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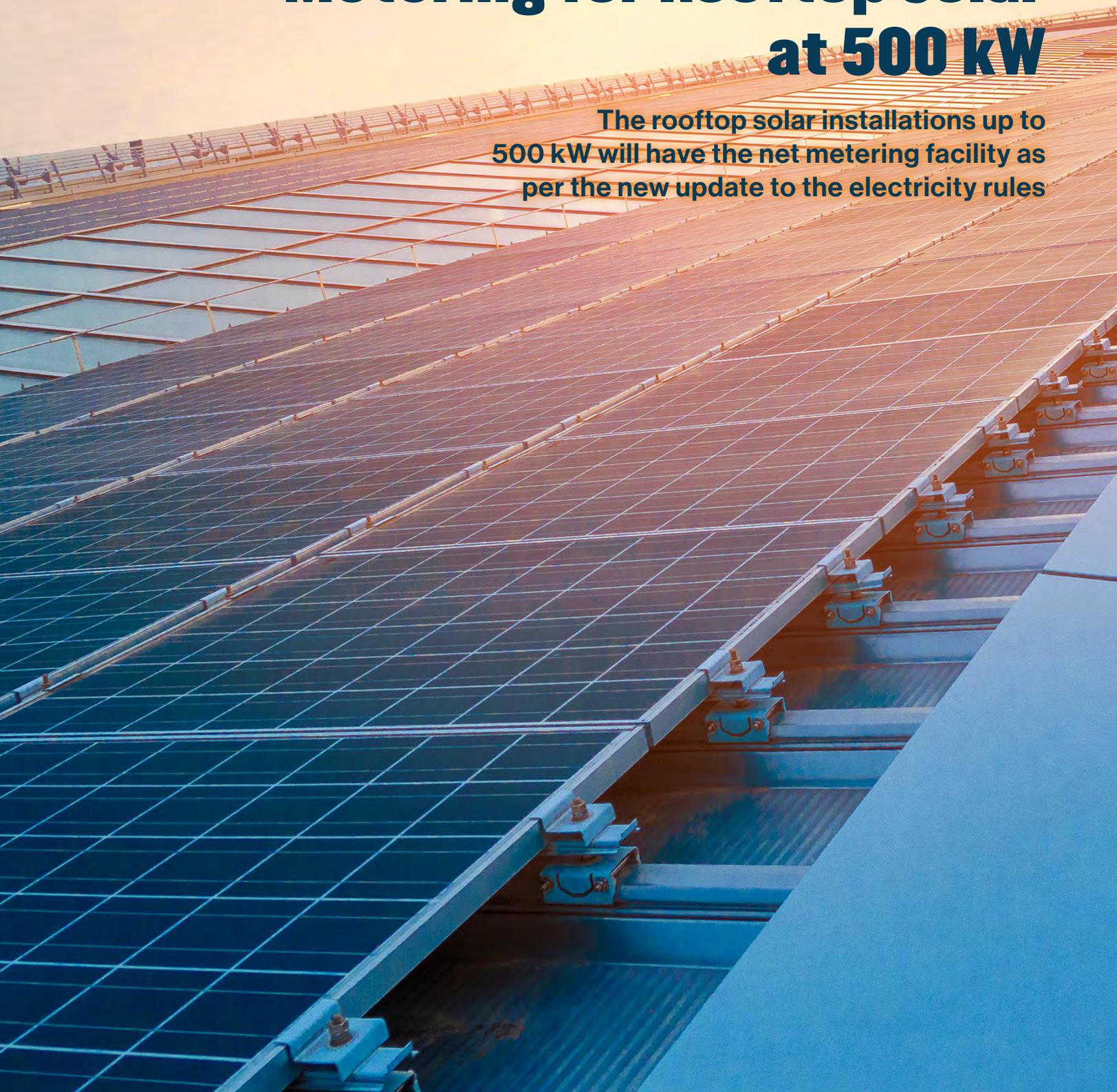
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Government Caps Net Metering for Rooftop Solar at 500 kW

The rooftop solar installations up to 500 kW will have the net metering facility as per the new update to the electricity rules



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

Foreword



The solar installations in the second quarter brought some good news to the industry that is facing challenges on so many fronts. With 4,578 MW of solar added in the 1H of 2021, India installed more solar in the first six months of the year compared to all of the calendar year 2020.

Solar installations were up 1,114% year-over-year compared to 205 MW added in Q2 2020. Solar capacity additions in India in Q2 2021 were the

highest in a quarter since Q2 of 2018.

Solar dominated the capacity additions in the first half accounting for close to 54% of the additions, followed by thermal power, which contributed close to 30%. The contribution of renewables (including large hydro) was close to 71%. Close to 1.1 GW of coal capacity was retired during 1H 2021.

Solar's share of new capacity additions was the highest ever in the first half of any year to date.

Considering the industry fared much better during the second wave of COVID-19, Mercom is increasing its forecast by 23% in the medium-case scenario to approximately 8-9 GW in CY 2021.

Even with a strong quarter, the industry continues to battle uncertainties around higher component costs and logistical issues. With duties and import restrictions, purchasing quality solar components at the best price will be the biggest challenge for the industry in the future as solar system costs ticked up for the fourth quarter in a row.

Solar module average selling prices have risen for an unprecedented five quarters in a row and could continue rising for another couple of quarters. Chinese polycrystalline modules were up 23% year-over-year. Freight charges have been climbing with no signs of recovery in the short term.

Although component costs continue to rise, low bids in auctions have fallen recently, with developers taking a win-at-all-costs approach due to a lack of new projects reaching auction fast enough for developers to sustain their operations.

Desperation is making 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 see bids go in the opposite direction and trend downwards. There is more 'hope' built into these bids than strategy.

A total of \$2.27 billion was invested in the solar sector in Q2 2021. The investments were up by almost 120% QoQ compared to Q1 2021. YoY, the investments increased by more than twenty times. Investments in Q2 were back to pre-pandemic levels helped by new manufacturing facilities announced in the quarter.

However, the ESG funds are not flowing to India at the needed rate. Unless policy risks are minimized, India will continue to lose billions in new investments waiting to be deployed globally.

Raj Prabhu
CEO
Mercom Capital Group

Editorial Team

Publisher

Mercom Communications India Pvt. Ltd.

Managing Editor

Priya Sanjay

Editorial Staff

Rahul Nair

Rakesh Ranjan Parashar

Utsav Sinha

Harsh Shukla

Editors – Research

Mohammed Salman

Shubham Bhattacharya

Editor – Data

R Govind

Sales & Marketing

Akshay Malgi

Design and Graphics Lead

Hariprasad M

Production

Sneha Printers

Mercom Communications India Pvt. Ltd.

#590, 1st main road, 3rd block, Dollars Colony,

RMV 2nd stage, Bengaluru-560094

t | 91.80.23560436 e | info@mercomindia.com

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RP - Sanjiv Goenka Group Company to Acquire Chandigarh DISCOM

The Sanjiv Goenka Group Company has placed the highest bid of ₹8.71 billion to acquire Chandigarh DISCOM

By : Harsh Shukla

Eminent Electricity Distribution Limited, a wholly-owned subsidiary of Calcutta Electricity Supply Corporation (CESC), has placed the highest bid of ₹8.71 billion (-\$117.32 million) to acquire a 100% stake in Chandigarh's power distribution company (DISCOM).

According to Mercom's sources, in the competitive bidding process, Torrent Power, NTPC Limited, and ReNew Power had placed bids of ₹6.06 billion (-\$81.61 million), ₹5.63 billion (-\$75.82 million), and ₹5.51 billion (-\$74.20 million), respectively. The Adani Group, Tata Power, and Sterlite Power had quoted ₹4.71 billion (-\$63.43 million), ₹4.26 billion (-\$57.37 million), and ₹2.01 billion (-\$27.07 million), respectively.

Privatization has not found favor among DISCOM employees

Incorporated in 1978, CESC is the flagship company of the RP-Sanjiv Goenka

Group. The company is into electricity generation and distribution. CESC is the sole distributor of electricity within an area of 567 sq km in Kolkata and Howrah and serves 2.9 million consumers in the domestic, industrial, and commercial categories.

