research - engineering the interlayer spacing by pre-intercalation for high-performance supercapacitor MXene electrodes in room temperature ionic liquid - has been published in the journal *Advanced Functional Materials*.

Led by Tulane University assistant professor Michael Naguib, the research revolves around MXenes, promising energy storage materials that are conductive and can host ions, such as lithium, between layers.

MXenes are a class of two-dimensional inorganic compounds that combine the metallic conductivity of transition metal carbides with a hydrophilic nature because of their hydroxyl- or oxygen-terminated

The amount of energy stored is limited in room-temperature ionic liquids

surfaces. The new materials, using ionic liquids, can combine the energy density of lithium-ion batteries with the rapid power charging of supercapacitors.

The team worked on MXenes at the nanoscale to develop new techniques to optimize the space between those layers, allowing larger ions to enter. According to the researchers, this can help bridge the gap between the rapid charging advantages of supercapacitors, or aqueous electrochemical capacitors, with the density of lithium-ion batteries.

Room-temperature ionic liquids are

promising electrolytes because they provide stability and a larger energy density. But because their ions are so large, they're unable to get between the MXene layers, and in turn, the amount of energy stored is limited.

While lithium-ion batteries offer one of the highest energy densities, according to Naguib, "They still struggle when it comes to high charging rates, and their electrolytes exhibit some safety concerns. On the other hand, aqueous electrochemical capacitors, also known as supercapacitors, can deliver a very high power, but their energy density is limited."

"Here, we introduced wedges or pillars between the layers to open them up, allowing the ionic liquid ions to get stored between the MXene layers, thus achieving very high energy and power densities," Naguib said.

In addition to authors from Tulane, the team for this study consisted of researchers from Oak Ridge National Laboratory, Vanderbilt University, North Carolina State University, and the National Institute of Standards and Technology. 

Proposed GST Hike on Solar Components Worry Developers

The GST council has stated that for “specified renewable energy parts,” the GST would be 12% instead of the earlier 5%, with effect from October 1, 2021

By : Arjun Joshi



The Goods and Service Tax (GST) Council's recommendation to raise GST on solar components from 5% to 12% has project developers worried about its impact on project costs.

The GST rate on solar modules was set at 5% in 2018 as per the GST Council's recommendations.

But last week's recommendation for the increase by the GST Council could make solar projects unviable, according to developers.

The GST council has stated that for "specified renewable energy parts," the GST would be 12% instead of the earlier 5% with effect from October 1, 2021.

Under the existing regime, 70% of the gross value of the contract was considered for the supply of goods, attracting a 5% rate - which will now be 12%.

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%.

Adding to the challenges of developers

Commenting on the proposal to hike the GST, Animesh Damani, Managing Partner, Artha Energy Resources, said, "The new recommendation by the GST council, increasing the proposed tax to 12% for renewable energy projects, will create a fresh set of challenges for the sector to address. Compared to the earlier 5%, this is a significant increase and will impact both the ongoing and upcoming projects. Utility-scale, open access and OPEX projects will be the most

GST Council has proposed a hike in GST on solar components from 5% to 12%

affected."

He said these projects' power purchase agreement tariffs would have to be increased to accommodate the new tax structure. Due to the inverted duty structure, wherein there is no GST levied on the sale of power, the GST paid for the renewables project would become a cost.

"Under the earlier tax structure, the GST component of the project cost was 8.9%, which has now been increased to 13.8%. An overall cost escalation of 4.9% is bound to influence consumer sentiments negatively. There will be prolonged tariff change applications by all developers under the change in law mechanism. DISCOMs, which have been averse to any cost escalation in solar tariffs, might find the new tariffs unattractive. Over one GW of projects across the rooftop and open access

segments will be adversely affected," Damani said.

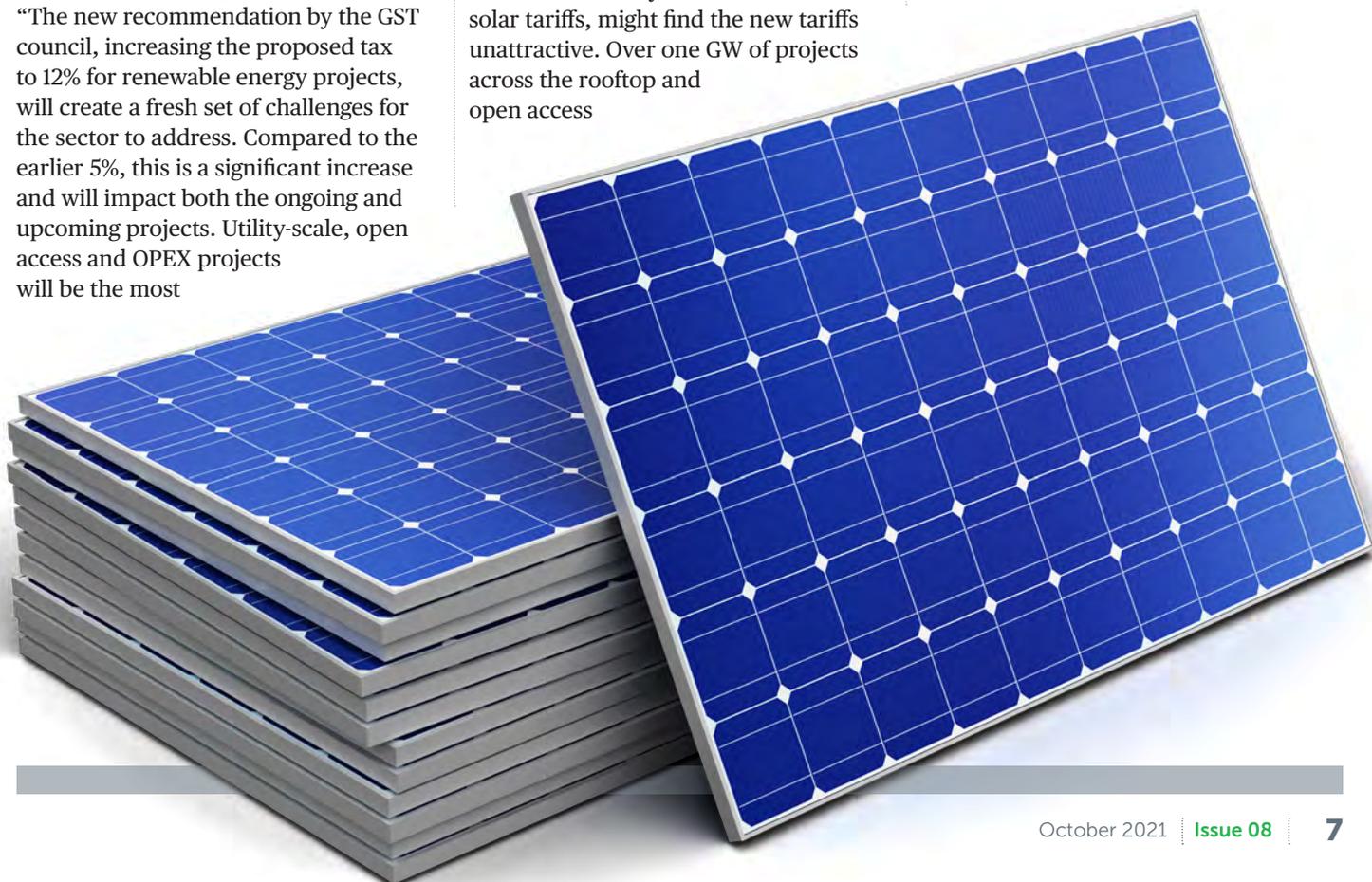
Policies not aligned with the targets

The government has announced lofty targets of installing 175 GW of renewables by 2022 and 450 GW by 2030. But developers have been wading through numerous policy flip-flops. Recently, the net metering policy uncertainty had brought the rooftop solar segment to a grinding halt.

"For a country looking towards net-zero emissions and increased dependency on renewable resources for energy generation, we are taking three steps backward for each step taken forward. This becomes even more pertinent since the government has deemed the renewable energy sector a priority sector," Damani said.

Multiple rulings and policies had already forced the industry to realign involuntarily, creating unprecedented uncertainty. "The ripples of dissent from the net metering policy, duty-free period, and other policy flip-flops are already felt throughout the industry. This will only aggravate the situation for businesses and customers alike," he added.

The rising cost of components and commodities



Adding to the concerns of the developers is the recommendation for a similar increase in GST on iron, manganese, copper, nickel, cobalt, aluminum, lead, zinc, tin, and chromium - ores and concentrates. An increase in GST from 5% to 12% has been proposed on these commodities.

Over the last six months, the rising price trends in commodities, including steel, aluminum, and copper, have already increased the burden on the solar industry. With the proposed increase in GST now, the challenges have increased for developers. The solar sector had just begun to recover from the impact of the second wave of the Covid-19 pandemic.

Pinaki Bhattacharyya, MD & CEO Amp Energy India, said, "With the industry still coming to terms with the effect of the impending basic customs duty imposition from April 2022, the decision to hike the GST in the middle of the year would lead to an increase in the cost of solar and wind power. The solar module/wind turbine generator prices have already gone up, and any additional tax burdens can make some projects unviable or slow them down.

*Until now,
70% of the
gross value of
the contract was
for the supply
of goods,
attracting a
5% GST*

We have finally got some momentum going after the second wave of Covid-19, but these untimely announcements will definitely derail the 175 GW program and damage the sector."

"The government should walk the talk to allow us to get India to meet the 175 GW target by not taxing the sector anymore. We are making clean power in India, and measures like these are against the vision of Atmanirbhar Bharat," Bhattacharyya said.

The tedious process of claims under the 'change in law' clause

The difference in cost due to the rise in GST rates can be claimed under the 'change in law' clause. But this is not a preferred option for developers who are wary of the tedious legal process, long delays, and expenses.

Another source who wished to remain anonymous told Mercom that such unforeseen changes could affect project viability. "A developer can file a review petition as this new GST hike would fall under the 'change in law' clause in renewable energy PPAs. But the whole process is expensive and time-consuming. This recommendation will affect our tariffs and internal rate of return," the source said.

According to Mercom's recently released Q2 2021 India Solar Market Update, the average cost of large-scale solar projects increased by 12% to ₹38.6 million (-\$529,036)/MW in Q2 2021 from ₹34 million (-\$455,532)/MW in the same period last year. The cost had risen 5% from the previous quarter (Q4 2020) when it was about ₹35.3 million (-\$488,255)/MW. ☺

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Reasons Behind the Success of MSEDCL's 500 MW Solar Auction

While stakeholders believe that solar tariffs in the upcoming auctions will hover around the ₹2.50/kWh, MSEDCL's 500 MW solar auction with a bid of ₹2.42/kWh surprised many

By : Rakesh Ranjan Parashar

Stakeholders in the solar industry believe that tariffs in upcoming solar auctions are likely to settle around ₹2.50 (-\$0.034)/kWh, given the spike in module and commodity prices. Developers are bracing themselves for life in the post-safeguard duty era until the basic customs duty (BCD) kicks in April 2022.

The recent auctions held by the Maharashtra State Electricity Distribution Company Limited (MSEDCL) and the Rewa Ultra Mega Solar Limited (RUMSL) have surprised many, as the tariffs have gone below ₹2.50 (-\$0.034)/kWh.

ACME Solar Holdings and ReNew Solar Power were declared winners in MSEDCL's auction for 500 MW of solar projects (Phase-VI).

ACME Solar Holdings won a capacity of 300 MW quoting ₹2.42 (-\$0.032)/kWh. ReNew Solar Power won 200 MW quoting ₹2.43 (-\$0.033)/kWh.

An MSEDCL official commented, "The main reasons for such a big response

*Developers
find it
financially
unviable
to quote less
than ₹2.50
(~\$0.034)/kWh*

to the solar tender were the absence of ceiling tariff this time around, which was ₹2.90 (-\$0.039)/kWh earlier, lower earnest money deposit (EMD) of ₹400,000 (-\$5,391)/MW, which was ₹500,000 (-\$6,739)/MW for Phase-V tender, and lower performance bank guarantee of ₹800,000 (-\$10,783)/MW, which was ₹1.4 million (-\$18,870)/MW earlier."

Hybrid power-not an attractive proposition as solar

Tata Power and Azure Power were declared winners in the MSEDCL auction for 500 MW of grid-connected interstate and intrastate wind-solar hybrid projects. Tata Power won a capacity of 300 MW and Azure Power 200 MW, both quoting ₹2.62 (-\$0.035)/kWh.

Commenting on the response to the hybrid tender as compared to the solar tender, an MSEDCL official had said, "Being a hybrid tender, MSEDCL had the clause of certified wind turbine procurement from the revised list of models and manufacturers. Solar modules had to be sourced from the approved list of models and manufacturers (ALMM). Therefore, only a few big players were eligible to bid for this capacity in compliance with both the clauses. Also, due to lower EMD and performance bank guarantee, more bidders were attracted to the solar tender rather than the hybrid one."

Tariffs continue to fall below the



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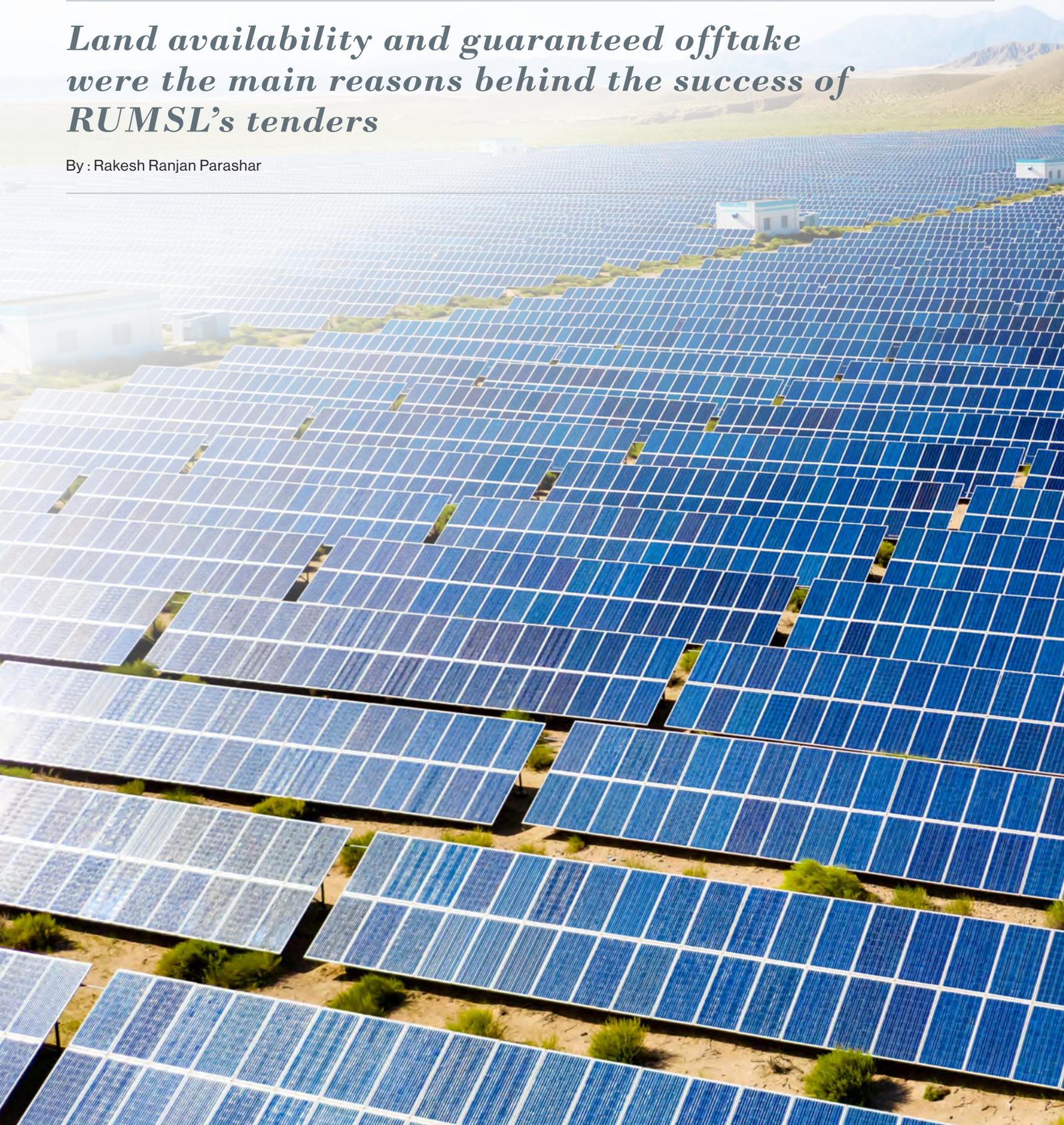
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RUMSL'S Solar Auction Results Takes the Industry by Surprise

Land availability and guaranteed offtake were the main reasons behind the success of RUMSL's tenders

By : Rakesh Ranjan Parashar





The Rewa Ultra Mega Solar Limited's (RUMSL) tenders for 550 MW of solar projects at the Agar Solar Park, 450 MW of solar projects at the Shajapur Solar Park and 500 MW at Neemuch Solar Park have received a massive response from the bidders.

In the held auction for 550 MW of solar projects at the Agar Solar Park, Avaada Energy, and O2 Power were declared the winners. Avaada Energy won a capacity of 200 MW, quoting ₹2.459 (-\$0.033)/kWh, and O2 Power won a capacity of 350 MW, quoting ₹2.444 (-\$0.032)/kWh.