This announcement comes after another successful DISCOM privatization deal closed in January this year when Tata Power took over the management of Western Electricity Supply Company of Odisha and Southern Electricity Supply Company of Odisha.

Background

In November 2020, the Chandigarh Administration had issued a request for proposal, inviting bidders to acquire its DISCOM, following the Ministry of Finance's proposal to privatize DISCOMs in the union territories of the country.

However, in December 2020, the High Court of Punjab and Haryana issued a stay order on the Union Government's proposal to privatize Chandigarh's DISCOM.

The UT Powermen Union Chandigarh had filed a petition in the High Court, calling the move 'unjust and illegal,' as the DISCOM has been running in profits and saw surplus revenue for the last three years. The High Court, in its order, had

ruled that the matter required further deliberation and that it would be brought up for hearing within six months after the court resumes its normal functioning.

In January 2021, the Supreme Court lifted the stay order passed by the High Court of Punjab and Haryana on the privatization of Chandigarh's DISCOM.

DISCOM privatization has not found favor among DISCOM employees and authorities in many union territories.

In March 2021, the Bombay High Court suspended the auction for a 51% equity stake in DISCOM for the Union Territory of Dadra and Nagar Haveli and Daman and Diu. The High Court suspended the auction after public interest litigation was filed against the privatization of the DISCOM. In July, the Supreme Court lifted the suspension order imposed by the Bombay High Court.

Mercom had previously written about why privatizing struggling DISCOMs could help them out of their financial troubles and push the Indian power sector forward. DISCOMs are at the root of all the problems in the Indian energy sector. Due to their financial ineptitude, attracting investments into the sector has become challenging. Unless steps like privatization of DISCOMs are put on the table, chances of a turnaround in the energy sector are minimal. 

4 Union Territories and Goa Miss RPO Targets for FY 2020-21

Except Chandigarh and Andaman & Nicobar Islands, all union territories and Goa failed to meet RPO targets

By : Harsh Shukla





The Joint Electricity Regulatory Commission (JERC) has reviewed renewable purchase obligation (RPO) targets for 2020-21 based on the submitted data from the regions of its jurisdiction. According to the Commission's analysis, except Chandigarh and Andaman & Nicobar Islands, all other union territories and Goa have failed to achieve their solar RPO targets.

The data was collected from the electricity departments of Puducherry, Lakshadweep, Goa, Chandigarh, Daman & Diu, Andaman & Nicobar Islands, and Dadra & Nagar Haveli. The Commission said it had received data on RPO compliance for the financial year (FY) 2020-21 from six union territories and their plans to meet their targets for FY 2021-22.

Goa

After examining the reports submitted by the electricity department of Goa, the Commission noted that while the state had achieved its non-solar RPO target for FY 2019-20, it had a 66.94 MU shortfall in achieving its solar RPO targets.

The state explained that it had established a long-term contract with Solar Energy Corporation of India (SECI) to supply 25 MW solar power and a medium-term agreement with NTPC Vidhyut Vyapar Nigam (NVVN) to supply 6 MW solar power. The state would fulfill short-term solar obligation through solar renewable energy certificates (RECs) and Green-Term Ahead Market.



The Commission also reviewed the action plan provided by the department. It concluded that if executed successfully, it would be able to meet its non-solar RPO target for FY 2021-22 by the end of the financial year. However, it would not be able to meet its solar RPO target, and there would be a shortfall of

32.6 MU.

The Commission directed the state to achieve full compliance for solar and non-solar RPO in FY 2021-22. However, due to the Covid-19 crisis and nationwide lockdown, the commissioning of these projects has been delayed.

Renewable Power Purchase Obligation Status for the State of Goa and Union Territories as of FY 2020-21

Region	RPO Obligation	Power Sale Data for FY 2020-21 in MUs (Actual Sales)*	RPO Target to be Met for FY 2020-21		Cumulative RPO Target for FY 2020-21 Including Backlog (Until End of March 2021)					RPO Excess/Shortfall
			(%)	MUs	MUs	Generation	REC	Power Purchase	Total	
Goa, Electricity Department	Solar	3575.65	6.1	218.11	218.11	12.65	0	138.53	151.18	66.94
Puducherry, Electricity Department	Solar	2806.29	6.1	171.18	483.68	11.53	0	0	11.53	472.15
Daman & Diu, Electricity Department	Solar	2084.46	6.1	127.15	311.85	28.66	0	7.98	36.64	275.21
Dadra & Nagar Haveli and Daman & Diu, DNHPDCL	Solar	5142.88	6.1	313.72	577.44	19.95	0	28.73	54.9	522.54
Chandigarh, Electricity Department	Solar	278.96	6.1	17.02	17.02	0	0	50.72	50.72	33.7
Andaman and Nicobar Islands, Electricity Department	Solar	232.54	6.1	14.18	17.78	0.02	0	21.005	21.025	3.25
Lakshadweep, Electricity Department	Solar	50.86	6	3.1	4.9	0.45	0	0	0.45	4.45

*Note- Power sale for FY 2020-21 in MUs include solar and non-solar obligation.

Source: JERC

Mercom India Research

Puducherry

The Commission noted that the union territory had not met its solar and non-solar RPO targets for FY 2020-21 and had a backlog of 472.15 MU and 561.37 MU, respectively.

The Puducherry Electricity Department submitted that it had signed power purchase agreements (PPAs) with SECI and NTPC for 490 MW. Of which, 250 MW is for solar RPO compliance and 240 MW against its non-solar RPO target. The department claimed that once all power projects would be operational, they would be able to generate around 1,000 MU per year that could help clear the total backlog of its solar and non-solar RPO.

After examining the action plan submitted by the electricity department, the Commission directed it to expedite the process of purchasing actual power available. The Commission noted that the department would have a considerable amount of backlog despite achieving its target mentioned in the action plan.

The Commission also emphasized

that the backlog is huge because the department has been defaulting on compliance in the past. The Commission warned that it would take appropriate legal action for non-compliance if this continues.

Daman & Diu

The data submitted by the electricity department of Daman & Diu showed that it had not met its solar and non-solar RPO target for FY 2020-21. Only 36.64 MU of its 311.85 MU solar RPO targets and 192.88 MU of its 436.93 MU non-solar RPO targets were met.

The electricity department of Daman & Diu explained that RECs were not available since July 2020. As a result, the union territory was able to purchase only 192.88 MU of RECs for non-solar RPO compliance.

The Commission stressed that the union territory has a huge backlog at the end of FY 2020-21. It also directed the department to procure physical renewable energy power in every quarter of 2021-22 to reduce the cumulative shortfall in FY 2021-22.