The tender for the Agar Solar Park had received responses from 18 bidders.

Speaking to Mercom, one of the winning bidders said, "We have factored the basic customs duty (BCD) in the bid. We plan to import solar cells and assemble them in India, so we will be able to comply with the Approved List of Models and Manufacturers (ALMM) order. The BCD will be 25% with this strategy. The RUMSL tender was an attractive proposition for everyone, as it had very limited risks, with land and evacuation infrastructure being available for the project. Additionally, the project also has a good credit rating."

The tender for 450 MW of solar projects at the Shajapur Solar Park in Madhya Pradesh received bids from 15 bidders. The tender was oversubscribed by 5.8 GW. The auction for the Shajapur Solar Park is expected to take place any time next week.

RUMSL had floated the tender for a total of 1,500 MW grid-connected solar projects to be developed across three solar parks in the state in 2018. However, due to the impending central and state elections at the time, the tenders were delayed.

Later, the tender was reissued in January last year. The first tender



was floated for developing 450 MW of grid-connected solar projects at the Shajapur Solar Park. The second tender was floated for 550 MW of solar projects at the Agar Solar Park, while the third tender was for 500 MW of solar projects at the Neemuch Solar Park. Later, the tender underwent several bid submission deadline extensions.

The World Bank will finance the entire 1,500 MW capacity of the three projects.

Land availability: Driving factor behind the success of RUMSL tender

The availability of land for the projects has been one of the main reasons for such a positive response from the bidders. The fact that the tender is for solar parks also helped garner interest from the bidders.

A top executive from one of the developers bidding for the project said, "The developers are interested in the project since it is a solar park. The availability of land and getting clearances from the government will be easy. Also, the Madhya Pradesh government has good credibility for providing support for such projects, which has also contributed to the good response received from the bidders."

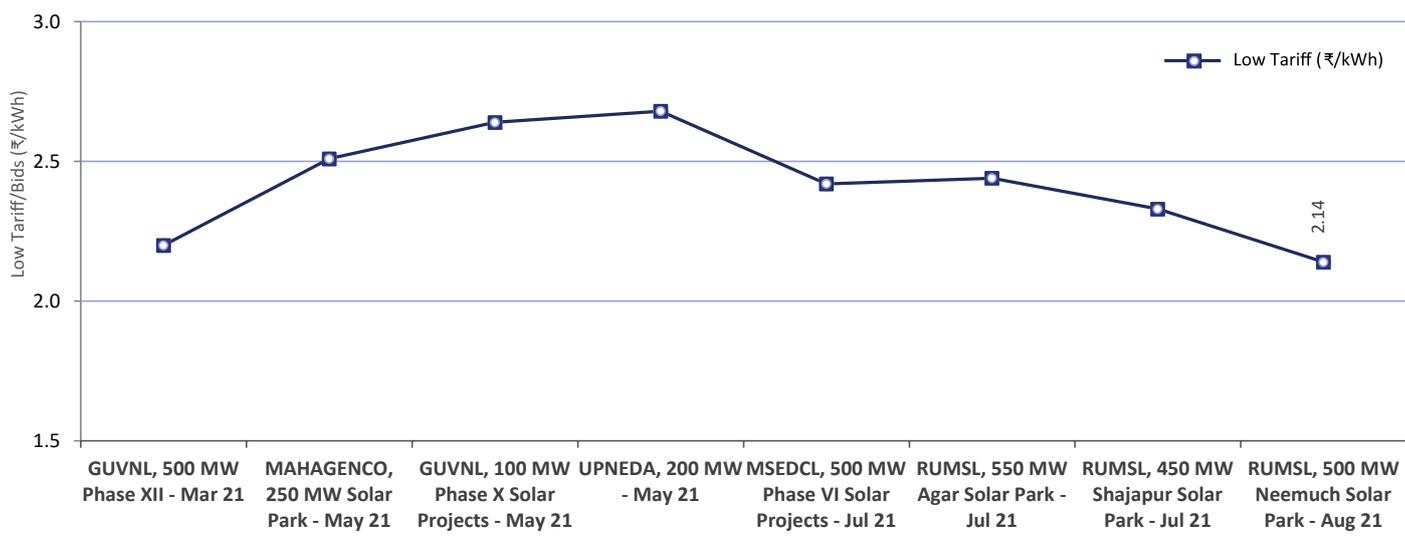
Avaneesh Shukla from RUMSL said, "Our focus was to address the concerns of the lenders, project developers, and the offtakers. We took care of the uncertainties related to the projects and tried to make it a profitable venture for all the stakeholders. The response has been up to our expectations. The

Rewa Ultra-Mega Solar: Tariffs Quoted by Winning Bidders for 1,500 MW of Solar Projects

Location	Capacity (MW)	Lowest Tariff Quoted by Winning Bidders		Highest Tariff Quoted by Winning Bidders	
		(₹/kWh)	(~\$/kWh)	(₹/kWh)	(~\$/kWh)
Agar Solar Park	550	2.44	0.033	2.46	0.034
Shajapur Solar Park	450	2.33	0.032	2.35	0.032
Neemuch Solar Park	500	2.14	0.029	2.15	0.029

Source: Mercom India Research

Lowest Solar Bids in Reverse Auctions in India (₹/kWh)



Source: Mercom India Research (Aug 2021)

most important thing in this tender is the availability of land, which is missing from the tenders floated by the Solar Energy Corporation of India. Other factors like guaranteed offtake, payment security mechanism, state guarantee, and the power grid construction made it an attractive proposition for the bidders. We offered a plug-and-play model, which was well received by the bidders.”

Guaranteed offtake: Another factor drawing bidders

Another bidder for the 450 MW of solar projects at the Shajapur Solar Park said, “In the recent past, other tenders have also received a good response. Rajasthan is a good example of that. The fact that this tender was floated for solar parks and funded by the World Bank makes it stand out.”

“Also, RUMSL and Madhya Pradesh have a good track record of timely payments, which has been the main factor in driving the interest among the bidders. There is a state guarantee, and from the credit rating perspective, it’s a good asset. With SECI tenders, you don’t know who is the ultimate offtaker, while here you have a known offtaker,” he pointed out.

About land availability, he added, “Many developers do not want to get their hands dirty in dealing with land issues while developing a project,

The World Bank will finance the entire 1,500 MW capacity

and this tender gives them a perfect opportunity to set up their projects where land allocation is taken care of.”

At a recently held webinar hosted by Mercom, Manu Srivastava, former Principal Secretary, New and Renewable Energy Department, said, “Our main aim was to offer contractual arrangements that reduced the risks and mitigated the projects’ uncertainty. We put ourselves in the bidders’ shoes, addressed their concerns, and assured them of guaranteed offtake. We ensured payment security. We also addressed issues like ‘Change in Law,’ comfortable timelines, and part-commissioning. These were just some of the issues that we addressed in the RUMSL tender.”

For the past three years, the tariffs for projects in solar parks across the country have been hovering around ₹2.60 (-\$0.035)/kWh to ₹2.80 (-\$0.038)/kWh. But the recently held auction by RUMSL saw the tariff drop to ₹2.444 (-\$0.033)/kWh, which might

be attributed to state-specific policies, the credibility of the Madhya Pradesh government regarding timely payments, and a host of other issues. With the module prices rising and a spike in commodities’ costs, the tariffs are not expected to go down any further.

With the BCD coming into effect next year and the fact that the bidders have to abide by the ALMM order, it will be interesting to watch how the auction for 450 MW of solar projects at the Shajapur Solar Park pans out. Many developers plan to import the solar cells and assemble them here to abide by the ALMM order. There is a consensus among the stakeholders that the tariff for 450 MW of solar projects will be in the range of ₹2.40 (-\$0.032)/kWh-₹2.50 (-\$0.034)/kWh, as discovered in the auction for 550 MW of solar projects at the Agar Solar Park.

Neemuch Solar Park

There is a consensus among the stakeholders that the tariffs in the post safeguard duty era with the Approved List of Models and Manufacturers (ALMM) in effect will hover around the threshold value of ₹2.50 (-\$0.034)/kWh in the future auctions under current market conditions. But the Rewa Ultra Mega Solar Limited’s (RUMSL) auction for 500 MW of solar projects at the Neemuch Solar Park has taken everyone

by surprise.

Whether the tariff of ₹2.14 (-\$0.029)/kWh discovered in the Neemuch solar auction is an exception or the rule for upcoming auctions is not yet clear.

The lowest tariff of ₹2.14 (-\$0.029)/kWh discovered in RUMSL's 500 MW Neemuch Solar Park auction seemed an unviable proposition to many.

TP Saurya, a Tata Power subsidiary, and Aljomaih Energy and Water Company were declared winners in the auction. TP Saurya won a capacity of 170 MW quoting ₹2.14 (-\$0.0288)/kWh and also a capacity of 160 MW quoting ₹2.149 (-\$0.0289)/kWh. Aljomaih Energy and Water Company won 170 MW at a tariff of ₹2.15 (-\$0.0289)/kWh.

The tender had received a strong response from the bidders and was oversubscribed by 7 GW.

Many believe that the tariffs will not fall any further, but at the same time, some believe that we will witness aggressive bidding in the upcoming auctions, and tariffs might even breach the ₹2 (-\$0.027)/kWh mark.

The RUMSL's tenders for 550 MW of solar projects at the Agar Solar Park, 450 MW of solar projects at the Shajapur

I think there is more 'hope' built into these bids than strategy – Raj Prabhu

Solar Park, and 500 MW of solar projects at the Neemuch Solar Park in Madhya Pradesh drew strong responses from the bidders.

In July, NTPC Renewables and Talettutayi Solar Projects Nine (SolarArise) were declared winners in RUMSL's auction for 450 MW of solar projects at the Shajapur Solar Park. NTPC Renewables had won a capacity of 105 MW quoting ₹2.35 (-\$0.0316)/kWh, and also a capacity of 220 MW quoting ₹2.33 (-\$0.0313)/kWh. Talettutayi Solar Projects Nine (SolarArise) had won a capacity of 125 MW quoting ₹2.339 (-\$0.0314)/kWh.

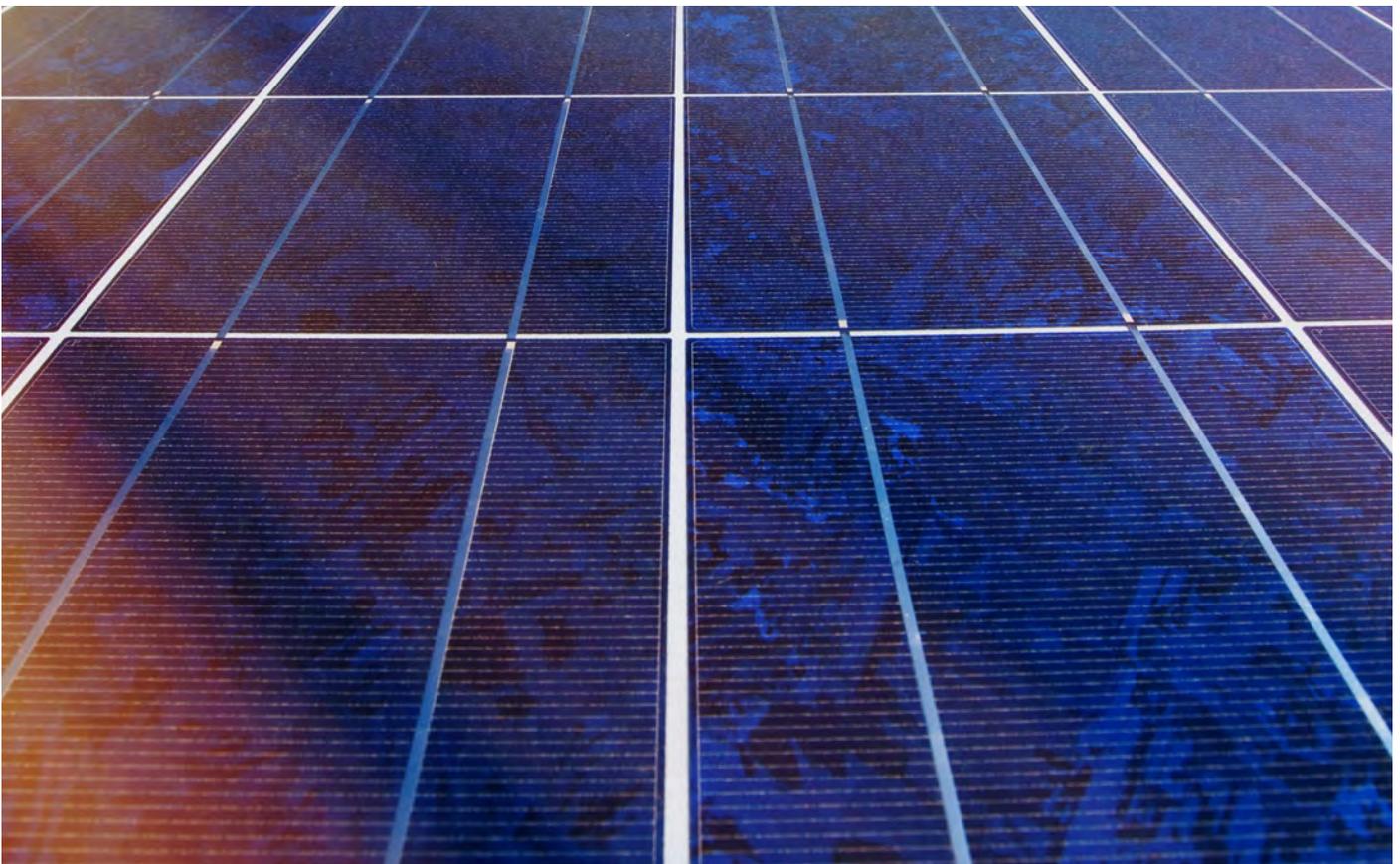
Earlier, Avaada Energy and O2 Power were declared winners in the RUMSL's auction for 550 MW of solar projects at the Agar Solar Park. Avaada Energy had won a capacity of 200 MW, quoting ₹2.459 (-\$0.033)/kWh, and O2 Power had won 350 MW, quoting ₹2.444 (-\$0.032)/kWh.

The tale of three tenders by RUMSL

The success of RUMSL's tenders has come as a surprise to many. While the lowest tariffs discovered in the Agar and Shajapur solar auctions were ₹2.44 (-\$0.033)/kWh and ₹2.33 (-\$0.032)/kWh, respectively, the lowest tariff dropped further to ₹2.14 (-\$0.029)/kWh in the Neemuch solar auction.

With the ALMM taking effect and the spike in module prices coupled with the increase in commodity prices and freight charges, tariffs were expected to be around the threshold mark of ₹2.50 (-\$0.034)/kWh.

The drop in tariff in the Neemuch solar auction may be attributed to the good track record of the Madhya Pradesh government for such projects, along with the availability of land and guaranteed offtake of power. Also, being





close to Rajasthan tipped the balance in its favor.

Not financially viable

Despite all these factors, the tariff of ₹2.14 (-\$0.029)/kWh seems to be an exception to many who believe that such a low tariff is not financially feasible in the current scenario.

Many developers are importing cells and assembling them in India. This allows them to cut costs as the cost of buying modules from local manufacturers is higher than the cheap Chinese imports. The situation has been exacerbated because there are no Chinese module manufacturers in the ALMM list issued by the Ministry of New and Renewable Energy so far.

Commenting on the reasons that elicited such aggressive bidding from the bidders, Avaneesh Shukla from RUMSL said, “One of the main reasons for the drop in tariff was the project structuring, as was the case with projects at the Agar Solar Park and Shajapur Solar Park. In the case of Neemuch Solar Park, the transmission lines are 2.5 km in length, and Neemuch is much closer to Rajasthan, where the solar irradiation is much better as compared to Agar Solar Park and Shajapur Solar Park. Another important factor that resulted in the tariff of ₹2.14 (-\$0.029)/kWh in the Neemuch auction is that the transmission lines being only 2.5 km in length, the transmission

Per stakeholders, the tariff of ₹2.14/kWh in the Neemuch auction is an aberration

charges are less when compared to Shajapur and Agar, where we have transmission lines of 60 to 80 km.”

“Also, Madhya Pradesh has a good track record for such projects, and the ease of doing business in the state is also good. These were the reasons that pushed bidders to bid aggressively, and the tariff dropped down to ₹2.14 (-\$0.029)/kWh. But I don’t think that the tariffs will fall any further,” Shukla added.

But things are not that bad for developers as they seem on the surface. Speaking to Mercom, one of the winning bidders said, “The tariffs may fall even further. It depends on several factors, including state-specific reasons. While

it is true that the ALMM is in place, many factors can push the tariffs higher. But the most important point is the amount of funds the developers have at their disposal, and I think it is the main factor in driving the tariffs lower, as was witnessed in the Neemuch solar auction.”

Commenting on the current predicament of developers, Vinay Pabba, Founder and CEO of VARP Power, opined, “I believe that some of the winning bidders have priced in a duty-free import of modules before the end of this financial year to gain a price advantage. I presume that this is the reason for the steep drop in prices in the Neemuch auction. The ALMM list is dynamic, and I do not believe that the current state of the list will continue for long. Many foreign manufacturers have applied for inclusion in the ALMM list, and we should see some additions to the list soon. This should widen the choice of manufacturers and the price at which they supply cells and modules to Indian buyers. Good investable power purchase agreement (PPA) and project structuring backed by credit-worthy offtakers and mitigation of land and evacuation risks have all contributed to making RUMSL’s tenders a success.”

No clear pattern or rationale

With no safeguard duty in place and the imposition of the basic customs duty (BCD) nearly seven months away, things



are looking a bit tricky for developers who are trying hard to strike a balance between the overall cost and financial viability of projects.

Speaking on the variation in tariffs in the recent auctions and no clear trend emerging for the upcoming auctions, Ajay Kumar, Senior Engineer with SJVN Limited, noted, “It is very hard to pinpoint why the tariffs in the Neemuch auction went so low. There are no specific reasons for the drop in the tariff. It has been a bit erratic in the last few auctions. Sometimes it has gone up and otherwise down. There’s no clear pattern or rationale behind it. Recently, in the Bihar Renewable Energy Development Agency’s auction, we won 200 MW capacity at ₹3.11 (-\$0.042)/kWh. Some developers have been bidding aggressively as there are not many auctions taking place right now. Aljomaih is a classic example as it is trying to set footprints in the country. It’s happening as per the requirements of the developers.”

“Location of projects is also an

important reason behind some of the auctions witnessing aggressive bidding. Projects in Rajasthan and Gujarat are drawing greater interest from the bidders and are being oversubscribed,

RUMSL and Madhya Pradesh have a good track record of timely payments

which is not the case with projects in Bihar, Odisha, and other states. Due to greater participation in some projects, the tariffs have gone down. I’m very sure that tariffs will not fall any further. It will never breach the ₹2 (-\$0.027)/kWh mark

in the current scenario. It will settle around ₹2.50 (-\$0.034)/kWh mark, and if we look at the average of the last few auctions, the average comes around that. The Neemuch solar auction is just an aberration,” Kumar added.

If the tariffs continue to go down further, it will only complicate matters for developers who are finding it hard to make their projects cost-effective and financially viable in the changing solar landscape and make it harder for them to prepare for contingencies in the future.

“Desperation will make companies do things that have no logical explanation. Not having projects to build has driven companies to that point. While some companies may have access to low-cost capital and scale, we are in uncertain times with severe price volatility, logistic issues, and import barriers. Yet, we are seeing bids go in the opposite direction and trend downwards. I think there is more ‘hope’ built into these bids than strategy,” said Raj Prabhu, CEO of Mercom Capital Group. 

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Hero Electric to Manufacture 300,000 E-Scooters Annually - Interview

Mercom spoke to Naveen Munjal, Managing Director, Hero Electric, to discuss the company's plans and targets and his perspective on the EV industry and existing policies

The electric vehicle (EV) sector in India expects high growth in the coming years. EV companies believe that demand will surge with electric two-wheelers (E-2W) and three-wheelers (E-3W) driving the sector's growth.

Last year, despite the Covid-19 pandemic, many EV companies raised funding significant enough to shape India's future electric mobility landscape.

Last month, electric scooter manufacturer Hero Electric raised ₹2.2 billion (-\$29.5 million) as the first part of a Series B funding.

Mercom spoke to Naveen Munjal, Managing Director, Hero Electric, to discuss the company's plans and targets and his perspective on the EV industry and existing policies.

1. How is the EV sector doing in the country now?

The EV industry has grown tremendously in the past year as the industry saw 94.16% growth in EV demand. Increasing traction and restructuring of EV policies helped drive more attention towards the segment. We aim to achieve sales of 300,000 vehicles in the coming year. The demand for EVs is expected to see a massive increase by 2030.

2. How far can the 2.2 billion raised in the Series B funding take the company, and what will it take in terms of investments for you to truly scale electric two-wheelers in the country?

The EV saw some great progress in the year 2021. Our goal is to amplify our manufacturing capacity to 300,000/

year, build both offline and online distribution, and invest in research and development for our next-generation vehicles. We are also targeting 1 million units for the coming years.

3. Could you talk about Hero Electric's business model and strategy to target consumers? How expensive are electric two-wheelers compared to petrol-based two-wheelers?

Given the number and type of products we have across various segments, our target audience is wide. From a college-goer and a performance enthusiast to an eco-conscious customer or even a senior citizen, our approach to developing the products was done keeping family users in mind.

Business-to-business (B2B) sales are crucial for the company, and we are



looking to garner 35% of our sales from this segment in the next

years. The segment currently contributes 9% to our total sales; we have products to cater to corporate mobility needs. We expect state governments to encourage the B2B sector to adopt electric vehicles. The last-mile delivery sector has huge potential to drive mass adoption and create demand for the sector.

The pricing of EVs post the recent FAME revisions in July are on a par with ICE vehicles and even lower than ₹60,000 (-\$808.99) at Hero Electric. The recent policy changes have significantly brought down prices. This is a great move to encourage adoption and transformation to EVs, push up demand, and create awareness for the segment.

4. How do you see the electric two-wheeler segment’s growth in India over the next five years?

Electric two-wheelers (E-2W) are expected to grow and make up 77% of the EV segment. The E-2W market should grow with at least an 84% compound annual growth rate in the next five years.

Currently, the EV sector constitutes less than 1% of the total vehicle sales in the country. We expect the electric two-wheelers market to be 10-20% of the ICE market in the next five years. Over the past four years, sales figures have grown exponentially, considering the overall market size from 40,000 units in 2017 to

four

units this fiscal at the base of 10%, the market will expand to 2 million units per annum. With a little push and more favorable policies, this number could expand to 20%; around 4 million units will be sold yearly. For the upcoming fiscal, we are aiming to double our growth as the outlook for the industry looks positive.

170,000 closing year. Even minimum conversion

5. Does Hero Electric plan to expand its charging infrastructure in the next five years? Is the current charging infrastructure adequate to meet the demand?

Yes, we aim to extend support in building an ecosystem with an easily available charging infrastructure. We have already contributed to this cause by setting up over 1650 charging stations across the country, even as the Union government has been pushing towards E-mobility and has also approved a production-linked incentive of ₹181 billion (-\$2.43 billion). This provides many benefits like lowering the cost of batteries and creating employment opportunities. The next five years are crucial for developing better infrastructure for EVs in the country.

6. What is your take on the current government policies towards the EV segment? What more needs to be done?

The government policies are

expected to bring the change EV segment needed in a long time. The

Union and

state governments have paved the way for EV development in the vehicle space.

The EV sector recently saw a much-needed recovery with the Faster Adoption and Manufacturing of Electric Vehicles in India Phase-II (FAME II) subsidy increase and the implementation of the EVE policy in Gujarat. The revised framework is relevant for manufacturing companies as it will accelerate demand creation for E-2Ws, E-3Ws, and e-buses. It will eventually decrease the parity between the traditional ICE (engines) and the EVs.

Gujarat’s revised EV policy following the recent amendments of the FAME-II program is an excellent move that will further bridge the gap and make the switch to electric vehicles an attractive option. With this policy, the prices of Hero’s EVs will further come down, making them the most affordable in Gujarat compared to pricing across the country. Further, allocating funds and capital to set up additional charging stations will help build the much-needed charging infrastructure and address the consumer’s range anxiety. As we at Hero Electric continue to expand our reach, set up charging points, and reskill private garage owners to create an Ecosystem for EVs, additional subsidies from state governments through policies will help grow EVs and transform the sector into a cleaner and greener mode of transportation. ☺

628 MW of Solar Open Access Capacity Installed in 1H 2021

Karnataka is the largest market for solar open access cumulatively, followed by Rajasthan and Madhya Pradesh

By : Harsh Shukla

India's solar open access installations totaled 209 MW in the second quarter (Q2) of 2021, a 664% year-over-year (YoY) increase compared to 27 MW in the same period last year, according to Mercom's India Solar Open Access Market Report Q2 2021.

Uttar Pradesh added the largest solar open access capacity in Q2 2021, followed by Chhattisgarh and Maharashtra. The top three states accounted for 83% of installations in the quarter.

Cumulative installations in the solar

open access market have reached 4.5 GW as of June 2021.

Installations in Q2 declined 50% compared to the previous quarter (419 MW) due to the impact of the second wave of COVID-19. However, they are expected to increase with over 1.1 GW projects in the pipeline. The government is promoting green open access under the 'Draft Electricity (Promoting Renewable Energy Through Green Energy Open Access) Rules, 2021.

The solar open access market installed 628 MW of capacity in the first half (1H) of 2021, a 12-fold growth

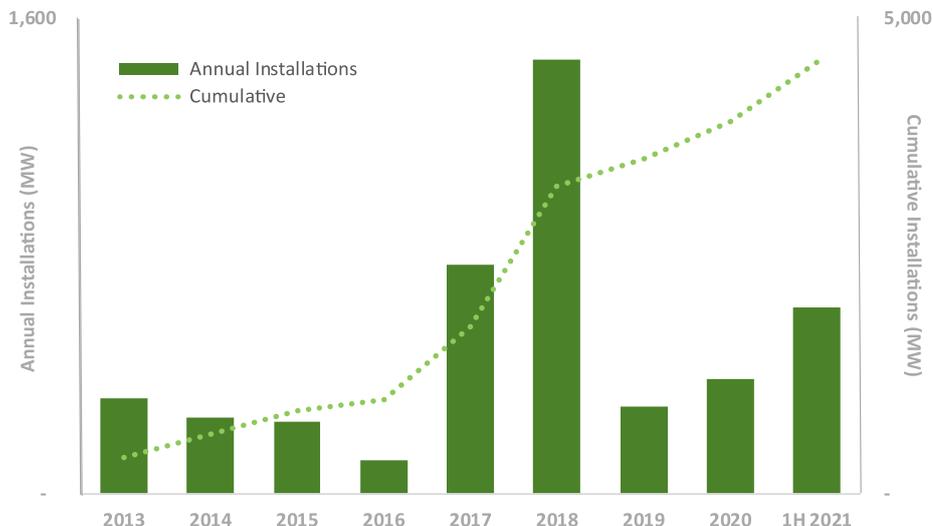
compared to 47 MW installed in the same period last year. Uttar Pradesh led the way with the highest installations in 1H 2021, followed by Maharashtra and Tamil Nadu.

According to the report, Uttar Pradesh, Rajasthan, and Chhattisgarh currently have conducive open access policies. The commercial segment also has potential for captive open access projects in Maharashtra.

As of June 30, 2021, Karnataka is the largest market for solar open access cumulatively, followed by Rajasthan, Madhya Pradesh, Andhra Pradesh, and



Annual Solar Open Access Installations (MW)



Source: Mercom India Research (Jun 2021)

There are over 1.1 GW of open access solar projects in the pipeline

necessary for the market to scale.

The average open access tariff in the states covered in this report ranged from ₹3.50 to ₹5.00 (\$0.047- 0.068)/kWh with a yearly escalation of 1-2% depending on contract terms.

“DISCOMS need to realize that the demand for renewables cannot be curtailed and have to reconsider the consumer’s right to combatting climate change and choosing their suppliers of power. The power demand from commercial and industrial entities is growing, and eventually, the states will have to invest in new power generation. On the other hand, open access will not only generate revenue without DISCOMS investing but also bring in huge capital from around the globe,” said Priya Sanjay, Managing Director of Mercom India.

The report also provides insight into short-term transactions such as day-ahead market (DAM), bilateral contracts, and real-time market (RTM) within the open access segment. The top five states are compared based on the electricity sold and purchased through each model.

Uttar Pradesh was the top seller in the DAM market in Q1 2021, while Gujarat was the leading purchaser in the DAM market in Q1 2021. The top markets for real-time and bilateral markets are covered in the report.

C&I entities are trying to meet a significant portion of their power demand through renewable energy sources with global commitments like RE100, Science-Based Targets initiative (SBTi), and environmental, social, and governance (ESG). Lack of sufficient space to meet a more significant percentage of power demand has led many corporates to opt for open access. The need for procuring renewables in the open market has only been growing every quarter, the report noted. ☺

Tamil Nadu. The top five states account for 73% of the total solar open access market in India.

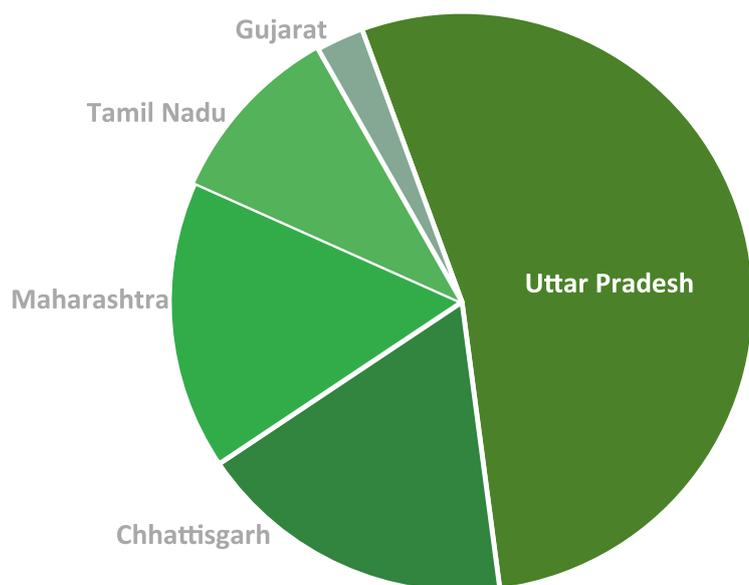
According to the report, the demand for procuring renewables in the open access market has increased every quarter. Many corporates are trying to meet their power demands through renewable energy sources.

However, regulatory inconsistency

and policy U-turns have hindered the growth of the open access market. State governments are also levying new charges or increasing the existing charges to avoid losing high-paying consumers.

Open access project developers believe uniform regulations across states and long-term policies without retroactive changes and charges are

State-wise Solar Open Access Installations in Q2 2021 (%)



Source: Mercom India Research (Jun 2021)

Odisha EV Policy Aims at 20% Electric Vehicle Registrations by 2025

The policy, which will be valid until February 11, 2026, aims to accelerate the adoption of electric two-wheelers, three-wheelers, and light motor vehicles

By : Arjun Joshi

The Odisha Government has announced the Electric vehicle (EV) Policy, 2021, which aims to accelerate the adoption of EVs, especially in the category of electric two-wheelers (E2W), three-wheelers (E3W), and light motor vehicles (E4W). The State aims to achieve 20% of all vehicle registrations to be EVs by 2025. Promotion of EV and component manufacturing, including batteries, is also planned through the policy.

The policy will be valid for five years.

The policy proposes financial incentives for EV manufacturing, purchases, and scrapping. Interest subvention in loans, road tax, and registration fee waivers will also be provided. Incentives will also be available for start-ups.

Demand incentives for EVs

The policy focuses on incentivizing the purchase and use of EVs, particularly in the segments of E2W, E3W, and E4W. The vehicles approved under the Faster Adoption and Manufacturing of Electric Vehicles in India Phase-II (FAME II) program would be eligible for incentives.

A 15% subsidy would be provided for the purchase of E2W, E3W, and E4W up to a maximum of ₹5,000 (~\$68), ₹12,000 (~\$163), and ₹100,000 (~\$1,359) respectively.

E-buses will receive a subsidy of

10% up to a maximum of ₹2,000,000 (~\$27,176). A purchase incentive of ₹30,000 (~\$408) will be provided to the first 5,000 electric goods carriers registered in the State.

State Goods and Services Tax (SGST) on the sale of e-buses and e-goods carriages sold and registered in the State during the policy tenure will be fully reimbursed. Road tax and registration fees of e-buses and e-goods carriages

Purchase of electric two-wheelers will be subsidized by up to ₹5,000 (~\$68)

will be exempted for five and four years, respectively.

The government would also provide a 100% interest-free loan to its employees to purchase EVs. Similarly, government departments, offices, and public sector undertakings would prioritize hiring and purchasing EVs for official use.

Interest subvention to the public

will be provided for purchasing EVs for personal use.

Municipal authorities will provide subsidized parking for all personal EVs. Towns and cities will prepare city parking plans to encourage on-street parking places for EVs with subsidized fees and EV charging stations.

Original Equipment Manufacturers (OEMs) will have to register their e-vehicle models, including swappable battery models meeting eligibility criteria with the Transport Department.

Supply incentives for EVs

Incentives will be provided to make the state conducive for setting up manufacturing and R&D facilities related to EVs (component manufacturing, vehicle assembly, battery assembly, cell manufacturing, electronics parts manufacturing, recycling of EVs, and EV batteries).

The policy outlines the following incentives:

- New micro & small enterprises (MSEs) would receive financial assistance up to 25% of capital investment made in plant and machinery subject to an upper limit of ₹10 million (~\$135,882).
- New MSEs owned by scheduled caste/scheduled tribe/differently-abled/women/technical and diploma holders would receive financial assistance of 30% of capital investment made in plant and machinery subject to a ceiling of ₹12.5





million (-\$169,853).

- New MSEs set up in industrially backward districts, including the Kalahandi Balangir Koraput region, would receive an additional capital investment subsidy of 5%.

The State government will also explore the possibility of entering into a memorandum of understanding with lithium cell manufacturers to start a battery assembly plant in Odisha.

Charging infrastructure incentives

The Odisha government will provide a grant of up to ₹5,000 (-\$68) to purchase charging equipment for the first 20,000 private charging points.

Energy operators will be invited to set up charging and battery swapping stations across all the cities and along the national and state highways. The government will provide a capital subsidy of 25% to the selected energy

A special subsidy will be provided for the first 500 EV charging stations

operators for the charger installation expenses. Such subsidy will be available within one year of allocation of locations.