The Commission believed that even if

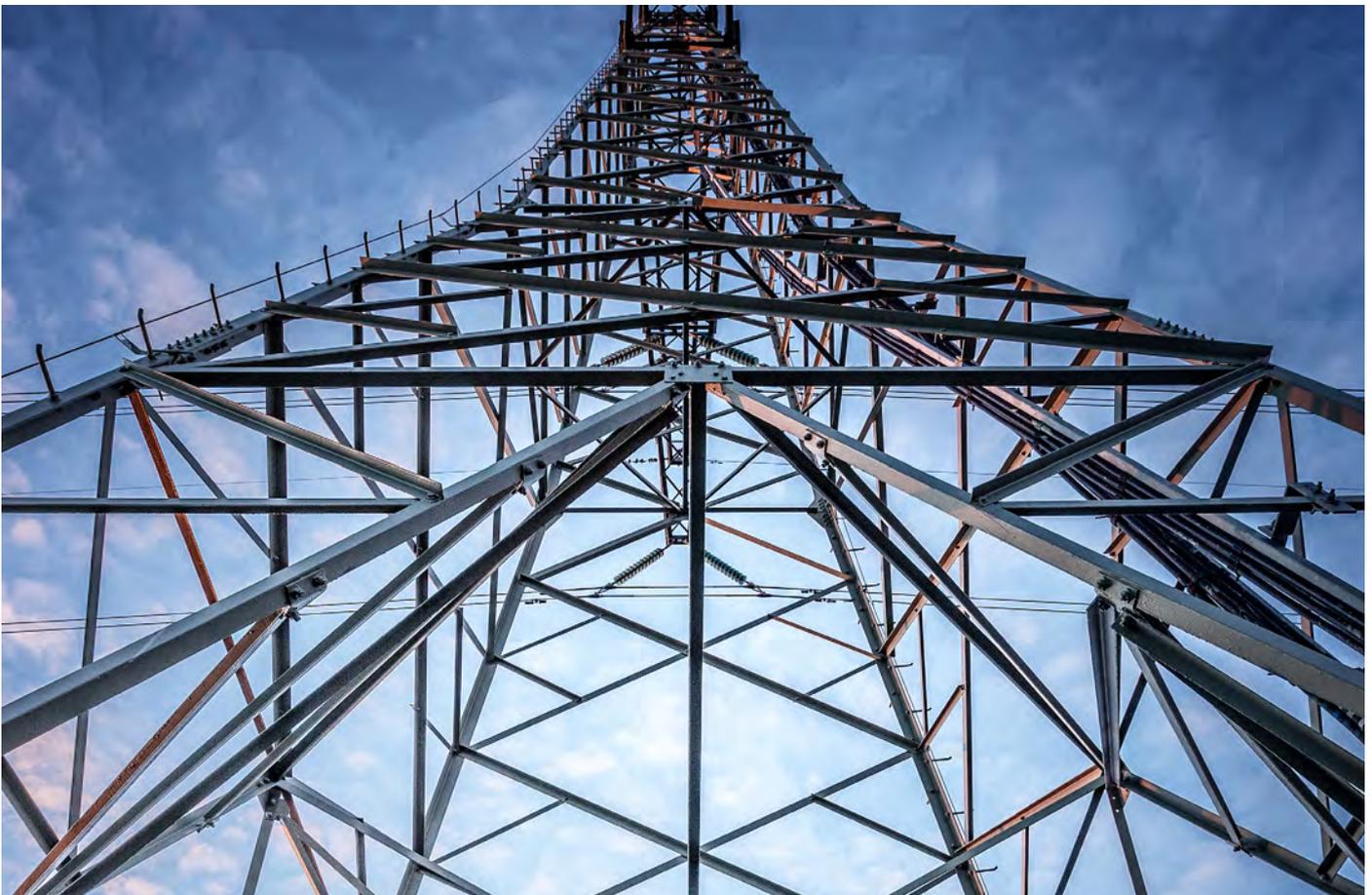
the union territory successfully executed its action plan, it would still have an RPO backlog of 444.02 MU. It directed the electricity department to ensure total compliance of RPO target for FY 2021-22, including backlogs.

Dadra & Nagar Haveli

Dadra and Nagar Haveli Power Distribution Corporation Limited

Chandigarh overachieved its solar RPO target by 33.70 MU for FY 2020-21

submitted that there is a 1,319.3 MU shortfall in RPO for FY 2020-21, including backlogs. The solar RPO target was 577.44 MU, but only 54.90 MU was met. Likewise, only 26.28 MU of its 823.04 MU of non-solar RPO target was





fulfilled.

The power distribution corporation said that the shortfall in RPO compliance was due to the unavailability of RECs since July 2020. The corporation informed that it had signed a PPA for 50 MW solar capacity with SECI, but the installation was delayed due to land acquisition issues. It also mentioned that they are trying to purchase power from Indian Energy Exchange and ready to sign short-term PPAs with generators supplying solar and non-solar energy.

The Commission reviewed the union territory's action plan for FY 2021-22 and believed that it could comply with its RPO targets if the action plan is successfully executed.

Chandigarh

After examining the Chandigarh Electricity Department's report, the Commission noted that the union territory had overachieved its solar RPO target by 33.70 MU for FY 2020-21. However, there was zero compliance for the non-solar RPO target, due to which solar RPO fulfilled the entire non-solar target of 24.02 MU.

The electricity department said the non-solar compliance had been zero for this year due to the unavailability of RECs since last year. It also informed

that it had signed a PPA with Adani through SECI for non-solar power generation, which has started in May 2021.

The Commission reviewed the action plan submitted by the department and concluded that if executed successfully, the union territory would be able to achieve its entire target for FY 2021-22.

Andaman & Nicobar Islands

The Commission noted that Andaman & Nicobar Islands had also overachieved its solar RPO targets by 3.24 MU, but there was a non-solar RPO target shortfall of 19.59 MU.

After examining the action plan submitted by the electricity department, the Commission opined that the department would not be able to achieve its RPO target for FY 2021-22. It has also directed the department to increase its efforts to achieve its solar and non-solar RPO targets for FY 2021-22.

Lakshadweep

The Lakshadweep electricity department's report showed that it could not achieve its solar and non-solar RPO targets for FY 2020-21 and has a cumulative shortfall of 16.72 MU.

The electricity department informed

Unavailability of RECs is one reason for RPO non-compliance

that it had signed PPAs with SECI for solar energy. However, the installation of solar projects has not been completed due to the nationwide lockdown because of Covid-19 related limitations.

The Commission expressed its displeasure due to the underachievement of RPO targets and directed the department to submit its action plan within a week from the issue of this order.

In its review of RPO targets for FY 2019-20, JERC had pointed out that only Chandigarh had overachieved its RPO target by 2.66 MU.

India's target to achieve 175 GW of renewable energy by 2022 would be simply unattainable without the RPO mechanism, which has single-handedly driven the growth of solar and other renewables since its introduction in 2010. But it hasn't been enough. Enforcing RPO compliance becomes more critical as the government shifts focus to solar manufacturing. 



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IYER NARAYANAN
M: +91 99673 53437

E: iyer.narayanan@informa.com

CONTACT US

JULIAN THOMAS
M: +91 99404 59444

E: julian.thomas@informa.com

AMITAVA SARKAR
M: +91 93792 29397

E: amitava.sarkar@informa.com

FOR SPEAKING OPPORTUNITY: AMIT SHARMA | M: +91 99109 55222 | E: amit.sharma@informa.com