A special subsidy will be provided for the first 500 EV charging stations.

The government will also provide 100% SGST reimbursement to the energy operators to purchase batteries in swapping stations.

The office of the Engineer-in-Chief, Electricity, will be the nodal agency for setting up and monitoring charging stations.

The government will ensure that batteries currently installed in the EVs will be clearly labeled with the specific battery chemistry. Synergies with existing e-waste management agencies will be explored.

The Industries Department will introduce a well-defined policy for encouraging recyclers in consultation with the Forest & Environment Department and State Pollution Control Board.

Policy Implementation

The Transport Department will be the nodal department for the implementation of the policy. A dedicated “EV Cell” will be established for effective day-to-day policy implementation. 



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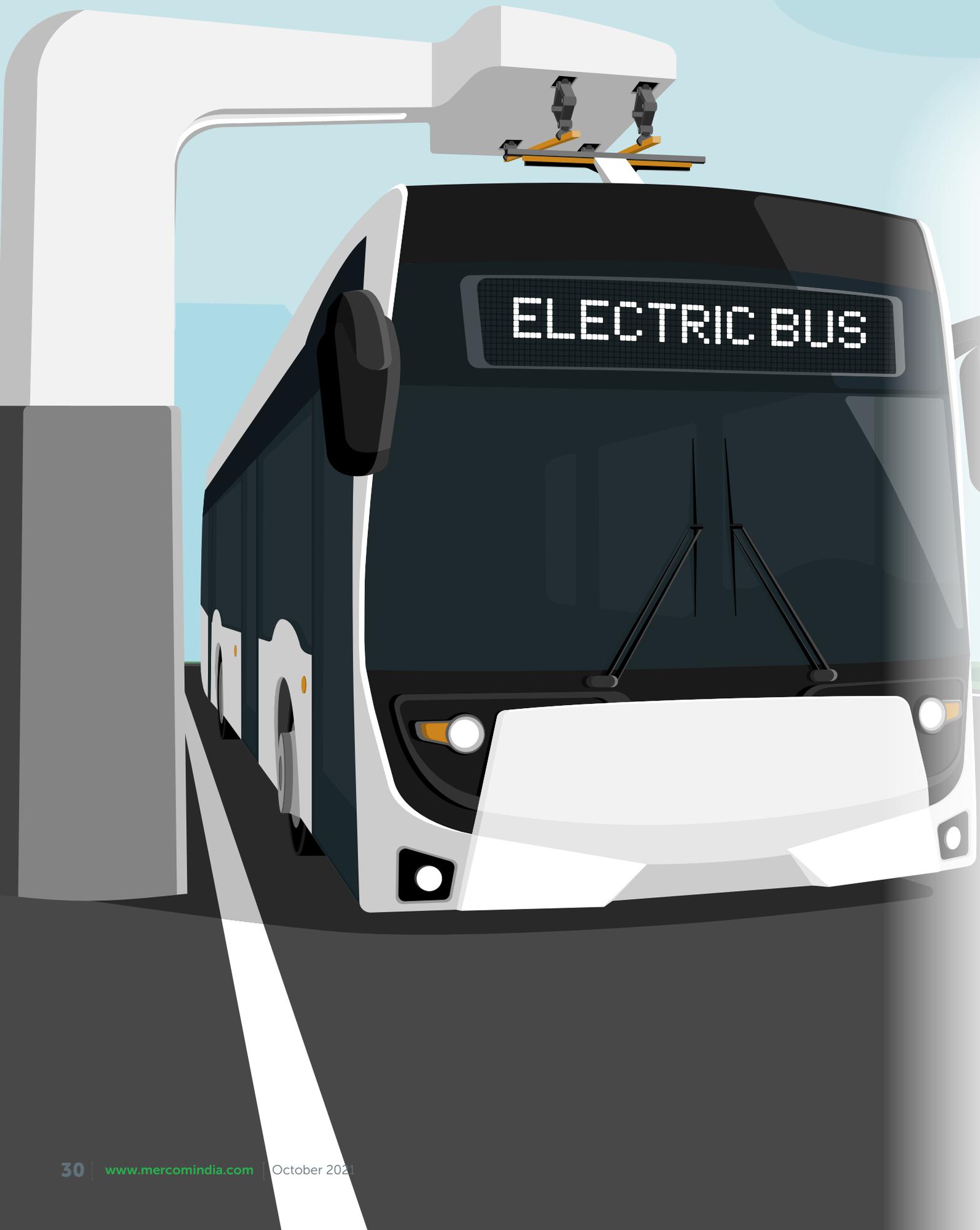
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Assam Aims to Deploy 200,000 EVs by 2026

Only EVs would be sold in the state after 2025 as the state intends to phase out all fossil fuel-based commercial and logistics vehicles in all cities by 2030

By : Arjun Joshi

Assam is the latest Indian state to announce an electric vehicle (EV) policy. The Electric Vehicle Policy of Assam, 2021 aims for 25% EV penetration in all vehicle registrations by 2026.

Assam has followed Maharashtra, Delhi, and Gujarat, which have earlier launched state-specific EV policies. The policy comes into effect from September 4, 2021, for five years (2026) or until the announcement of a new or revised policy, whichever is earlier.

The state will target and support the deployment of the first 200,000 EVs - 100,000 electric two-wheelers (E2Ws); 75,000 electric three-wheelers (E3Ws); and 25,000 electric four-wheelers (E4Ws)- either for individual or commercial use during the five years.

The state also aims to convert 100% of its public transport bus fleet to electric buses and convert all government vehicles to EVs by 2030. As per the policy, only EVs would be sold in the state after 2025 as the state intends to phase out all fossil fuel-based commercial and logistics vehicles in all cities by 2030.

The policy also exempts registration

charges and road tax on E2Ws, E3Ws, and E4Ws, coupled with a full waiver on parking charges for all EVs until 2026.

The policy exempts registration charges and road tax on E2Ws, E3Ws, and E4Ws

Demand-side incentives

The state is offering incentives based on the EV battery capacity to foster the transition to EVs,

E2Ws, E3Ws, and E4Ws would receive a subsidy of ₹10,000 (-\$137)/kWh for a battery capacity of 2 kWh, 5 kWh, and 15 kWh capacity, respectively. The subsidies would be limited to ₹20,000 (-\$274), ₹50,000 (-\$685), and ₹150,000 (-\$2,054) for E2Ws, E3Ws, and E4Ws,

respectively.

The maximum ex-factory price to avail incentive for E2W is ₹150,000 (-\$2,054), ₹500,000 (-\$6,845), and ₹1.5 million (-\$20,536) for E2Ws, E3Ws, and E4Ws, respectively.

According to the policy, the maximum subsidy is limited to 40% of the ex-factory price of the vehicle. The policy also provides a retro-fitment incentive of 15% up to ₹15,000 (-\$205) for E3W.

EV buyers are allowed to avail similar subsidies from only one program of the state government. However, there is no bar on availing subsidies or incentives under any central government program.

Supply-side incentives

Micro, small and medium units manufacturing EVs or EV components are eligible for a 20% subsidy on plant and machinery costs up to ₹1.5 million (-\$20,536), ₹5 million (-\$68,454), and ₹10 million (-\$136,908), respectively.

Similarly, large units manufacturing EVs or EV components are eligible for a 10% subsidy on plant and machinery costs up to ₹100 million (-\$1.36 million).

These subsidies are in addition to the 30% capital investment subsidy

Subsidy Under Electric Vehicle Policy of Assam, 2021

Vehicle Segment	Battery Size kWh	State Subsidy		Total State Subsidy		Maximum Ex-Factory Price to	
		₹/kWh	~\$/kWh	₹	~\$	₹	~\$
2 wheeler	2	10,000	136.90	20,000	273.82	1,50,000	2,053.67
3 wheeler	5			50,000	684.54	5,00,000	6,845.56
4 wheeler	15			1,50,000	2053.61	15,00,000	20,536.69

Source: Government of Assam

Mercom India Research

available under North East Industrial Development Scheme (NEIDS) 2017 or any subsequent policy from the central or state government.

Units manufacturing EV or its components are eligible for an additional interest subsidy of 2% on the working capital loan, in addition to the 3% interest subsidy on working capital loan available under NEIDS 2017 or any subsequent policy from central or state government.

Charging infrastructure incentives

Commercial public EV charging stations for E2W, E3W, and E4W are eligible for 25% capital subsidy on equipment subject to a maximum limit of ₹1 million (~\$13,691) per station. The incentive will be provided to the first

500 commercial public EV charging stations.

Petrol Pumps are also permitted to set up EV charging stations, provided they follow fire and safety norms issued by the competent authorities.

Assam aims to convert 100% of its public transport to electric buses by 2030

The state government would exempt 90% of electricity duty on EV charging stations while 10% electricity duty would be borne by the entrepreneurs through the policy duration.

Buyback incentive

EV owners can deposit vehicle batteries that have reached their expiry at any charging point or swapping station landfills and, in return, get a remunerative price for the battery. Disposal of EV batteries in any other manner, such as scrap, will not be allowed.

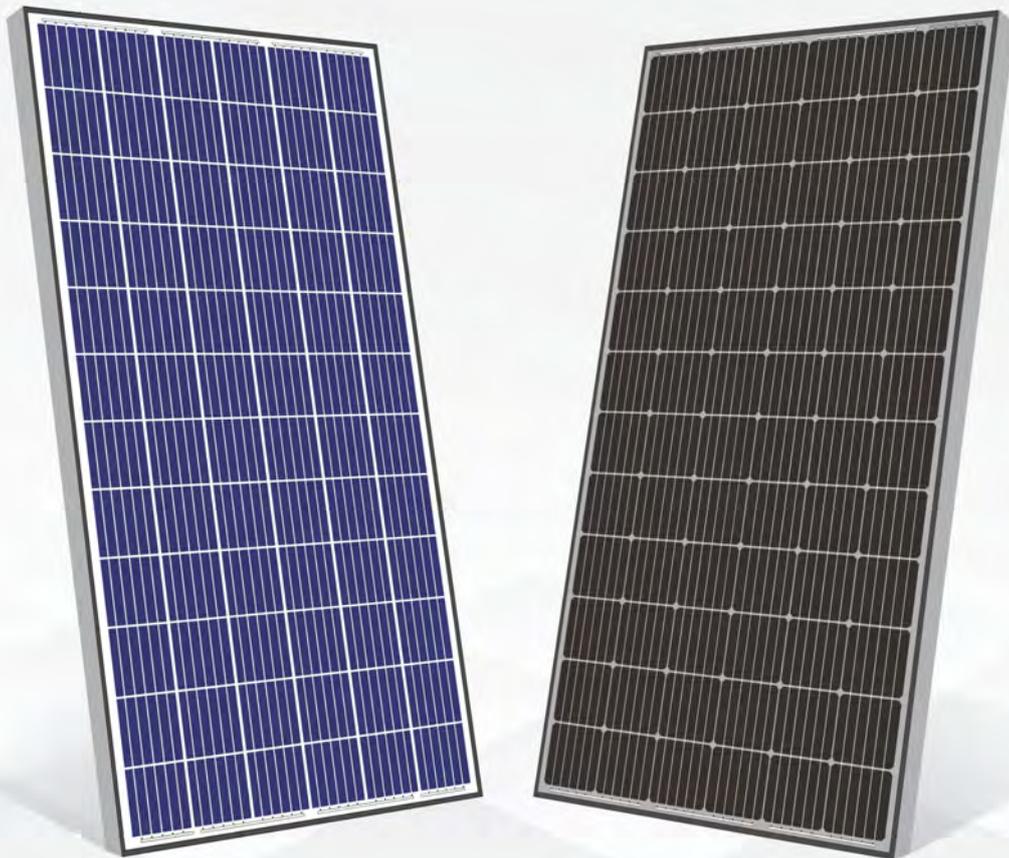
A nodal agency will be appointed to act as an aggregator to purchase EV batteries that are at least 70% of rated capacity. These batteries will be purchased from the charging points and battery swapping stations and re-used as power banks to store renewable energy.

Batteries procured in such a manner will be auctioned to renewable generators within and outside Assam. The nodal agency would publish the purchase price of end-of-life batteries every month based on auction prices along with a margin for the agency, the charging points, and battery swapping stations. 📍





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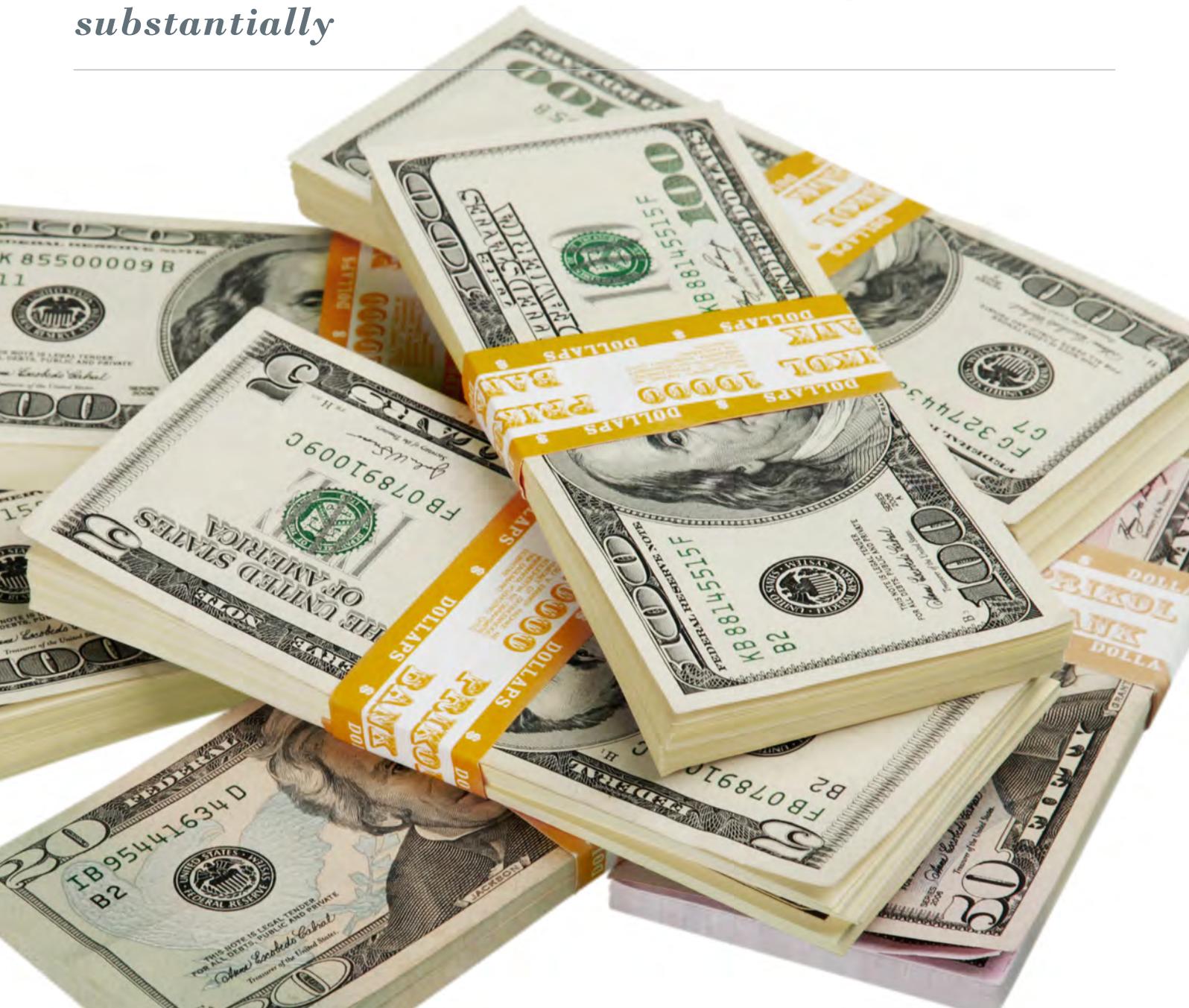
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Investments in Indian Solar Sector Up 119% QoQ in Q2 CY 2021

Despite the second wave of the Covid-19 pandemic, investments in the Indian solar sector grew substantially



The investments in the Indian solar sector increased by 119% quarter-over-quarter (QoQ), with over \$2 billion in the second quarter (Q2) of the calendar year (CY) 2021. However, in a year-over-year (YoY) comparison, the investments increased by a staggering 2,170% compared to the same period amid the Covid-19 pandemic last year. The data was revealed in Mercom India Research's latest Q2 2021 India Solar Market Update.

The second wave of the pandemic also impacted the overall investment scenario in the country in Q2 2021, but it was not as bad as experienced last year. However, investments in the solar sector were back to the pre-pandemic levels boosted by the new manufacturing facilities announced in the quarter.

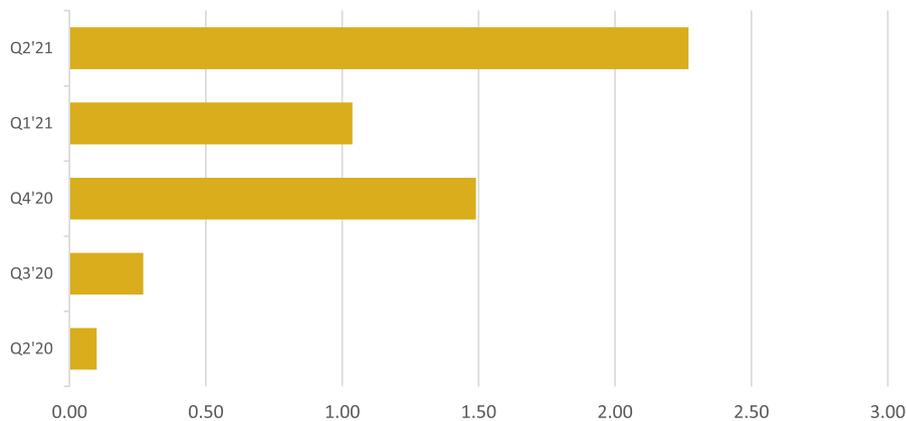
According to the report, investments in the utility-scale solar segment were

Investments in Q2 increased by a staggering 2,170% compared to Q2 of 2020

approximately \$1 billion in Q2 2021, an increase of 17% compared to Q1 2021. Meanwhile, the rooftop segment saw investments increase by 73% compared to the preceding quarter.

There were also investments in the

Investments in Indian Solar Sector by Quarter (\$ Billion)



Source: Mercom India Research (Jun 2021)

manufacturing sector, with companies expanding their capacities following the announcement of the Basic Customs Duty (BCD) on imported modules and cells coupled with the enforcement of the Approved list of Models and Manufacturers (ALMM) clause for projects to be implemented by the government.

Investments in the first half (1H) of 2021 surged to over \$3 billion, increasing by 210% compared to the same period last year.

Deal Highlights

Some of the deals that grabbed the headlines in Q2 2021:

- Adani Green Energy Limited signed a share purchase agreement to acquire a 100% stake in SB Energy India from Soft Bank Group (80%) and Bharti Group (20%). The transaction values SB Energy India at an enterprise valuation of about \$3.5 billion (-₹47 billion).
- ReNew Power secured \$585 million

(-₹43.5 billion) through green bonds listed on the Global Securities Market of India International Exchange at GIFT International Financial Services Centre. The bonds have a maturity period of 7.25 years and are assigned expected ratings of BB- (with a positive outlook) by Fitch Ratings and Ba3 rating by Moody's investor services. These are priced competitively at 4.50% per annum.

- The distributed solar company, Fourth Partner Energy, raised \$125 million (-₹9.3 billion) in equity funding. Norwegian Investment Fund Norfund brought in \$100 million (-₹7.4 billion) while existing shareholders, the Rise Fund, invested \$25 million (-₹1.8 billion).
- CDC Group, a UK government-owned financial development institution, announced a ₹2.5 billion (-\$33.44 million) investment into distributed solar energy company Fourth Partner Energy. The capital from CDC will be in the form of non-convertible debentures. ☺



Tariff for Manufacturing-Linked Solar Projects Reduced

SECI reduced the tariff in the manufacturing-linked solar auction from ₹2.92/kWh as DISCOMs were unwilling to buy power at the discovered rate

By : Rakesh Ranjan Parashar

The tariff of ₹2.92 (-\$0.04)/kWh discovered in the manufacturing-linked solar projects auction held in January last year has now been reduced

to ₹2.54 (-\$0.034)/kWh. Adani Green Energy (AGEL) and Azure Power had won the first of its kind manufacturing-linked solar tender floated by Solar Energy Corporation of

India (SECI). Adani and Azure had won the bid to develop 2,000 MW of projects with 500 MW of manufacturing capacity each. The winning tariff quoted by both the companies was ₹2.92 (-\$0.04)/kWh.



The ceiling tariff for the tender was fixed at ₹2.93 (\$0.041)/kWh.

According to the project timeline, SECI was to sign the power purchase agreement (PPA) for 4 GW by the financial year 2020.

A SECI official told Mercom, “We tried to negotiate with the successful bidders, which reduced the tariff because DISCOMs were unwilling to buy power at the rate discovered through the bidding.”

SECI is set to sign the power sale agreements (PSAs) for 3 GW of solar projects, according to the official. PSA for 500 MW has been signed with Grid Corporation of Odisha (GRIDCO) and approved by the Odisha Electricity Regulatory Commission. PSA for 300 MW is finalized with the distribution company (DISCOM) of Chhattisgarh. Tamil Nadu DISCOM is likely to buy 1 GW. SECI is also in discussion to sell the remaining 1,200 MW.

The PSAs will be signed at ₹2.61 (-\$0.035)/kWh - tariff of ₹2.54 (-\$0.034)/kWh plus a trading margin of ₹0.07 (-\$0.0009)/kWh.

Once agreements to sell the power to the DISCOMs are finalized, SECI will be signing the PPAs with Adani and Azure. The tariffs at which Adani and Azure will be signing the PPAs are 13% lower than what was won at the auction. The SECI official mentioned that the tariff was still attractive considering the decline in the project costs and the tariffs discovered in the recent auctions. In the recent Neemuch auction by Rewa Ultra Mega, solar tariffs dropped to ₹2.14 (-\$0.029)/

Adani and Azure will be signing the PPAs at tariffs 13% lower than discovered in the auction

kWh.

According to Mercom’s recently released Q2 2021 India Solar Market Update, the average cost of large-scale solar projects in the second quarter of 2021 (Q2 2021) was ₹38.6 million (-\$529,036)/MW. The cost increased by 12% when compared to the same period last year when it was ₹34 million (-\$455,532)/MW and a 5% rise from the previous quarter (Q4 2020) when the cost was about ₹35.3 million (-\$488,255)/MW. In the long-term, the market is hoping for solar component costs to start declining again once the COVID-19 related supply chain issues are resolved.

The manufacturing-linked tender also had a greenshoe option, where the companies could opt for an additional capacity to both develop and manufacture. Under the greenshoe option, Adani had offered an additional capacity of 1,500 MW solar cell and module manufacturing and 6 GW generation. Azure had taken the greenshoe option for an additional capacity of 500 MW manufacturing and 2 GW generation. ☺





DISCOM Revamp Plan to Strengthen Transmission Network

The program aims to reduce AT&C losses to 12-15% and help DISCOMs expedite payments to renewable energy generators

By : Harsh Shukla

The Ministry of Power (MoP) issued detailed guidelines last month for the reform-based result-linked power distribution program over the next five years.

The program aims to reduce the aggregate technical and commercial (AT&C) losses across India to 12-15% and improve the quality and reliability of power supply to consumers through a financially and operationally efficient distribution sector.

Through this program, MoP will provide subsidies to DISCOMs for installing prepaid smart meters, leveraging artificial intelligence, machine learning, and blockchain technology, and providing financial assistance to upgrade distribution networks.

In June 2021, Union Finance Minister Nirmala Sitharaman announced a ₹3.03 trillion (-\$40.82 billion) outlay for the reform-based power distribution program.

Distribution companies (DISCOMs) and solar developers are optimistic that the program would help improve the financial conditions of DISCOMs and strengthen the transmission network to reduce losses.

Enhancing Transmission Network

According to the guidelines, an inter-ministerial committee will be constituted under the chairmanship

DISCOMs believe a 15% subsidy for prepaid smart meters is insufficient

of the MoP's Secretary. The committee will design and approve all operational guidelines and review and monitor the program's implementation.

DISCOMs will be provided financial assistance of up to 60% to upgrade distribution systems through this program. For special category states, DISCOMs will receive assistance up to 90% to upgrade distribution networks.

Commenting on the program, the technical director of a Karnataka DISCOM said the funding would help them upgrade redundant transformers and other technologies.

"Through this funding, we can reach the last mile for providing power to consumers. In addition, the upgradation of transmission networks would help us reduce transmission and financial losses," the DISCOM official said.

Shishir Singh, Assistant General Manager of Tata Power Delhi Distribution Limited, said, "The

government should support the power sector to improve electricity distribution sector as it is a cross-subsidized and regulated industry. If the government does not support DISCOMs to improve distribution infrastructure, the overall economic development will be hindered as all industries require an efficient power supply. Financial assistance and soft loans by the government have helped DISCOMs improve the distribution network in the past; otherwise, the DISCOM networks would have faced a difficult situation."

Echoing similar thoughts, a senior executive of Delhi-based private DISCOM said the funding would help upgrade the distribution networks and reduce distribution losses. Transformers of many DISCOMs are in bad shape leading to technical losses.

He suggested that the government include private DISCOMs in the program with different criteria for them.

Animesh Damani, Managing Partner, Artha Energy Resources, said, "The program will not directly impact renewable energy developers. However, if the program is implemented correctly, DISCOMs can enhance transmission systems, which would benefit renewable energy generators. If DISCOMs can enhance their financial condition and reduce AT&C losses, then renewable energy generators may get their payments on time."

Funding for prepaid smart meters

To deploy prepaid smart meters by December 2023, the program will fund a flat 15% of the cost per meter over the whole project to a maximum of ₹900 (-\$12). The funding will be 22.5% for special category states of up to ₹1,350 (-18) per meter.

DISCOMs - which initiated tenders for prepaid smart metering after January 1, 2020 - will be eligible for funding if they carry out prepaid smart metering work under TOTEX (capital expenditure+operational expenditure) mode after the monitoring committee's approval.

The technical director of Uttar Pradesh DISCOM said the 15% subsidy was not sufficient. Paying for the rest would be a burden on DISCOMs and hinder the deployment of smart meters.

Echoing similar thoughts, the technical director of Karnataka-based DISCOM said that at least 50% subsidy should be extended to DISCOMs to deploy prepaid smart meters.

Vinay Pabba, Founder and Chief Executive Officer of Varp Power, said, "If DISCOMs come up with the balance



Artificial intelligence and blockchain technology

According to MoP's guidelines, artificial intelligence, blockchain technology, and machine learning will be leveraged to implement actionable management information systems to help DISCOMs take decisions on loss reduction, demand forecasting, asset management, time of day tariff, renewable energy integration, and other predictive analysis.

As a part of the program, the Smart Grid Knowledge Center at Power Grid Corporation of India, Manesar, will be developed as a resource center for smart grid activities in the country. The Ministry has earmarked ₹300 million (-\$4.03 million) to expand the center's activities with 100% gross budgetary support. The fund will be utilized to create applications related to artificial intelligence in the distribution sector.

Commenting on this, a senior executive of a Delhi-based private company said, "Artificial intelligence is a broad suite of technologies. Currently, we are using artificial intelligence and machine learning for demand forecasting. We also use it for

asset health management and predict customer level demand and peak load. DISCOMs can import data through smart meters. With that data, artificial intelligence and machine learning can help DISCOMs predict the demand through behavioral demand response techniques.

Echoing similar thoughts, Singh said introducing new technology and data analytics would help DISCOMs reduce losses and forecast demand better.

DISCOMs owed ₹121.91 billion (-\$1.63 billion) to renewable energy generators (excluding dispute amounts) in overdue payment across 256 pending invoices at the end of June 2021, according to data released by the Ministry of Power.

The financial health of the DISCOMs has consequences to all power generators, including renewable energy. DISCOMs are offtakers of the power generated and critical for the growth of renewable energy with a target of 450 GW of installations by 2030. Offtaker risk is one of the main barriers to investments flowing into the sector. The DISCOM revamp plan has the stakeholders hopeful of a positive change. 

The program will fund a flat 15% of the cost per smart meter over the whole project to a maximum of ₹900

of funding after the funding from the Union government grant, this has the potential to alter the working capital cycle of DISCOMs fundamentally. The paradigm shift from the post-paid model to the pre-paid model can reduce the working capital gap. As a solar developer, this is good news for me as it translates into prompt payments."

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Energy Cost and Revenue Gap Narrowed to ₹0.28/kWh in FY 2020

The Union Minister R.K. Singh has said that the gap between the average cost of supply and the average revenue realized narrowed in FY 2020 at the national level

By : Rakesh Ranjan Parashar

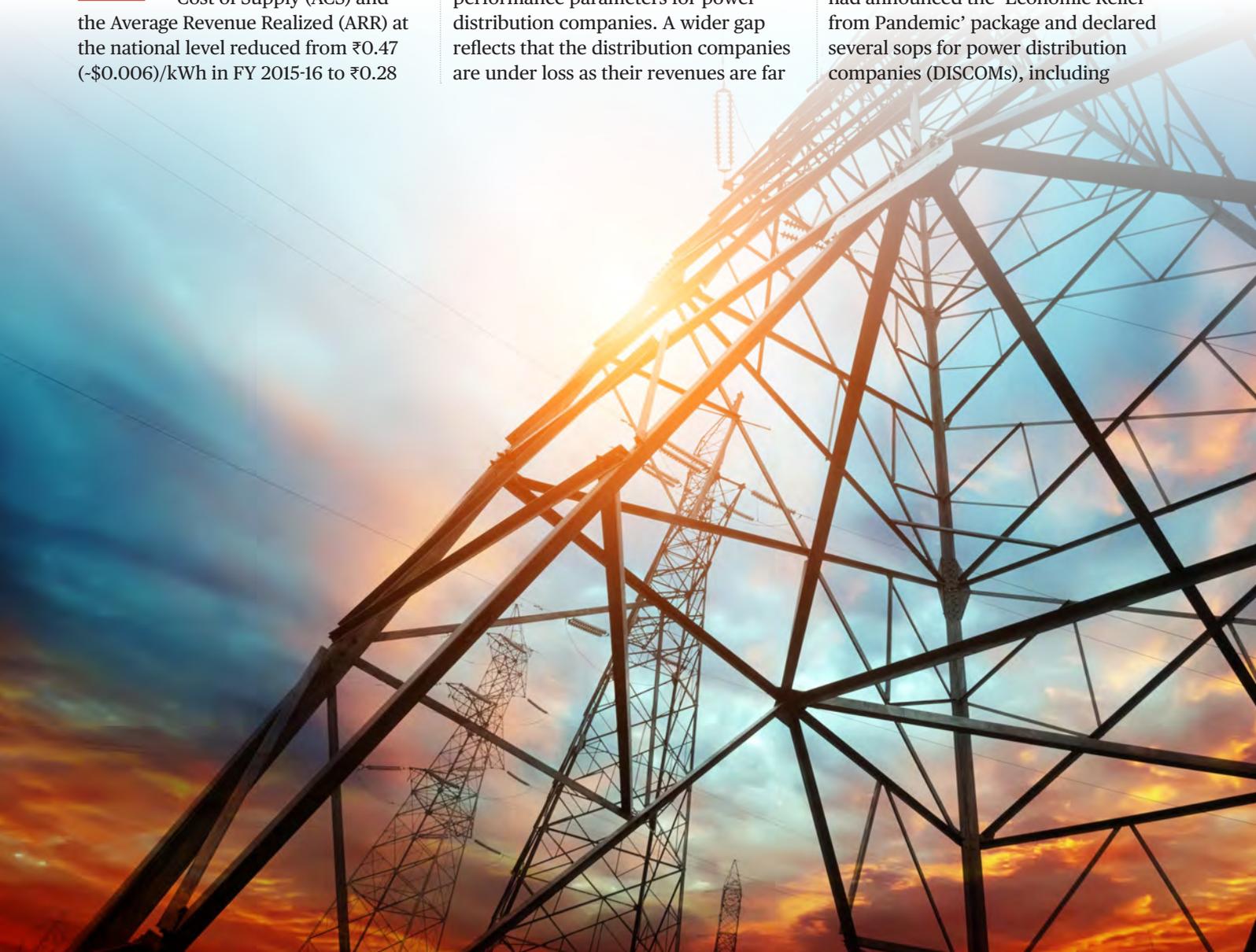
The Union Minister R.K. Singh said in Rajya Sabha that the gap between the Average Cost of Supply (ACS) and the Average Revenue Realized (ARR) at the national level reduced from ₹0.47 (-\$0.006)/kWh in FY 2015-16 to ₹0.28

(-\$0.004)/kWh in FY 2019-20.

The gap between the revenue and cost per unit/kWh is one of the critical performance parameters for power distribution companies. A wider gap reflects that the distribution companies are under loss as their revenues are far

lower than their expenditure.

Earlier in June this year, the Union Finance Minister Nirmala Sitharaman had announced the 'Economic Relief from Pandemic' package and declared several sops for power distribution companies (DISCOMs), including



₹3.03 trillion (-\$40.82 billion) outlay for reform-based result-linked power distribution program.

The program aims to improve the quality and the reliability of power supply to consumers through a financially sustainable and operationally efficient distribution sector. The plan is to reduce the aggregate technical and commercial (AT&C) losses across India to 12-15% and eliminate the gap between the average cost of supply and the aggregate revenue requirement by 2024-25.

Only six states have registered revenues more than the cost of power supply

The minister added that all state-owned distribution companies and state and union territory DISCOMs, excluding private sector DISCOMs, will be eligible for financial assistance under the revamped distribution sector program.

According to the data released by the Ministry of Power, the ACS-ARR gap narrowed in 18 states/union territories between financial year (FY) 2016 to FY 2020. On the national level, the gap narrowed from ₹0.47 (-\$0.006)/kWh to ₹0.28 (-\$0.004)/kWh from FY 2016 to FY 2020.

In reply to the question, the minister shared the state-wise data regarding the narrowing of the ACS-ARR gap and the current status of the states. The data is based on the subsidies booked by the states to the central government.

The ARR-ACS has considerably widened in Arunachal Pradesh, Meghalaya, Nagaland, Puducherry, and Tamil Nadu, which is concerning.

On the positive side, the ARR-ACS gap has narrowed significantly in Andhra Pradesh, Jammu & Kashmir, Madhya Pradesh, Mizoram, and Sikkim.