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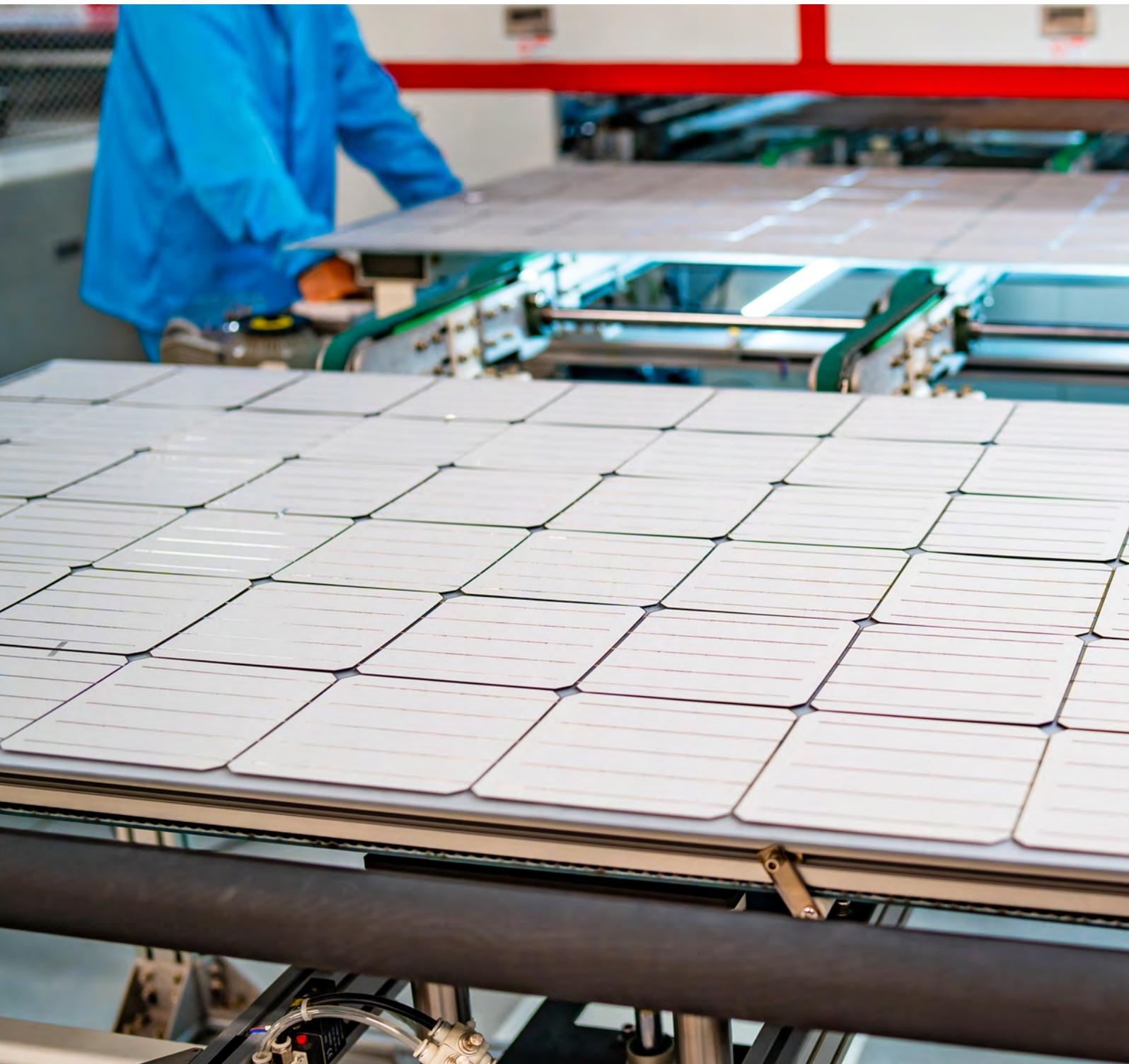
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Cost of Solar Projects to Rise as ALMM Takes Effect

With no foreign solar module manufacturers on the ALMM list, developers are forced to procure expensive domestic modules

By : Harsh Shukla



Solar developers are finding it challenging to execute solar projects with a tariff lower than ₹2.50 (-\$0.034)/kWh with the Approved List of Models and Manufacturers (ALMM) restrictions.

According to the developers, the prices of domestic modules - procured from manufacturers enlisted in ALMM - are 20% higher than Chinese modules, which has increased the overall cost of solar projects.

In October 2018, the Ministry of New and Renewable Energy (MNRE) introduced a rule requiring solar cell and module manufacturers to register under ALMM to supply to the projects tendered by the government agencies.

On March 10, 2021, the ministry released the first list of module manufacturers registered under ALMM. For tenders issued after April 10, 2021, it was mandated that bidders must procure modules only from the list of module manufacturers enlisted under ALMM.

Currently, there are no foreign solar manufacturers on the ALMM list. Many foreign manufacturers have paid the inspection fee, but the government inspection teams have not made any factory visits abroad due to the Covid-19 pandemic.

Since then, developers have been expressing concerns about the supply, quality, and impact on the cost of the projects.

Majority of the bids are over ₹2.50 (-\$0.034)/kWh

In auctions of solar projects since ALMM has been applicable, the majority of the bidders (more than 70%) have quoted tariffs over the ₹2.50 (-\$0.034)/kWh threshold. Only a few winning bidders with access to either foreign funds or low-cost debt have quoted aggressively.

In the recently concluded Maharashtra State Electricity Distribution Company Limited's 500 MW solar auction, only three bidders quoted tariffs below ₹2.50 (-\$0.034)/kWh. ACME Solar Holdings and ReNew Solar Power won 300 MW quoting ₹2.42 (-\$0.032)/kWh and 200 MW quoting ₹2.43 (-\$0.033)/kWh, respectively. In contrast, eight bidders quoted between ₹2.51 (0.0337)/kWh and ₹2.95 (-\$0.0396)/kWh.

***Currently,
there are no
foreign solar
manufacturers
on the ALMM
list***

Similarly, only three bidders out of 13 quoted the tariff below ₹2.50 (-\$0.034)/kWh in the Rewa Ultra Mega Solar Limited's (RUMSL) 550 MW solar auction. Of this, 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. While ten bidders quoted a price over ₹2.50 (-\$0.034)/kWh, and the highest bid was ₹3.64 (-\$0.049)/kWh.

In RUMSL's auction for 450 MW of solar projects at the Shajapur Solar Park in Madhya Pradesh, NTPC Renewables 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. While Talettutayi Solar Projects Nine (SolarArise) won a capacity of 125 MW quoting ₹2.339 (-\$0.0314)/kWh. In this auction, only four bidders quoted a tariff below ₹2.50 (-\$0.034)/kWh, while nine bidders quoted a price over ₹2.50 (-\$0.034)/kWh. The highest bid was ₹3.45 (-\$0.046)/kWh.

Domestic modules are comparatively expensive

A senior executive of a Pune-based solar energy company said that solar projects at such low tariffs seem to be financially unviable. Due to the ALMM order, developers are forced to procure modules from the domestic market that are around 25% more expensive compared to imports, increasing the overall cost of solar projects. "We also don't know if international companies would be enlisted or not under ALMM, and even if these companies are enlisted, the basic customs duty (BCD) of 40% would be enforced on these imported modules from April 2022."

"In recent auctions, state-owned companies like NTPC and SJVN and a few private developers bid aggressively

Majority of the Bids are Over ₹2.50 (~\$0.034)/kWh in the Auctions after the Announcement of ALMM

Tender Details	Capacity (MW)	Lowest Tariff Quoted by Winning Bidders		Total Bids (Nos.)	Bidders who quoted less than ₹2.50/kWh (Nos.)	Bidders who quoted more than ₹2.50/kWh (Nos.)	Bidders who quoted more than ₹2.50/kWh of the total Bids (%)
		(₹/kWh)	(~\$/kWh)				
MSEDCL Phase VI Solar	500	2.42	0.033	11	3	8	73%
RUMSL, Agar Solar Park	550	2.444	0.033	13	3	10	77%
RUMSL, Shajapur Solar Park	450	2.33	0.031	13	4	9	69%

Note: \$1 = ₹74.32

Source: Mercom India Research



because they have lower return expectations compared to the majority of the private developers,” he added.

According to Mercom’s Q1 2021 India Solar Market Update, the cost of domestic solar modules was 15-20% higher than modules procured from China in Q1 2021.

Echoing similar thoughts, a deputy general manager of a Bangalore-based solar energy company said that the costs of solar energy tariffs and projects would increase because of ALMM. For solar developers, it is financially unviable to execute projects at such a low tariff, as seen in the recent bids. The impact of ALMM would depend on the supply and demand of solar modules as domestic manufacturers do not have enough module manufacturing capacity currently.

However, Ajay Kumar, Senior Engineer at SJVN Limited, believes that solar projects are viable at a tariff below ₹2.50 (-\$0.034)/kWh despite ALMM. “The company’s funding and credit rating play an important role in solar projects as companies like SJVN can arrange debt at 6-6.5% interest rates from the market. This can improve

the financial viability of solar projects. To reduce the cost of projects despite an increase in module costs, solar developers are using modules with increased capacity that reduce land

Cost of domestic solar modules was 15-20% higher than those imported from China in Q1 2021

requirements, artificial intelligence, high-quality tracker, among others.”

“Solar developers can also optimize operation and maintenance (O&M) costs through short-term contracts and engaging smaller companies for O&M services,” he added.

Commenting on the auction results, another executive at a foreign

investment-backed renewable energy platform said several solar developers quoted tariffs around ₹2.50 (-\$0.034)/kWh, which suggests that solar projects are financially feasible at a similar tariff. “We secured solar capacity with a tariff below ₹2.50 (-\$0.034)/kWh. However, we do not like to reveal the reason behind quoting that tariff as a part of our business strategy.”