Only six states have registered revenues more than the cost of power supply. These include Assam, Gujarat,

Gap in Average cost of supply (ACS) and Average Revenue Realised (ARR) on Tariff Subsidy Booked Basis in India

States/Union Territories	2015-16		2019-20	
	(₹\kWh)	(~\$\kWh)	(₹\kWh)	(~\$\kWh)
States and Union Territories with Improved ACS-ARR Gap				
Andhra Pradesh	0.79	0.0106	0.02	0.0003
Assam	0.13	0.0017	-0.19	-0.0026
Goa	0.71	0.0095	0.60	0.0081
Gujarat	-0.03	-0.0004	-0.06	-0.0008
Haryana	0.16	0.0021	-0.06	-0.0008
Himachal Pradesh	0.01	0.0001	-0.01	-0.0001
Jammu & Kashmir	3.00	0.0403	1.85	0.0249
Jharkhand	0.93	0.0125	0.89	0.0120
Kerala	0.30	0.0040	0.10	0.0013
Madhya Pradesh	0.88	0.0118	0.24	0.0032
Maharashtra	0.29	0.0039	0.03	0.0004
Mizoram	2.06	0.0277	1.21	0.0163
Odisha	0.39	0.0052	0.34	0.0046
Punjab	0.34	0.0046	0.21	0.0028
Rajasthan	1.61	0.0216	-0.36	-0.0048
Sikkim	2.09	0.0281	0.50	0.0067
Tripura	0.42	0.0056	0.29	0.0039
West Bengal	0.00	0	-0.13	-0.0017
States and Union Territories with deteriorated ACS-ARR Gap				
Arunachal Pradesh	0.49	0.0066	4.92	0.0661
Bihar	0.46	0.0062	0.93	0.0125
Chhattisgarh	-0.01	-0.0001	0.29	0.0039
Delhi	-0.10	-0.0013	0.38	0.0051
Karnataka	0.06	0.0008	0.28	0.0038
Manipur	0.02	0.0003	0.08	0.0011
Meghalaya	0.82	0.0110	1.80	0.0242
Nagaland	0.20	0.0027	5.62	0.0755
Puducherry	-0.03	-0.0004	0.95	0.0128
Tamil Nadu	0.67	0.0090	1.27	0.0171
Telangana	0.68	0.0091	0.96	0.0129
Uttar Pradesh	0.29	0.0039	0.34	0.0046
Uttarakhand	0.10	0.0013	0.38	0.0051
National	0.47	0.0063	0.28	0.0038

Source: Rajya Sabha

Mercom India Research

Haryana, Himachal Pradesh, Rajasthan, and West Bengal.

In April last year, the Ministry of Power had proposed amendments to

the Electricity Act 2003 to improve the health of DISCOMs, including direct benefit transfer and cost-reflective tariffs, among others. ☹



Karnataka Sets Generic Tariff for Solar Projects

The Karnataka regulator, in its new solar tariff order, set a tariff of ₹4.02/kWh (without capital subsidy) for rooftop solar projects up to 10 kW capacity

By : Rakesh Ranjan Parashar

The Karnataka Electricity Regulatory Commission (KERC) has issued an order setting the generic tariff for solar power projects (including rooftop solar projects) for FY 2022 and FY 2023. The Commission has set a tariff of

₹3.10 (-\$0.042)/kWh for grid-connected MW scale solar power projects of capacity less than 5 MW and ₹3.19 (-\$0.043)/kWh for grid-connected rooftop solar projects of 1 kW to 2,000 kW (excluding 1 kW to 10 kW).

For grid-connected residential

rooftop solar projects of 1 kW to 10 kW capacity, the Commission has set a tariff of ₹4.02 (-\$0.054)/kWh (without capital subsidy) and ₹2.67 (-\$0.036)/kWh (with capital subsidy).

The new tariffs will be applicable for new solar projects for which the power



purchase agreements (PPAs) have been entered into on or after April 1, 2021. The order will be in force from April 1, 2021, and applicable for the control period of FY 2022 and FY 2023.

Background

Through its order dated May 22, 2020, the Commission had extended the earlier tariff order's validity for FY 2021. In an earlier order in 2019, the Commission had determined the levelized tariff of ₹3.08 (-\$0.048)/kWh for large solar projects, ₹3.07 (-\$0.041)/kWh for 1 kW to 2,000 kW scale rooftop solar projects and ₹3.99 (-\$0.054)/kWh for 1 kW to 10 kW for domestic consumer's rooftop solar projects.

The Commission issued a discussion paper to determine tariff on February 3, 2021, inviting suggestions from the stakeholders. It also held a public hearing in the matter on August 4, 2021, and said it would allow net metering for rooftop solar projects for capacity up to 500 kW.

Karnataka has allowed net metering for rooftop solar projects for capacity up to 500 kW

In July, the KERC had proposed net metering for rooftop solar installations up to 500 kW from the earlier suggested cap of 10 kW.

Commission's analysis

The Commission adopted the useful life of the solar power projects as 25 years from the date of the commissioning of the projects. It proposed adopting a levelized tariff for 25 years to ensure certainty of revenue

streams to the investors.

The Commission allowed 0.5% of the net generation as an annual degradation factor commencing for large-scale projects from the fifth year onwards. It adopted the minimum capacity utilization factor for solar power projects at 21%.

To determine the tariff, the Commission considered a debt-equity ratio of 70:30 for all solar power projects.

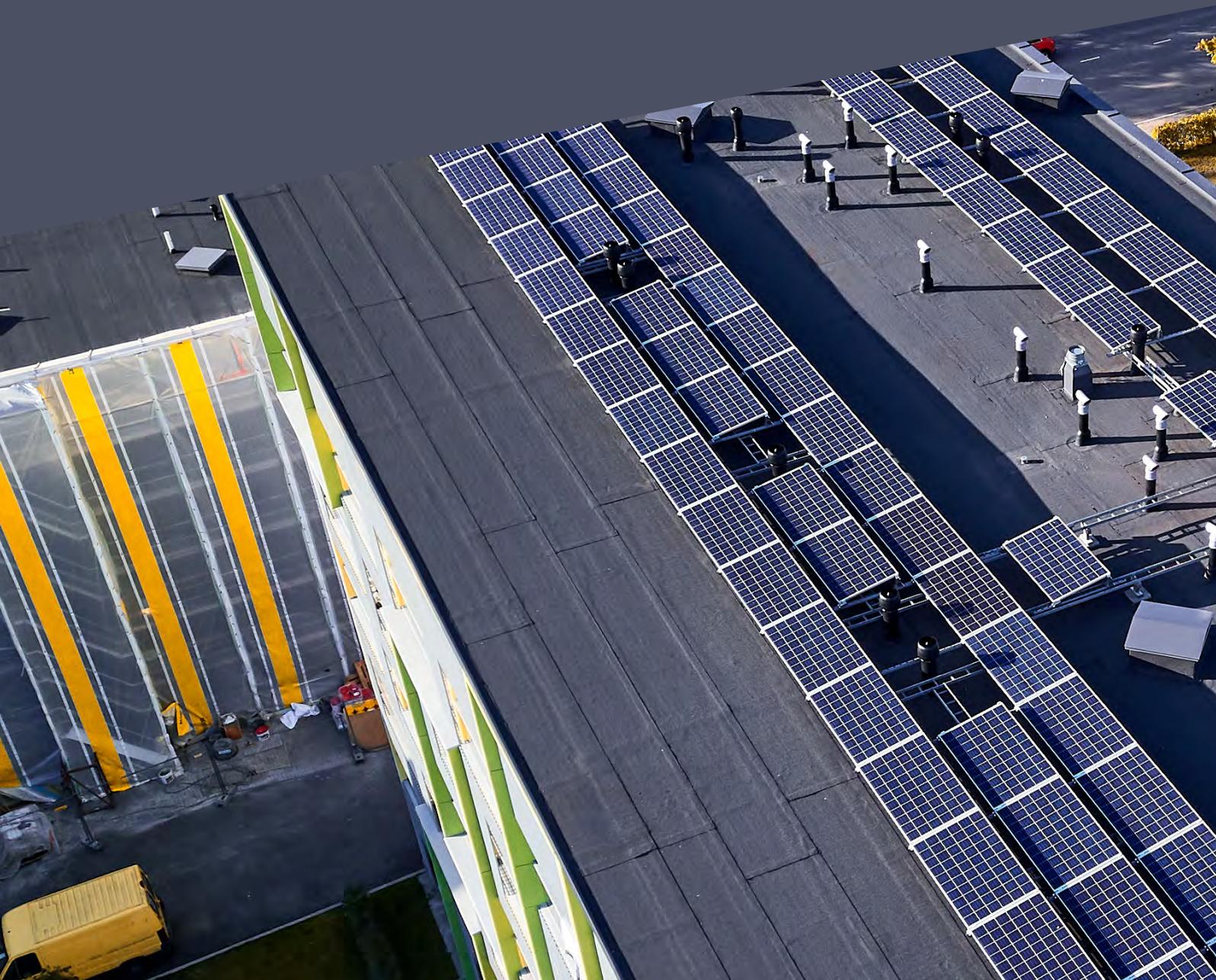
The state regulator considered the capital cost of ₹35.05 million (-\$471,919)/MW to determine the tariff. It allowed operation and maintenance expenses at ₹670 (-\$9.02)/kW for solar rooftop projects and ₹503,000 (-\$6,772)/MW for ground-mounted solar projects with an annual escalation of 5.72%.

The Commission adopted the marginal cost of a funds-based lending rate of 10% per annum to calculate the interest on the working capital. The return on equity was considered as 14% per annum. 

India Installs the Highest Rooftop Solar Capacity in a Quarter

According to Mercom India Research's India Rooftop Solar Market Report Q2 2021, installations soared despite the second wave of the pandemic and the state lockdowns

By : Rahul Nair



Ondia marked a 53% quarter-over-quarter (QoQ) increase in rooftop solar installations in the second quarter (Q2) of 2021, the highest for any quarter, with 521 MW installations compared to 341 MW installed in Q1 2021.

The figures were revealed in Mercom India Research's latest report, India Rooftop Solar Market Report Q2 2021.

In Q1 2021, rooftop solar installations had increased 8% compared to 285 MW added in Q4 2020.

A significant contribution came from Gujarat, where a large amount of residential rooftop solar projects were commissioned.

The year-over-year (YoY) installations rose 517% compared to 85 MW in Q2 2020.

In the first half (1H) of 2021, 862 MW of rooftop solar was added, a 210% increase compared to the same period last year. Installations in 1H had already surpassed the total rooftop solar capacity installed in 2020 (719 MW) when the COVID-19 lockdowns took

Gujarat contributed about 55% of the installed capacity

their toll on the industry.

2021 could be the second-best year for rooftop solar after 2018 if the market has no other adverse COVID-19-related or other events in the second half (2H).

The report further states that installations were significantly higher than the previous quarter despite the second wave of the pandemic and the state lockdowns. Since the lockdowns were targeted, the industry was well prepared, and installation activity was not affected much.

“The rooftop segment had a strong quarter, and demand is up. Finalizing

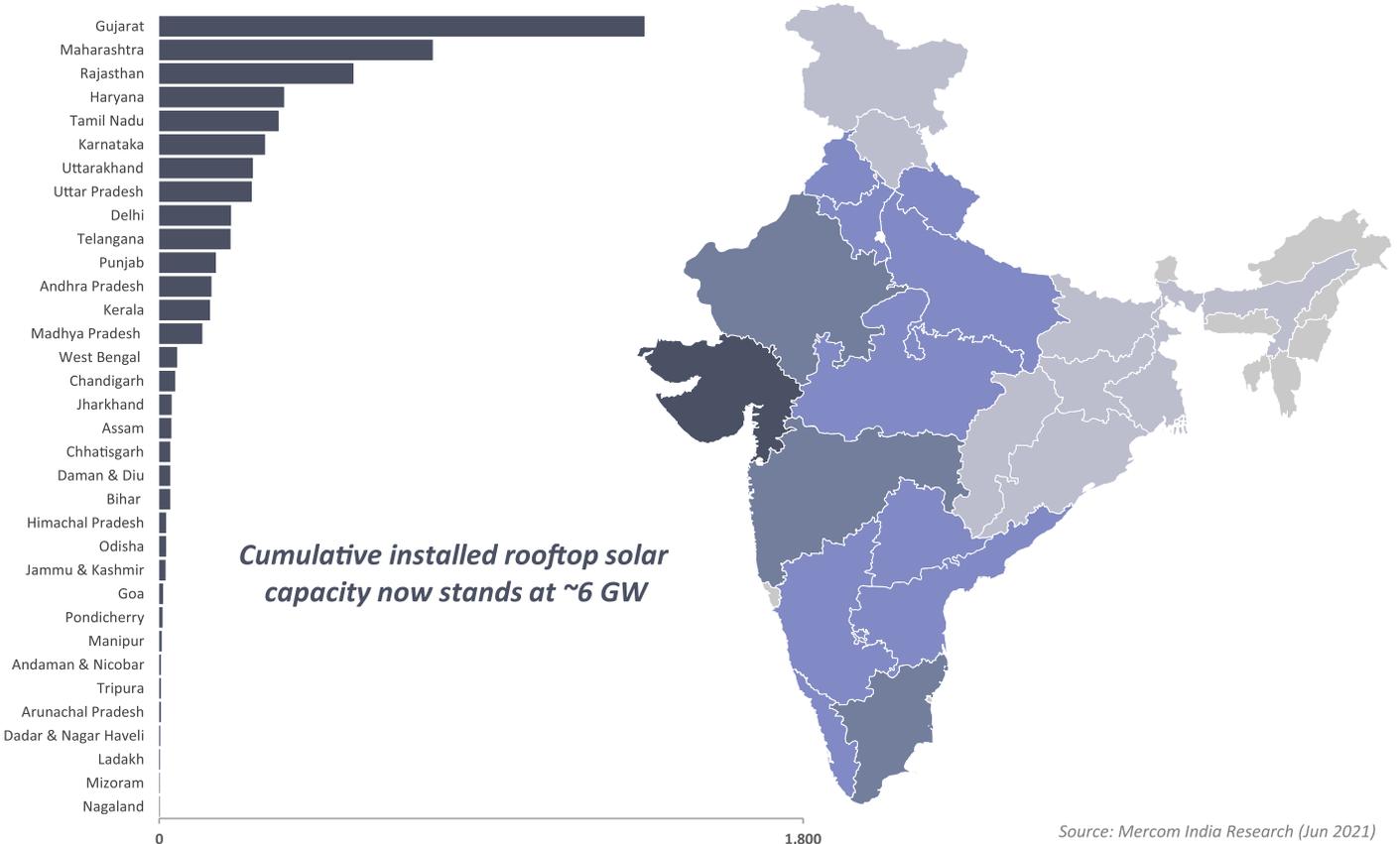
the net metering cap at 500 kW has removed uncertainty for installers and paved the way for future growth. However, haphazard rooftop policies across states and a lack of support from distribution companies are holding back the sector from realizing its true potential to bring in new investment, create jobs and drive the clean energy economy forward,” said Raj Prabhu, CEO of Mercom Capital Group.

According to the report, cumulative rooftop solar installations reached 6.1 GW by the end of Q2 2021.

In Q2 2021, more than 130 MW of rooftop solar projects were tendered, a 69% QoQ decrease, albeit a 46% YoY increase. Major rooftop solar tenders were issued this Quarter by Madhya Pradesh Urja Vikas Nigam, Jharkhand Bijli Vitran Nigam, Haryana Renewable Energy Development Agency, and West Bengal Renewable Energy Development Agency.

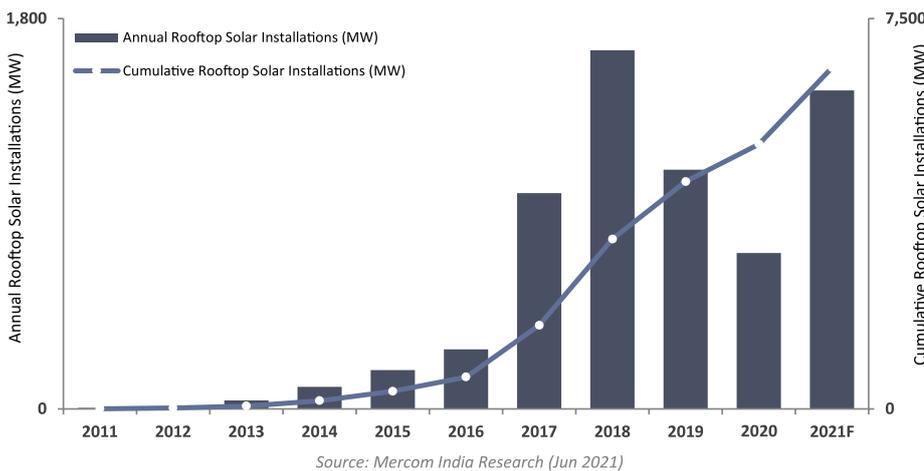
Q2 2021 saw most rooftop solar installations in Gujarat, accounting for about 55% of the installed capacity.

India Rooftop Solar Cumulative Installations by States (MW)





India Rooftop Solar Demand Forecast (MW)



Solar modules still make up for the majority of rooftop solar costs. Even with rising costs, consumers are realizing that solar is still cheaper than retail power tariffs.