Signing power sale agreements has been a formidable task for implementing agencies like the Solar Energy Corporation of India and other state agencies. Higher tariffs have mostly been the reason for cancellations of auctions and power purchase agreements in the past. Now with the ALMM restrictions, tariffs are bound to go up in the short term unless bids are won by a state-owned company or a prominent developer with access to cheaper foreign debt. For all others, it is becoming increasingly challenging to win large-scale solar auctions.

If the intention was to close the procurement window between the safeguard duty expiration and the BCD start date, the goal has been achieved at a cost. ☺



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Premier Energies Increases Module Manufacturing Capacity by 750 MW: Interview

Mercom spoke with Chiranjeep Saluja, Managing Director of Premier Energies, to discuss the company's plans and his thoughts on the existing policies related to the solar sector

Domestic solar module manufacturers are slowly ramping up capacities to supply India's solar project pipeline of over 53 GW and another 24.1 GW of projects tendered and pending auctions as of Q1 2021.

Solar module manufacturer Premier

Energies has recently announced a solar photovoltaic (PV) module manufacturing facility at E-city, Hyderabad, to increase its module production capacity.

1. What is the new manufacturing capacity that Premier Energies has added, and what is the total capacity

now?

Our manufacturing facility in Hyderabad has 750 MW each of solar modules and solar cells manufacturing capacity. With this, the company has a cumulative module manufacturing capacity of 1.25 GW and 750 MW of solar cell manufacturing capacity. The



company also plans to increase its capacity by 2 GW over the next two years.

2. How much capital was invested in this manufacturing facility?

The new capacity has been built with an investment of ₹4.83 billion (-\$65.14 million). With this new facility, Premier Energies will likely be amongst the country's top five solar module manufacturers.

3. Is the new manufacturing capacity fully operational?

Yes, the new manufacturing facility is fully operational. The facility can manufacture the latest metal catalyst chemical etching textured multi-crystalline cells, mono passivated emitter, and rear cells (PERC), while the module making facility can produce the latest multi busbar half-cut and bifacial modules.

4. What is the technology used in the new manufacturing capacity?

The new facility has a fully automated solar cell manufacturing line with mono PERC and multi-crystalline cell technologies. The line can handle wafer sizes from 156 mm to 210 mm. The module manufacturing line produces half-cut and bifacial modules.

The facility has quality control systems like total quality control and

The Telangana facility produces half-cut and bifacial modules

statistical process control, and the facility is certified with ISO 9001/ ISO 14001.

5. What was the driving factor behind this manufacturing capacity expansion?

Working towards a greener decade while contributing to India's power sector is the motivating force behind Premier Energies. Solar energy has proven to be a viable alternative to traditional energy and a viable solution to India's power crisis, particularly in villages, over the last few decades. Solar energy has a crucial function in irrigation and harvesting in an agricultural economy like India.

By increasing our capacity with this new facility, we will be able to contribute to India's growth story. Also, this launch will increase the availability of the highest quality of 'Made in India' solar cells aligned to the government's Atmanirbhar Bharat initiatives.

6. What was the reason behind building the facility in Telangana?

Telangana government was proactive in giving us the right incentives to set up the facility and provide quality water

and power, which are critical for solar cell manufacturing. That said, Premier Energies has a 500 MW operational manufacturing facility in Hyderabad that helps provide access to a trained and qualified workforce, which is critical for a new facility.

7. Are you expecting all the demand to come from domestic markets, or are you also planning to expand export activity?

Currently, the domestic demand is quite good due to the domestic content requirement market and impending customs duty on imported modules and cells. However, we would like to have a sales spread and plan to export to North America and European markets. This would also drive us to increase productivity and compete with international players.

8. Do you plan to vertically integrate into cells and wafers?

Currently, the facility is integrated for manufacturing both cells and modules. We are evaluating the manufacturing of wafers, which requires the right incentives to make its production in India viable. 🌞

Setting Tariff Based on Energy Usage Pattern

A study by a team of researchers suggests how using smart meters would help record data on the amount of energy a consumer has used at a given period based on which tariffs can be set

By : Arjun Joshi

Researchers from Texas A&M University have suggested a tariff plan for utilities based on energy consumption that replicates the toll calculation method on toll roads.

The model recommended by the researchers suggests charging customers a grid access fee based on the impact

they have on their local distribution network instead of simply calculating the tariff based on their kilowatt-hour consumption.

The research has been published in the journal *Utilities Policy*. The study received support from the Power Systems Engineering Research Center and the National Science Foundation.

Dr. Le Xie, professor at the institute's Department of Electrical and Computer Engineering and Assistant Director - Energy Digitization, Energy Institute, and his team of co-authors of the paper noted that the fees associated with the roadways are higher during peak traffic hours.

Under this framework, while vehicles



not adding to the heavy traffic load are not required to pay higher toll fees, those using the busy thoroughfares during congested hours pay a premium to use the faster highways.

Drawing on this example, Dr. Xie explained that the costs of delivering power could vary from customer to customer, and their impact on the power grid could also vary.

The study suggests how using smart meters would help record the amount of energy a consumer has used at a given period.

Dr. Xie pointed out that while peak load hours put more strain on the grid, there could be individuals within that duration who use more electricity while others conserve it.

The tariff plan proposed by

The tariff plan proposed is likely to benefit consumers who use solar power to ease the strain on the grid

the researchers is likely to benefit consumers who use less power or utilize solar power to ease the strain on the distribution power grid. However, those drawing excess power from the electrical grid during peak times would have to bear the additional delivery cost, the experts insisted.

The team's data-driven approach aims to overhaul the power tariff structure for the utility sector.

The team stressed that adopting this mechanism would provide the utilities a refined, near-real-time understanding of the consumption pattern of customers.

"If a particular customer is sending some of their solar panel energy back to the grid during the peak hours, they should be viewed as a positive asset to the grid, and that individual should be

somehow compensated," feels Dr. Xie. According to the expert, consumers adding to the grid strain should pay a higher portion of the delivery cost.

Some 200 residential clusters, including 50 homes with electric vehicles (EVs), 50 homes with solar photovoltaic (PV) systems, and 100 homes without distributed energy resources (EV, solar, or battery storage device), were studied.

Over 90% of EV customers saw reduced bills under the proposed tariff model, considering customers charge their EVs during the night - which is an off-peak hour with low grid impact. The study suggested that combining solar PV with battery storage under a smart scheduling algorithm for charging and discharging would slash power bills for PV customers. Over 80% of non-distributed energy resources customers experienced a small reduction in their bills under the proposed model.

Dr. Xie insisted that implementing the concept into real-time use would pave the way for a more sustainable grid operation. 



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Will Duty-Free Window Benefit Solar Developers?

The duty-free period until the basic customs duty comes into effect is crucial for developers to procure solar modules, but it is not that simple

By : Rahul Nair



Solar developers in India are facing two important dates – the safeguard duty (15%) set to end on July 29, 2021, and the basic customs duty (BCD) of 40% on solar modules and 25% on solar cells that starts from April 1, 2022.

There is a duty-free period in between, which is crucial for developers to procure solar modules. But it is not turning out to be that simple.

Mercom spoke with solar developers and manufacturers to understand how the post and pre-BCD implementation period will impact their businesses.

Will developers ramp up procurement before the BCD kicks in?

Many from the industry noted that there is no encouragement for developers to buy cells and modules at this point, especially from the BCD perspective.

Gajanan Joshi, who heads project development in Asia for the German company WattKraft Solar GmbH, which develops solar projects in Europe, Africa, and Asia, said, “Developers would have imported cells and modules before BCD kicked in, provided there was a decreasing price trend. But the prices are going up, and my interactions with Chinese manufacturers indicate

they are certain about prices going up but not sure how much. Even if the price goes down, it would be negligible. As far as Indian developers are concerned, buying cells and modules now could be counterproductive.”

According to Joshi, even if the prices drop, shipping would take significant time. Besides, the Chinese will sign contracts with the Indian developers only if the terms of the agreement are favorable to them.