There is significant concern over increasing costs compared to the prices quoted under state empanelment auctions. Failure or success of these installations will have a considerable impact on the future of the residential rooftop solar segment, noted the report.

Key Highlights from Mercom India Research’s India Rooftop Solar Market Report Q2 2021

- In Q2 2021, India added 521 MW of rooftop solar, an increase of 53% compared to 341 MW installed in Q1 2021. YoY installations rose 517% compared to 85 MW in Q2 2020
- In 1H 2021, India added 862 MW of rooftop solar, a 210% increase compared to the same period last year
- Cumulative installed rooftop solar capacity in India was about 6.1 GW at the end of Q2 2021
- In Q2 2021, the top 10 states accounted for approximately 83% of the cumulative installations
- The State of Gujarat had the most rooftop solar installations in Q2, followed by Maharashtra and Haryana.
- Rooftop installations in Q2 were the highest ever in a quarter. ☺

Maharashtra and Haryana rounded off the top three states for rooftop solar in Q2 2021.

The industry witnessed a surge of demand from commercial and industrial (C&I) consumers even during the lockdown from the second wave of COVID-19. The first half of the year could have been much stronger if not for the uncertainty around net metering regulations. With regulatory certainty in place, demand is expected to pick up, though with smaller-sized installations, noted the report.

According to the report, in Q2, average rooftop solar system costs increased 3% to ₹39.1 million/MW compared to ₹38 million/MW in Q1

2021. System costs have been rising since Q3 2020 due to increasing costs led by modules and other components, coupled with raw material shortages.

Finalizing the net metering cap at 500 kW has removed uncertainty for installers

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Blending Metal Halide Perovskites with Silicon to Enhance Solar Cell's Efficiency

The addition of perovskites onto silicon photovoltaics is the fastest way to enhance the performance of silicon

By : Harsh Shukla

R

esearchers at Oxford PV, an Oxford University spin-off company, have asserted that combining metal halide

perovskites with conventional silicon could overcome the 26% efficiency limit of solar cells made with only silicon.

The researchers said that the

addition of perovskites onto existing silicon photovoltaics is the fastest way to enhance the performance of silicon. Perovskites satisfied all optoelectronic

requirements for a solar cell and could be manufactured with existing processes. These properties make perovskite perfect plug-and-play as it could be deposited as a layer onto a traditional silicon solar cell.

The research report stated that the elemental composition of perovskites materials is available within the existing supply chain that provides a way to scale up the technology quickly for meeting the ambitious solar energy targets required to tackle climate change.

In addition, the higher power output of perovskite on silicon tandem cells could reduce the carbon footprint embodied in the production of silicon required for solar cells.

The researchers aim to start mass commercial production of the new technology at its manufacturing facility in Brandenburg, Germany.

The lead author of the report Laura Miranda Perez said, “We identified perovskites as the perfect partner for a tandem system with silicon. We are

providing the potential of perovskite-on-silicon tandem technology through the continuous achievement of world-record efficiencies, with our current record at 29.52%.”

“We want to help people understand the potential of perovskite-on-silicon tandem technology to boost the efficiency of solar installations and

*The researchers
aim to
start mass
commercial
production
of the new
technology*

to help the world reach the goal of providing sustainable energy for all,” Perez added.

Oxford PV is a spinoff of Oxford University and a developer of thin-film perovskite solar cell technology. The company has raised \$133 Million in VC funding to date, according to Mercom Capital Group’s Solar Funding and M&A Report.

In January 2021, Oxford PV announced a new record efficiency of 29.52% for its perovskite silicon tandem solar cell. This record efficiency was certified by the National Renewable Energy Laboratory of the United States. To achieve higher efficiency, the researchers used the technology of coating a thin film of perovskite material on ordinary silicon solar cells to better use photons across the solar spectrum.

Earlier, it had achieved a 27.3% conversion efficiency for its 1 cm² perovskite-silicon tandem solar cell. The Fraunhofer Institute for Solar Energy Systems (ISE) had certified this finding. 



Kakatiya Energy Systems to Play Bigger Role in Smart City Projects: Interview

The company has developed patented sensing technology for the automation of outdoor lighting

Several state governments, municipal corporations, and gram panchayats across India have increasingly opted for energy-efficient outdoor lighting systems, including LED lamps and solar lanterns. As recently as May this year, the Himachal Pradesh Energy Development Agency (Himurja) invited bids to supply and install 20,000 solar street lighting systems in various villages, gram panchayats, and other agencies in the state.

In 2020, Energy Efficiency Services Ltd (EESL), a government entity under the administrative control of the Ministry of Power (MoP), floated a tender for the design, manufacture, testing, and supply of 1.9 million LED streetlights in Telangana gram panchayats and other states.

Hyderabad-based Kakatiya Energy Systems Private Limited (KES) has been at the forefront of developing

patented sensing technology for outdoor lighting automation. It specializes in manufacturing lighting controls using advanced and innovative patented technologies that offer energy conservation.

Kakatiya has introduced automatic sensor-based electrical switches that are immune to artificial lights under the brand Nature Switch. The company claims a savings of 55 million units of electricity globally with its Nature Switch systems.

Mercom spoke with P R Lakshmana Rao, CEO, Kakatiya Energy, to discuss the company's energy-efficient lighting products and plans for the future.

1. How is Kakatiya Energy addressing energy efficiency through lighting systems?

Through its brand Nature Switch, Kakatiya offers innovative control systems for lighting applications. Nature

Switch offers attention-free operation and automatically adapts to dynamic lighting conditions on the field using patented sensing technology. Nature Switch protects lighting systems from high and low voltages, significantly reducing energy and operation and maintenance (O&M) costs. So, our products not only save energy with automatic switching but promote energy efficiency with many more value-added features.

Our products offer attention-free operation and adapt automatically to the lighting conditions on the field. They come in IP 65 enclosures, offer protection from High-Low Voltages, and require no maintenance. As a result, we are improving efficiency, saving electricity, and reducing costs. We offer products to eliminate wastages in the use of lighting while meeting the planned objectives.

2. Are your products used mainly in outdoor/public lighting systems? Do you have products designed for use in homes/indoors?

While our products are used for outdoor lighting primarily, we also offer many solutions for indoor applications. Customers use our products Nature Switch - Wireless, Nature Switch - ATM, for controlling air conditioners apart from lighting, minimizing electricity consumption significantly daily.

We also offer the Nature Switch - IoT (Internet of Things) series, which offers real-time smart control and state-of-the-art data analytics for automation of lighting, air conditions, motors, or any other electrical item.

3. What kind of energy and cost savings can users of Kakatiya's products expect?

As per internationally published reports, automatic control systems are proven to save up to 20% of electricity. While this is the direct energy saving resulting from automation, there are other benefits, including a reduction in fuel, workforce, and administrative costs involving the O&M of the application. The indirect advantages concerning O&M activities are significantly higher.

Our users can expect a significant reduction in O&M costs. Our products offer an attractive payback period and help in saving electricity.

4. Can you talk about the patent your company has received for infrared light-sensing technology?

Nature Switch is designed to perform automatic switching ON-OFF functions as per ambient sunlight level. The precision of measuring sunlight level determines the switching times and, ultimately, the product's energy efficiency. We are proud to claim that our sensing technology can differentiate between natural sunlight and artificial light, giving it the unique ability to perform the most efficient switching while meeting human visibility requirements. Nature switch thus does not get affected by light from vehicles, buildings, or other artificial sources during its operation, thus providing ideal automation.



5. Does Kakatiya manufacture products other than lighting control systems?

Our RAKSHA HEADLAMP RELAY comes with a complete wiring harness suitable for any four-wheeler offering the needed protection and millions of switching cycles using solid-state technology for the first time in headlamp switching.

We designed NATURE SWITCH-ATM to control signages and air conditioners automatically in an ATM. The automation is enabled using advanced infrared sensing and microcontroller-based logic to control all varieties of air conditioners, which are switched ON/OFF based on the need for attention-free operation. It reduces manual costs, saves power bills, and pays for itself.

We also offer products for IoT applications in sectors like Elevator Control, Motor Control, Aircon Control, and Fire Detection. We have teams capable of designing systems based on GSM/GPRS/RF/LORA/LORAWAN/Wifi/Bluetooth communication technologies for IoT applications.

6. Which public utilities are using Kakatiya's products in India?

Our products control over 1 million streetlamps every day across multiple countries. Amongst Indian public utilities - Indian Railways, Kerala State Electricity Board (KSEB), Bruhat Bengaluru Mahanagara Palike (BBMP), Greater Hyderabad Municipal Corporation (GHMC), and Thane Municipal Corporation (TMC) widely use the Nature Switch series.

Smart, IoT-enabled Nature Switches

enable more than 150 municipalities across India with smart, online control & monitoring with real-time energy analytics. Some of the cities include Noida, Hyderabad, Surat, Gandhinagar, and Visakhapatnam.

7. How did you indigenously develop these products? Can you tell us about your growth story in brief?

Kakatiya Energy Systems, incorporated in 1999, is a specialist in manufacturing lighting controls using advanced technology to offer energy conservation and automation. Our approach involves developing products based on a zero-base concept and adopting new manufacturing methods, offering unique and new products to the customer.

We have a team of dedicated staff who have been associated with the company from its inception. The company's development and manufacturing teams regularly interact so that the design objectives are practical and are realized fully in manufacturing.

8. What are the company's plans for the next five years?

Being an Energy Service Company (ESCO), we wish to play an increasingly prominent role in offering project services to many upcoming Smart City projects. We intend to expand our footprint in international markets. We have also launched individual LED lamp dimming control popularly known in the lighting industry circles as ILM with remote connectivity. ☺

Cost to Build Large-Scale Solar Rises by 12% Year-Over-Year

The costs have soared due to the rise in component costs led by modules and other commodities, along with a shortage of some raw materials

By : Rahul Nair





According to Mercom's recently released Q2 2021 India Solar Market Update, the average cost of large-scale solar projects in the second quarter of 2021 (Q2 2021) was ₹38.6 million (-\$529,036)/MW.

The cost increased by 12% when compared to the same period last year when it was ₹34 million (-\$455,532)/MW and a 5% rise from the previous quarter (Q4 2020) when the cost was about ₹35.3 million (-\$488,255)/MW.

The costs have soared due to the rise in the component costs led by modules and other commodities, along with a shortage of some raw materials. The global steel prices surged in the first four months of 2021. But steel producers struggled to supply as the production was low due to a shortage of iron ore, the raw material used to produce steel.

Meanwhile, the average cost per MW for rooftop solar installations was around ₹39.6 million (-\$541,942)/MW, up 8% from the same period last year when costs stood at ₹36.5 million (-\$489,027). The average cost for setting up rooftop solar systems was ₹38 million (-\$524,445)/MW in the previous quarter, up roughly 4% quarter-over-quarter (QoQ).

Increasing solar module ASPs continued in Q2 2021, driven by expensive polysilicon and higher raw material prices. Freight charges have remained high since last year due to shipping container shortages and global logistical challenges.

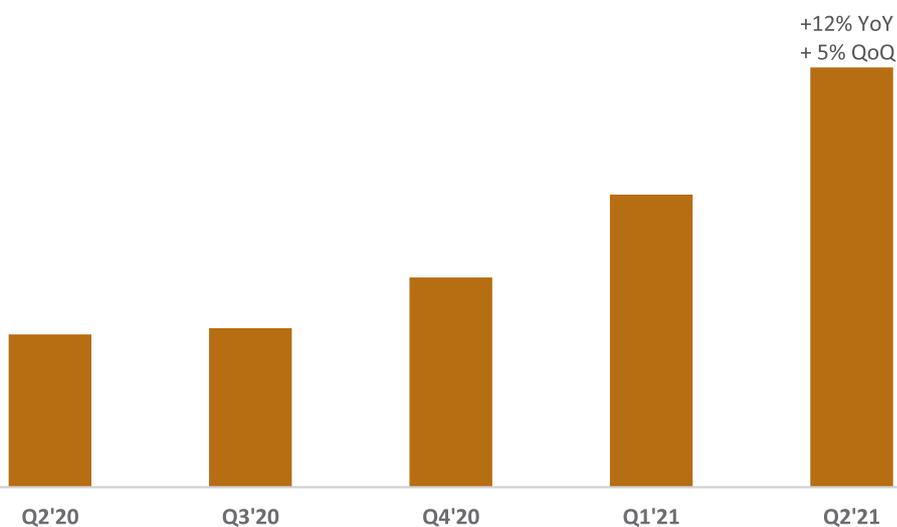
The container shortage issue has not yet been resolved, resulting in high freight charges, adversely impacting module prices. The module prices had surged due to the supply-demand gap, adding more financial burden on rooftop solar developers.

The rooftop solar sector has been seeing better financing opportunities with a reduction in the cost of debt, increased availability of equity, and the overall cost of financing going down. Q2 also saw many government tenders being issued, indicating a demand for rooftop solar in this segment.

However, bucking the trend, the bids have been trending down in the recent auctions, which is a cause for concern in the industry. ☹️

Q2 2021 Average Large-scale Solar Project Cost per MW

Large-scale project costs have increased by 12% YoY



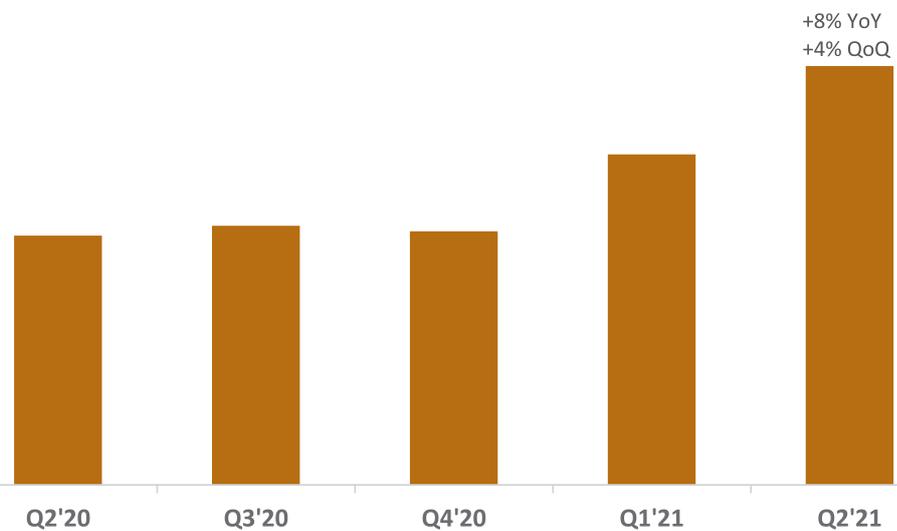
₹ Cr/MW

Source: Mercom India Research (Jun 2021)

Q2 also saw many government tenders being issued, indicating a demand for rooftop solar in this segment

Q2 2021 Average Rooftop Solar System Cost in India per MW

Rooftop system costs have increased by 8% YoY



₹ Cr/MW

Source: Mercom India Research (Jun 2021)

Solar Projects With ₹7.01/kWh Tariff Face Higher Curtailment in Tamil Nadu

POSOCO stated that only 5.26% curtailment was justifiable from a grid security standpoint

By: Staff



Power System Operation Corporation Limited (POSOCO) has submitted a report on renewable energy curtailment in Tamil Nadu following the Appellate Tribunal For Electricity's (APTEL) orders. The tribunal had ordered POSOCO to verify in detail the data presented by the stakeholders and submit the report.

Based on the report, APTEL had directed the Tamil Nadu State Load Despatch Center (TNSLDC) and Tamil Nadu Generation and Distribution Corporation (TANGEDCO) to compensate the solar developers for curtailment of power at 75% of the tariff listed in the power purchase agreement

(PPA) along with 9% interest.

The POSOCO had been directed to report whether the Tamil Nadu State Load Despatch Center had intentionally curtailed power or whether the curtailment was due to grid safety precautions.

POSOCO analyzed the data from March 1, 2017, to June 30, 2017, and observed that 16 out of 56 power generators, comprising approximately 68% of the total installed solar capacity in the state (totaling 1,052 MW), had submitted the data. Of the 16, only ten generators submitted complete data.

POSOCO deducted the actual generation from the irradiance-based estimated generation to arrive at the

proportion of curtailment. Since solar power was only available throughout the day, solar and non-solar periods were compared.

A curtailment comparison between solar and wind power projects was made for blocks with solar generation exceeding 10 MW and wind power generation exceeding 500 MW.

POSOCO confirmed that it completed the investigation, validated the data, and reached conclusions based on the facts available. Based on the extensive study, the following findings were reported by POSOCO:

- Of the 1,140 blocks (total curtailed blocks), 55 blocks (4.82%) had a frequency greater than 50.05 Hz.





Grid frequency within 49.90 Hz - 50.05 Hz is considered safe and does not call for security measures.

- In terms of grid frequency, only 5.26% (60 out of 1,140 blocks) curtailment was justified from a grid security standpoint.
- Most solar power generators with a tariff of ₹7.01 (-\$0.095)/kWh faced more curtailment in terms of instances and percentage generation compared to other solar power generators.
- Frequency was over 50.00 Hz in 427 blocks (37.45%) of 1,140 blocks. The state was under-drawing in 350 of the 427 blocks. In 60 of the 350 blocks, there was no margin for backing down thermal and hydro generation to absorb renewable energy.
- Wind and solar energy generation were not curtailed simultaneously (during the same day or month); however, wind and solar power were equitably curtailed to a large extent

over the four months. Equitable curtailment in this context means curtailment across the board without discriminating generators based on the tariff, source of generation, or any other factor.