A few others, however, added that developers would try to make the most of the duty-free window as projects before the BCD announcement would qualify for the ‘Change in Law.’

Vice President of Fortum Solar Manoj Gupta said, “Most developers will plan to procure modules before BCD kicks in as it is less likely that the bids finalized before the BCD notification will qualify under ‘Change in Law.’ The government has deliberately given a six-month window to procure the modules without BCD or safeguard duty.”

While several developers were hoping to benefit from the duty-free window,

certain market trends have allegedly upset the plans.

BCD compensation under the ‘Change in Law’ clause

Commenting on the matter, P. Vinay Kumar, Founder, and CEO of Varp Power, opined, “Many have timed their orders to fall in this window. Two developments, however, have upended this expectation. The first has been the steep rise in the price of modules, which has neutralized most of the benefits that would have otherwise accrued from a mere lack of safeguard duty. Another main reason is that all older projects (before the BCD notification) benefit from the ‘Change in Law’ clause. If they pay BCD, then they would be compensated for the same. Given the price hike, they seem to prefer to wait rather than ship modules in this window because they are already compensated for BCD hikes.”

Kumar further added that projects tendered after the MNRE BCD announcement date had assumed this higher BCD rate in their tariffs.

There is a 9-month duty-free period between August 2021 and April 2022



In a webinar held by Mercom in April this year, stakeholders speculated that the BCD's impact would be somewhere around ₹0.45(-\$0.00)/kWh, and the tariffs will be in the range of ₹2.50 (-\$0.033)/kWh-₹2.60 (-\$0.034)/kWh. Since the prices of modules have gone up, the tariffs were expected to increase.

Digging deeper into the ambiguities surrounding the duty-free period, he said, "If they avail the duty benefits of this window, then there is a possibility that the regulator can direct compensation to DISCOMs, as their tariffs are presumably included in the BCD payment. Also, the launch of an anti-dumping investigation could result in a negation of this window. There is also another possibility. The Director-General of Trade Remedies may resort to a provisional extension of safeguard duty. Given this uncertainty, the duty-free window is more of an illusion than a reality."

The stakeholders were not optimistic about a safeguard duty extension when Mercom spoke to them in May.

According to Kumar, the rooftop solar and open access markets would gain from this duty-free period - as these do not operate under the purview of 'Change of Law.' But the benefits would be marginal because of the prevailing high price levels currently.

Similar sentiments were shared by Gagan Vermani, CEO and Founder of MYSUN. Vermani told Mercom that almost every developer with an existing pipeline of solar projects due for completion in the first two quarters of the calendar year 2022 is worried about two factors.

BCD will affect 60% of the project cost, effectively escalating the project cost by 25-30%

"One, avoiding the huge BCD effective from April 1, 2022, and second, battling the availability and significant price rise issues in the module supply chain. They are also trying to convince the new clients to bring forth their plans to go solar. With BCD coming in, the cost of solar is expected to go spike, especially since the domestic manufacturers are not expected to drop their prices as they

benchmark their rates with the market prices governed by global players."

Concerns about rising prices

Several industry experts noted that this is the first time they are witnessing increasing module price trends in a decade.

According to Kumar from Varp Power, the manufacturers have already increased rates. "Module prices (for mono-PERC) are currently ruling in the \$0.25 - \$0.27/W range, which is a 30-40% increase in six months. Coupled with the higher freight charges, the costs have gone through the roof. The higher commodity prices in cement, steel, and copper have also increased the cost of the Balance of System (BoS) items," he added.

Gupta from Fortum stated, "This is the area of concern and will remain so until the time we have enough manufacturing capacity of silicon, wafer, ingot, cell, and modules."

Vermani from MYSUN told Mercom that the Chinese manufacturers have significantly dominated the Indian solar market.

"However, there is a lot of materials that are bought domestically too. And it is not just the solar modules, but the structures, cables, and the cost of almost all parts of material going into a solar



project have gone up. There is a genuine increase in commodity prices, putting the viability of the existing pipeline of projects under stress. So, the timing of the BCD implementation could not be worse,” he added.

Domestic solar manufacturers have already urged the government to introduce an interim duty before BCD kicks in. Without such a protectionist measure, the industry will find it hard to thrive, believe many.

According to Bharat Bhut - Co-founder & Director, Goldi Solar, “The local manufacturers can focus on projects mandating domestic content requirement (DCR). They may also have to work on a no-profit, no-loss basis until then. Meanwhile, countries exporting to will certainly get a chance to sell at lower rates with the absence of an interim duty before BCD.”

Implications of the BCD provision on future projects

Kumar told Mercom that the MNRE has advised that future government projects should quote tariffs keeping the higher BCD in mind. “So, in a sense, they would be protected; however, this would result in firming up the tariffs, making it more difficult for Solar Energy Corporation of India (SECI) and the central aggregators to sell costlier power to the DISCOMs,” he added.

Fortum’s Gupta said, “BCD will be affecting 60% of the project cost, which is effectively escalating the project cost by 25-30% and increase the tariff by 25-30%.”

According to Vermani, a 40% BCD means an increase of ₹5 (-\$.067)/W in capital expenditure (CAPEX) costs and about ₹0.50 (-\$.0067)/kWh in terms of tariff.

He said, “In the long run, the markets, developers, and customers will factor this into their plans. However, this increase in solar costs will dent the leverage solar has against the traditional grid tariff.”

“One positive result expected from BCD is a significant jump in domestic manufacturing capacity addition. Still, if this domestic capacity addition does not lead to cost reduction, then the government will have to step in to assess the long-term benefits of BCD,” noted



Vermani.

Expecting domestic module prices to be eventually lower than Chinese modules is extremely naïve thinking. The Indian manufacturers currently lack the scale and have not invested in developing any new technology so far.

“The need of the hour is for the government to intervene to ensure power purchase agreements are signed on time, and auctioned projects are not canceled and re-auctioned, and that dues and reimbursements are paid on time, especially since liquidity may become important,” Bhut added.

Joshi opined that the duties and tariffs are bound to rise, and the government will earn income, but the customers will bear the higher tariffs.

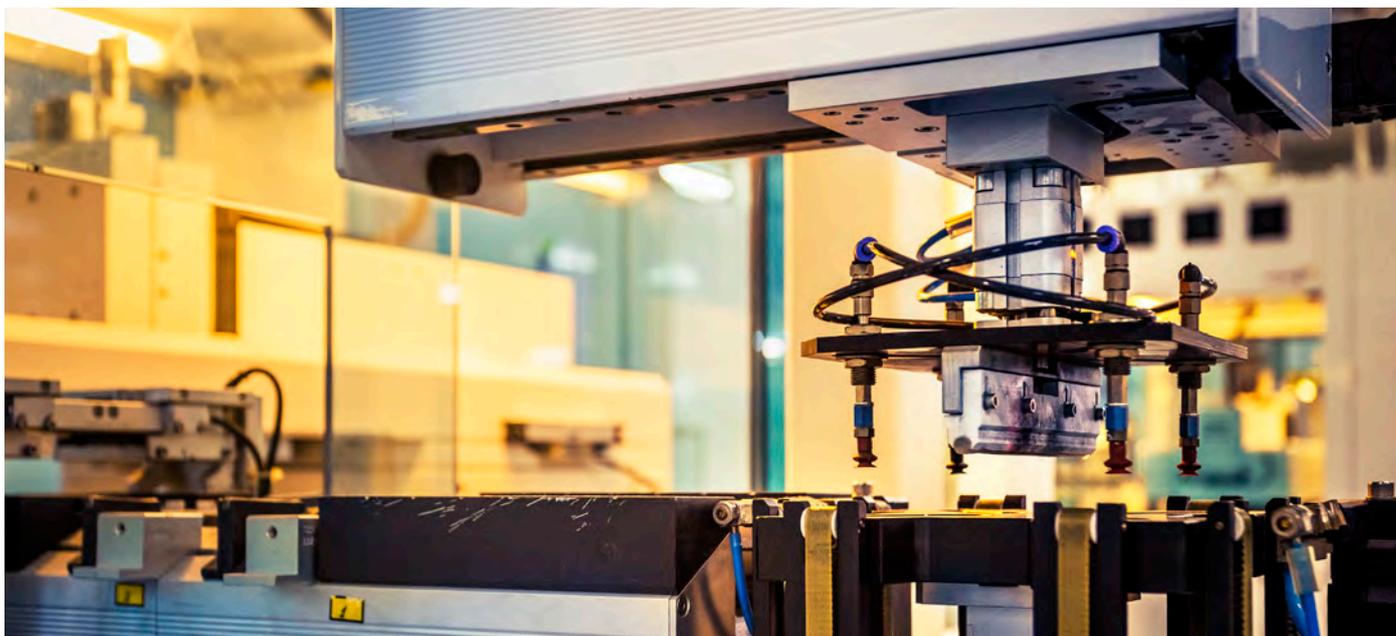
“Lower tariffs were never the prudent way to run the business. It is not just the prices of Chinese modules and cells that have gone up. The cost of raw materials needed to manufacture these goods has also increased. Indian manufacturers need to have the complete supply chain

needed for vertical integration. There is no point blaming China for dumping its products,” he said.

Does India have sufficient manufacturing capacity to cater to the solar sector?

Manufacturers mentioned that they are more than equipped to handle the demands of the upcoming projects. With the introduction of the production-linked incentive program, some manufacturers are in the process of establishing or have already set up additional capacities.

However, according to Kumar, India’s domestic demand has not crossed 10 GW in the best of years in the recent past. “Domestic module manufacturing capacity, in MW terms, on the face of it can meet this requirement. The rub, however, comes in the technology upgradation of the capacity. Mono PERC modules, the industry’s workhorse for current projects, is not being made on scale in India,” he said.



“For some allied materials and components like glass, aluminum frames, and others, we have even lesser manufacturing capacity than solar modules. With a target of more than 200 GW of solar by 2030, India needs to significantly ramp up its manufacturing capacities in all aspects of the value chain and not just cell and module manufacturing,” Vermani added.

While pointing out the gap in local manufacturing capacity, Gupta stated that India doesn't have more than 2-3 GW of manufacturing capacity available to independent power producers.

“Few of the large manufacturers are also developers and are using the modules they produce. On the one hand, India wants to reach 350 GW solar by 2030. On the other hand, the government restricts the import of modules by introducing the approved list of models and manufacturers (ALMM). Therefore, there is a mismatch between plan and implementation. To reach 350 GW by 2030, they have to come out with 15-20 GW solar tender every year, similarly manufacturing capacity needs to be scaled,” Gupta said.

ALMM is another bottleneck in procuring imported solar modules and has the developers seriously concerned.

How will the new duty regime affect small and big players?

According to Kumar, larger developers with utility-scale projects have shelter and protection under the

‘Change of Law’ clause.

He said, “They will find it difficult, however, to pass on the full impact of the duty hikes to DISCOMs, in the form of tariffs. As a result, we expect the developer's internal rate of return (IRR) to shrink. Developers of rooftop solar and smaller projects would see demand from commercial and industrial customers adversely affected. In terms

couple of quarters. But again, here too, as the price increase will be all across the board, the clients will start getting back to their solarization goals as overall there is a largely growing consensus in the industry to reduce their energy costs using solar as well as increase their sustainability footprint,” Vermani said.

India has so far largely concentrated on the demand side, and the

ALMM is another bottleneck in procuring imported solar modules and has the developers concerned

of its attractiveness vis-à-vis grid power, the economics of rooftop solar would be considerably diminished and could result in weakening of demand.”

Many, however, believe that big developers are already impacted as their project pipeline could become unviable unless they have factored in this BCD impact.

“However, as the BCD comes into effect, over time, the market dynamics will drive tariffs up for everyone. Integrated solar module manufacturing will surely have a distinct advantage as they would stand a better chance to control their overall costs. Meanwhile, smaller solar project developers may see a delay in client acquisition for a

government is now shifting its focus on manufacturing. The introduction of BCD, production-linked program, and ALMM are all government initiatives in support of domestic manufacturing.

“Whatever the intentions may be, unless properly executed, too much focus on supply and the resulting increase in prices and shortages due to lack of capacity can easily diminish demand. The government needs to ensure there is robust demand for this shift towards manufacturing to work,” said Raj Prabhu, CEO of Mercom Capital Group.

The stakeholders meanwhile expect the government to at least not add to the already existing challenges. ☺

Dalhousie Varsity Gets Grant for EV Battery Research

\$2.9 million in funding came from NSERC and \$3.1 million came from Tesla to develop advanced batteries for electric vehicles and grid energy storage

By : Rahul Nair

A team of researchers from the Dalhousie University, based at Halifax in Nova Scotia, Canada, received a grant of \$2.9 million in funding from the Natural Sciences and Engineering Research Council (NSERC) and an

additional \$3.1 million from Tesla to help develop advanced batteries for electric vehicles (EVs) and grid energy storage.

The research team includes Jeff Dahn, a lithium-ion battery expert who has worked with Tesla since 2016. In January 2021, the Dalhousie team expanded to

include Dr. Chongyin Yang as the Tesla Canada Chair and Dr. Michael Metzger as the Herzberg-Dahn Chair.

The funding for Dr. Dahn's project is made possible through NSERC's Alliance Grant Program, and the \$6 million grant is the largest alliance grant that



Dalhousie University has ever received.

The major goals of the funded project include lowering the costs, increasing the lifetime and energy density, maintaining and improving the safety of batteries for EVs and electrical energy storage applications, and increasing the content of sustainable materials in the batteries.

Commenting on the grant received and the scope of the study, Dr. Dahn added, “I am very grateful for this funding from NSERC and Tesla. This will allow us to solve many remaining puzzles that will help improve battery lifetime and lower cost. The students trained in this program are finding, and will continue to find, immediate employment in the advanced battery sector locally and around the world.”

The partnership and project have been built upon, extended, and significantly enhanced the existing, successful NSERC/Tesla Canada Industrial Research Chair Partnership between Dalhousie University, Tesla Canada, and Tesla. The first-ever research agreement between a university and the leading American EV company was signed with Dalhousie in June 2015, and Dr. Dahn’s work

The project aims to lower the costs, increase the lifetime, and improve the safety of EV batteries

officially began with Tesla in 2016. The partnership has since been renewed until at least 2026.

Alice Aiken, vice president of research and innovation at Dalhousie, said, “With a distinguished career in innovative thinking, fundamental science, and strong industry partnerships, Jeff Dahn exemplifies research excellence. And we are incredibly fortunate to have two world-class scientists like Dr. Chongyin Yang and Dr. Michael Metzger, join Dalhousie University and the exclusive partnership with Tesla. Together, this dynamic

team is making the kind of significant contributions in battery technologies that are moving us towards a renewable energy future.”

Tesla expressed its appreciation of the talents of Dr. Dahn and his team. “We are thrilled for our work with Dalhousie, Dr. Jeff Dahn, Dr. Chongyin Yang, and Dr. Michael Metzger. We are excited and look forward to their important contributions in battery technology to help achieve our mission,” the company said in a statement.

Last year, Tesla announced that it would make EV batteries with cobalt-free cathodes to make EVs more affordable as cobalt is an expensive material. The company also revealed its plans to develop a ‘tabless’ battery that could enhance the EV’s range and power.

According to Mercom Capital Group’s latest report, Q1 2021 Funding and M&A Report for Storage, Grid, and Efficiency, global corporate funding for battery storage companies in Q1 2021 increased 52% with \$4.7 billion compared to \$3.1 billion in Q4 2020. Lithium-based battery companies raised \$801 million in Q1 2021, compared to \$28 million in the previous. 📍



Vikram Solar Inaugurates a 1.3 GW Solar Module Manufacturing Facility



Domestic manufacturers of solar modules are slowly ramping up capacities. India has a large-scale solar project pipeline of 53.6 GW, with another 24.1 GW tendered and pending auctions as of Q1 2021. The government is also promoting domestic manufacturing through various programs.