***Per APTEL,
for the power
curtailed, solar
generators must
be paid 75% of
the tariff listed
in PPA with a
9% interest***

- In terms of generation (MW), from the solar generators' standpoint, 52% of time blocks where wind energy was curtailed were equitable. Meanwhile, from the wind generators' perspective, 48% of time blocks where solar energy was curtailed were equitable.

Comparing the curtailment of non-renewable facilities to renewable energy was considered inappropriate by POSOCO. It stated that there were difficulties in furnishing some data related to state-owned thermal stations and renewable energy solar forecasts due to the non-implementation of intra-state forecasting and scheduling regulations.

Hydropower potential in the state was found to be limited when compared to other states in India. Hydropower is used to bridging the variations of renewable energy in real-time grid operation daily and seasonally and found to be utilized prudently. 



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Industry News and Policy Briefs

SJVN Limited, a joint venture between the Government of India and the Government of Himachal Pradesh, registered a **net profit of ₹3.39 billion (-\$45.63 million)** in Q1 of FY 2021-22. The company's net profit increased 12.77% in Q1 from ₹3.01 billion (-\$40.52 million) in the June quarter of FY 2020-21.



Power Finance Corporation, a financial institution under the Ministry of Finance, issued its maiden **Euro Green Bond of £300 million (-\$353 million)** under the U.S. Global Medium Term Note Program. The bonds will have a tenor of seven years at a coupon of 1.841%.

The **Indian Renewable Energy Development Agency** announced that it would soon float **an initial public offering of fresh equity shares** and issue **green bonds** in domestic and international markets to mobilize capital for lending.

Indian solar module manufacturer **Waaree Energies** filed its **draft red herring prospectus** with the Securities and Exchange Board of India to raise funds via an IPO. The IPO includes a fresh issue of equity shares worth **₹13.5 billion (-\$182 million)** and an offer for sale component.

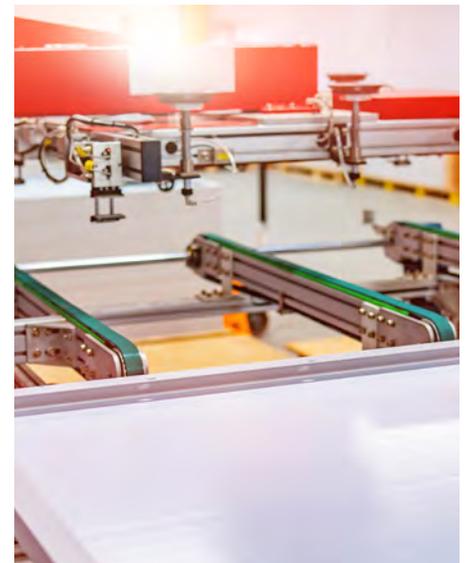


Virescent Renewable Energy Trust, a renewable energy infrastructure investment trust (InvIt) from KKR's **Virescent Infrastructure**, raised **₹4.6 billion (-\$62 million)** from foreign and domestic investors. Alberta Investment Management Corporation, a Canada-based institutional investment manager, led the funding round.

Adani Renewable Energy (MH), a wholly-owned subsidiary of **Adani Green Energy**, signed an agreement with **Essel Green Energy** to acquire its **40 MW operational solar project** in Odisha for ₹2.9 billion (-\$39 million).



India's **solar open access installations** totaled 209 MW in the **second quarter (Q2) of 2021**, a 664% year-over-year (YoY) increase compared to 27 MW in the same period last year, according to **Mercom's India Solar Open Access Market Report Q2 2021**.



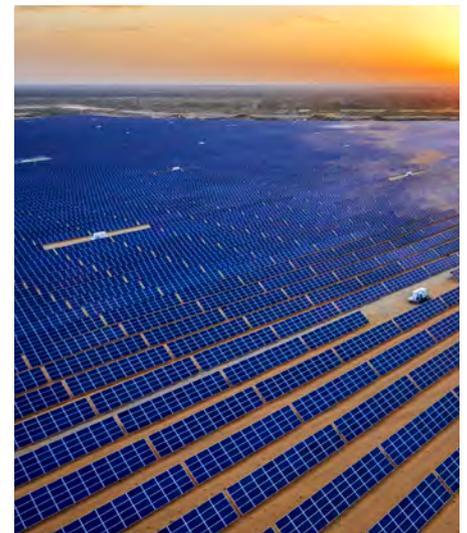
The **Adani Group** will invest **\$20 billion in renewable energy generation and component manufacturing** over the next ten years and produce the world's cheapest green electron, its Chairman Gautam Adani said.

Bharat Petroleum Corporation Limited plans to **convert around 7,000 conventional retail outlets into energy stations**

providing multiple fueling options like petrol, diesel, and flexi fuels, besides electric vehicle charging facility, compressed natural gas, and hydrogen.



Distribution companies (DISCOMs) owed ₹146.07 billion (~\$1.97 billion) to renewable energy generators (excluding disputed amounts) in overdue payment across 259 invoices at the end of August 2021, according to data released by the **Ministry of Power**.



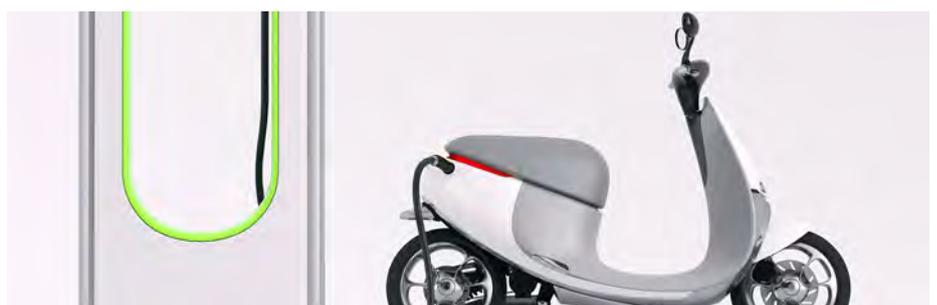
Kolkata-based cement manufacturer **Shree Cement** plans to develop 106 MW of **solar power projects** to meet the captive power needs of its cement manufacturing facilities at various locations.

Tamil Nadu's Power Minister V Senthil Balaji informed the legislative assembly that **Tamil Nadu Generation and Distribution Corporation** would develop a **4 GW solar park with battery energy storage systems** to meet the growing demand for power in the state.

REC Limited is seeking the approval of shareholders to raise **₹850 billion (~\$11.63 billion)** through the private placement of **bonds or debentures**. The company plans to raise funds in one or more tranches within a year from the date of passing the resolution.

Renewable energy company **Adani Green Energy** raised **\$750 million** by issuing its maiden **ListCo senior green bond**. The bonds will have a tenor of three years at a coupon of 4.375%.

Bangalore-based electric vehicle infrastructure startup **REVOS** received **\$4 million in Series A funding**. With this, the company has raised \$4.5 million in funding to date. The funding will be used to expand the company's peer-to-peer electric vehicle charging network and smart EV platform for electric two-wheelers and three-wheelers.



Policy Briefs

States



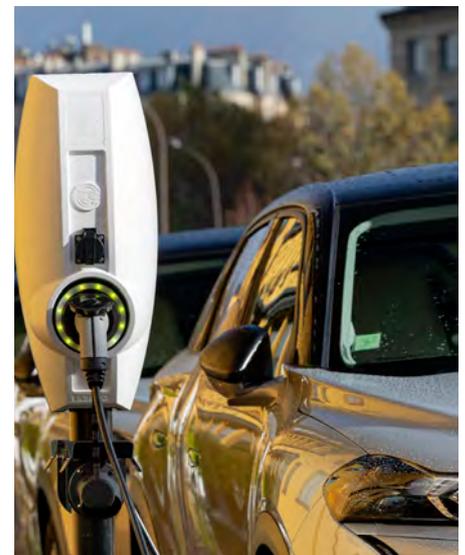
The **Punjab State Electricity Regulatory Commission** ruled that power generated from co-firing biomass will be considered renewable energy and eligible for meeting the **non-solar renewable purchase obligation (RPO)** of obligated entities.

The **Chhattisgarh State Electricity Regulatory Commission** issued a draft to determine the feed-in-tariff (FiT) for **decentralized solar projects** with 500 kW to 2MW capacity. These projects come under **Component-A** of the **Pradhan Mantri Kisan Urja Suraksha Evam Utthan Mahabhiyan (PM KUSUM) program**.



The **Chhattisgarh Electricity Regulatory Commission** issued guidelines to determine the **generic levelized tariffs** for small hydro projects and non-fossil fuel-based co-generation plants. The tariff is for projects that achieve commercial operation during the **FY 2021-22**. It also finalized the energy charges for existing biomass power projects.

Assam announced the electric vehicle policy. The **Electric Vehicle Policy of Assam, 2021** aims for **25% EV penetration** in all vehicle registrations by 2026.



Center

The **Union Government notified** the **Production Linked Incentive program for automobile and auto components** recently. The PLI program aims to encourage the industry to make fresh investments to make advanced auto products. Incentives under the program are open to existing auto companies and new non-auto investors. It has two components - Champion OEM Incentive Program and Component Champion Incentive Program.



Union Minister of Power R K Singh approved amendments to the **renewable energy certificate (REC) mechanism**. According to the new amendments, the REC will remain valid until sold. As per the earlier guidelines, the validity of RECs was 1,095 days.

The **Central Electricity Regulatory Commission** issued the draft **Deviation Settlement Mechanism and Related Matters Regulations, 2021**. The regulations seek to ensure, through a commercial mechanism, adherence to their schedule of drawal and injection of electricity into the grid, taking care of the security and stability of the grid.

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Major Tender and Auction Announcements in September

Here is a list of major tenders and auctions from September. A comprehensive list can be obtained by subscribing to Mercom's Tender and Auction Tracker and Alerts. Please contact info@mercomindia.com for more information.



Top Large-Scale Solar Tenders

The Uttar Pradesh New and Renewable Energy Development Agency has invited fresh bids to set up **200 MW** solar projects in the state's **solar park**. The **ceiling tariff** for the tender has been set as **₹3 (-\$0.041)/kWh**.

NHPC has invited bids for the engineering, procurement, and construction (**EPC**) of a **45 MW grid-connected** solar power project along with an associated **power evacuation** system in the **Jalaun** district of Uttar Pradesh.

Coal Lignite Urja Vikas, a joint venture company of Coal India and National Lignite Corporation, issued a tender to set up a **40 MW ground-mounted** grid-connected solar photovoltaic (PV) power project for South Eastern Coalfields at Bishrampur and Bhatgaon in **Surajpur** District, **Chhattisgarh**.

The Gujarat State Electricity Corporation Limited has invited bids for the design, engineering, erection,

construction, installation, and commissioning of **35 MW** of grid-connected solar project with **57 MWh** of battery energy storage system at its Kutch Lignite Thermal Power Station Pandhro site in **Kutch** district of **Gujarat**.

Bharat Heavy Electricals Limited (BHEL) has invited bids for the supply of balance of system (**BoS**), installation, testing, and commissioning of a **5 MW** (6.5 MW DC) grid-connected **ground-mounted** solar project at the Nalanda University in **Rajgir, Bihar**.

Autokast Limited, a Kerala government-owned foundry unit, has floated a tender to develop a **2 MW** grid-connected **ground-mounted** solar project at its factory in **Cherthala, Kerala**.

Hindustan Petroleum Corporation, a state-owned oil, and natural gas company has invited bids to develop a **1.3 MW ground-mounted** solar project at its Yediyur Receiving Station in the **Tumakuru** district of **Karnataka**.

Rooftop Solar Tenders

The Gulbarga Electricity Supply Company Limited has reissued the tender to **empanel** agencies to design, supply, install, and commission **10 MW** of grid-connected **rooftop solar** projects under **net metering** arrangement on **residential buildings** in seven districts of **Karnataka**.

The Punjab Energy Development Agency has invited bids to develop **5 MW** of grid-connected **rooftop solar** systems under the renewable energy service company (**RESCO**) model on **government buildings** at various locations in the state.

The Indian Synthetic Rubber Private Limited, a joint venture of the Indian Oil Corporation, Taiwan Synthetic Rubber, and Marubeni Corporation, has invited bids to install and commission **2,918 kW** of **rooftop solar** systems at its manufacturing facility in **Panipat, Haryana**.

Rajasthan Electronics and Instruments has issued a notice inviting tender for supply of **balance of systems** (except solar photovoltaic modules and string inverters), erection, testing, and commissioning of **2.5 MW** (2.64 MWdc) capacity grid-connected **rooftop solar** PV projects.

The Directorate of Purchase and Stores, **Department of Atomic Energy**, has invited bids to supply, install, commission, and maintain a **1.73 MW** grid-connected (without battery bank) **solar** project at the Indira Gandhi Center for Atomic Research facility in **Kalpakkam**.

Punjab Energy Development Agency has invited bids for the installation and commissioning of **243** grid-connected **rooftop solar** systems (**5 kW** capacity each) with an aggregate capacity of **1.215 MW** at various government schools and district institutes of education and training in the state.

The Assam Power Distribution Company Limited has invited bids for off-grid rural electrification through **71,199 standalone** solar systems on a **turnkey** basis under the Pradhan Mantri Sahaj Bijlee Har Ghar Yojana (**SAUBHAGYA**) program.

The **Uttar Pradesh** government has installed **rooftop solar** systems with **40 kW** capacity at **60** state Industrial Training Institutes (**ITI**).





Other Tenders

Coal India plans to associate with the **equity partner** to implement and operate the **4 GW vertically integrated** solar **manufacturing** project. Coal India is in the advanced stage of discussions with selected states in **India** for site identification and finalization.

NTPC has invited bids to develop **300 MW** of interstate transmission system (**ISTS**)-connected **wind** energy projects anywhere in **India**.

NTPC has invited bids for the operation and maintenance (**O&M**) of a **15 MW** solar power project at Jayant, Singrauli in **Madhya Pradesh**.

The Chennai Petroleum Corporation Limited, a wholly-owned subsidiary of Indian Oil Corporation, has invited bids for carrying out capital expenditure (**CAPEX**) and operating expenses (**OPEX**) estimation to set up a **10 MW solar** project at the **Cauvery basin** refinery in the Nagapattinam district of **Tamil Nadu**.

The Indian Renewable Energy Development Agency (**IREDA**) has issued tenders to appoint valuers to determine **fair market** and other values of **assets** under its loan portfolios in **Andhra Pradesh, Telangana, Tamil Nadu, and Karnataka**.

The Solar Energy Corporation of India (**SECI**) has issued an **expression of interest** for sourcing **land** to set up **solar** projects for the solarization of **agricultural feeders** in **Uttar Pradesh**.

The Gas Authority of India Limited (**GAIL**) has issued a notice to **empanel** solar engineering, procurement, and construction (**EPC**) contractors and operation and maintenance (**O&M**) service providers.

The Railway Energy Management Company Limited (**REMCL**), a joint venture of the Indian Railways and RITES Limited, has issued a notice inviting tender to **enroll** agencies or **consultants** to set up **solar** projects.

Indian Oil Corporation has invited bids to **empanel** vendors to develop solar projects at its locations and retail

outlets across **India**.

The Hindustan Petroleum Corporation, a state-owned oil and natural gas company has invited proposals from consultants for a detailed **feasibility** study to develop a solar project on vacant land available in **Gujarat**.

The Gujarat State Electricity Corporation has issued an e-tender inviting **consultancy** services to verify the designs and drawings of **25 solar** photovoltaic (**PV**) projects. The projects with capacities of **10 MW to 100 MW** are located near Gujarat Energy Transmission Corporation (**GETCO**) **wasteland** across **Gujarat**.

The Rajasthan Electronics and Instruments has invited bids to supply **200,000 monocrystalline** or **multicrystalline** silicon **solar cells** of wattage output **4.57 W**.

Rajasthan Electronics and Instruments has invited bids for contract **manufacturing** of **7,000** monocrystalline or mono passivated emitter and rear cell (**mono PERC**) solar **modules**. The modules should have a minimum output of **380 W**.

Rajasthan Electronics and Instruments has also invited tenders for two rate contracts. The first tender has invited bids to procure **2,000 mono** or **polycrystalline** solar photovoltaic (**PV**) **modules** qualifying for domestic content requirement (DCR). The second tender has invited bids to manufacture **1,000 polycrystalline** solar **PV modules**.

REC Power Development and Consultancy has floated two tenders to establish **transmission** systems for renewable power evacuation in the Rajgarh district of **Madhya Pradesh** and Gadag district of **Karnataka**.

The solar business division of **BHEL** has issued a tender to set up a temporary **office** at the **50 MW** Maharashtra State Power Generation Company (**MAHAGENO**) **solar** project site for six months at Osmanabad in **Maharashtra**.

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Auctions

ReNew Power, Green Infra Wind Energy (Sembcorp), Anupavan Renewables (EverGreen), Adani Renewable Energy, and Azure Power were declared winners in SECI's auction for 1,200 MW interstate transmission system (ISTS)-connected wind power projects (Tranche-XI) in the country.

IREDA's tender for 5 GW grid-connected solar projects (Tranche-III) under the central public sector

undertaking (CPSU) program (Phase-II) has received a strong response from the bidders. It has been oversubscribed by 1,960 MW.

IREDA's tender for setting up manufacturing capacities for vertically-integrated high-efficiency solar modules under the production-linked incentive (PLI) program received a strong response from the bidders.



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