Vikram Solar is one of the top 10 suppliers of solar modules in India, according to Mercom's India Solar Market Leaderboard 2021. The company has recently inaugurated a solar photovoltaic (PV) module manufacturing facility in Tamil Nadu to increase its module manufacturing capacity.

Mercom spoke with Gyanesh Chaudhary, Managing Director of Vikram Solar, to discuss the company's plans and his thoughts on the existing policies related to the solar sector.

1. What is the new manufacturing capacity that Vikram Solar has

added, and what is the new total capacity now?

Our new manufacturing unit in Tamil Nadu has a 1.3 GW solar PV module manufacturing capacity annually. With this unit, Vikram Solar's cumulative PV module manufacturing capacity reaches 2.5 GW, currently the largest in India. The company's other manufacturing facility with 1.2 GW capacity is located in Falta, West Bengal.

2. Are you assembling only modules, or will you also manufacture cells?

We have plans to expand the capacity to 3 GW of integrated modules, cells, and wafers in the next five years.

3. What is the technology used in the new manufacturing capacity?

Currently, the company is manufacturing mono and bi-facial solar modules with M6 solar cells and mono PERC technology.

The new manufacturing facility has

forward compatibility with upcoming technologies such as M12 cell modules, high-efficiency bi-facial, and smart modules. The facility will produce mono passivated emitter and rear cell (PERC) modules with a peak output of up to 640 watts.

In addition, the new facility is equipped with high-tech automation, in compliance with Industry 4.0 standards. The facility's state-of-the-art machinery and the convergence of digitization with manufacturing will give the company a competitive edge globally.

4. Is the new manufacturing capacity fully operational now?

Yes, the facility is fully operational.

5. How much was invested in this manufacturing facility?

We have invested ₹2 billion (-\$26.86 million) to develop the new manufacturing facility. The company plans to invest around ₹50 billion

(-\$671.61 million) over the next five years for the company's future expansions.

6. What was the driving factor behind such a big manufacturing capacity expansion?

India is moving towards solar adoption at an incredible rate. We have seen exponential growth in the last decade, with 35-40 GW capacity addition. We believe that the exponential demand surge for solar energy coupled with a global call to diversify trade markets and supply chains present a huge opportunity for indigenous solar manufacturing. The pandemic provides a huge opportunity for India to shape an inclusive and sustainable economy.

The company is committed to enable India's Aatmanirbhar Bharat vision and accelerate the clean energy transition. Our new capacity extension is aligned to the vision of making India self-reliant in solar manufacturing and capitalize on

the opportunities both in the domestic and international markets.

7. Are you expecting all the demand to come from domestic markets, or are you also planning to expand export activity?

We are supplying modules domestically and exporting our modules, mostly to the United States, Europe, and Africa. We export about 25-30% of our total capacity, and we see our supply increasing both domestically and internationally in the future. Our focus will be high growth markets with ample development potential - India, the United States, Europe, and Southeast Asia.

8. What was the reason behind building the facility in Tamil Nadu?

Tamil Nadu has been one of the early adopters of clean energy and has led India's clean energy transition over the years. In addition, the state has

created the right policy environment, business ecosystem, and ease of doing business. Further, the well-developed infrastructure, railroad network, ports, and airports across the state provide excellent connectivity, making it an attractive investment destination.

The company's new facility is in proximity to seaports, which enables us to have faster and cost-effective transportation. Further, the finalization of any state for our manufacturing plans depends on the overall strategic goals and effective investments packages we may get from the state governments.

9. Are there plans to expand into cells and wafers?

The company plans to add another 3 GW of integrated modules, cell, and wafer manufacturing capacity in the next five years, at the manufacturing unit in Tamil Nadu. ☺



A 1 kW Rooftop System to Cost ₹53,000 in Kerala and ₹50,000 in Andhra

Distribution companies in the states are empanelling rooftop solar installers through auctions to discover competitive rates and avail the subsidies available for residential installations

By : Rakesh Ranjan Parashar and Harsh Shukla



The Kerala State Electricity Board (KSEB) has discovered the lowest bid of ₹53,651 (-\$721)/kW for residential rooftop solar systems of up to 1 kW.

The bids were in response to the tender floated by KSEB in February this year to empanel contractors for providing engineering, procurement, and construction (EPC) services for 200 MW of grid-connected residential rooftop solar systems in Kerala. The projects will be developed under Part A (Up to 1 kW), Part B (1 to 2 kW), Part C (2 to 3 kW), Part D (3 to 10 kW), Part E (10 to 100 kW), and Part F (100 to 500 kW) categories.

A total of seven vendors were empaneled for rooftop solar systems ranging from 1 kW to 500 kW. The vendors who have been empaneled under the tender include Tata Power Solar System, Power-One MicroSystems, Druidic Energy, Ishaan Solar Power, Bingas Electrical Electronics, and Solar System, Kondass Automation, and BSS Solar.

The lowest quoted cost for a rooftop solar system up to 1 kW was ₹53,651 (-\$721)/kW, ₹49,000 (-\$658)/kW for 1 kW to 2 kW rooftop systems, ₹48,000 (-\$645)/kW for 2kW to 3 kW rooftop systems, ₹48,949 (-\$658)/kW for 3 kW to 10 kW rooftop systems, ₹43,499 (-\$584)/kW for 10 kW to 100 kW rooftop systems, and ₹39,900 (-\$536)/kW for 100 kW to 500 kW rooftop systems.

The projects will be developed under the 'Soura Subsidy Program' being

implemented by the Kerala government. The project is in line with the Phase II Subsidy Program of the Ministry of New and Renewable Energy.

In August 2019, the Kerala Government had launched a program called 'Soura' to add 1,000 MW of solar projects to the existing capacity of KSEB by 2022. The projects will be executed to fulfill the state's renewable purchase obligation.

Kerala plans to install 200 MW of residential rooftop solar systems

The project has to be commissioned within three months of the receipt of the orders from individual customers.

The minimum installed capacity at a single location should be 1 kW. The projects up to 30 kW should be commissioned within three months from the EPC order date, and projects above 30 kW should be commissioned within six months. The contractor would have to bear the cost of setting up infrastructure for the solar generation facility to the interconnection point and data acquisition, including the communication facility.

Only indigenously manufactured

solar modules (both cells and modules) will be used in projects under the subsidy program.

Per Ministry of New and Renewable Energy's (MNRE) guidelines, central financial assistance (CFA) of 40% on the benchmark cost will be provided for systems up to 3 kW. For systems above 3 kW and up to 10 kW, a CFA of 40% will be applicable for only the first 3 kW capacity, and for others, it will be 20%. For group housing societies and residential welfare associations, the CFA will be restricted to 20% for common facilities up to 500 kW.

Andhra Pradesh

In Andhra Pradesh, the Andhra Pradesh Eastern Power Distribution Corporation Limited (APEPDCL) discovered the lowest bid of ₹50,000 (-\$673)/kW for residential rooftop solar systems of up to 1 kW under the capital expenditure (CAPEX) model.

The bids were in response to the tenders floated by APEPDCL to empanel agencies to install the rooftop solar systems. The projects were set to be developed under the CAPEX model.

According to APEPDCL, 17 installers were empaneled to install rooftop solar systems with capacities ranging from 1 kW to 500 kW. Of the 17 installers, 14 were enlisted to install systems with capacities from 1 kW to 10 kW. Two agencies are empaneled to install systems of 2 kW to 500 kW, and one agency to install 10 kW to 500 kW systems.

Kerala: List of Empaneled Residential Rooftop Solar Installers Under the Soura Subsidy Program (2020-21)

Rooftop Solar System Capacity	Rate Discovered in the Empanelment Auction		Tata Power Solar System	Power One Micro Systems	Druidic Energy	Ishaan Solar	Bingas Electrical Electronics and Solar System	Kondaas Automation	BSS Solar	Total (kW)
	₹ /kW	~\$/kW								
1 kW	53,651	720.81					250			250
> 1 kW to 2 kW	49,000	658.32			500				250	750
> 2 kW to 3 kW	48,000	644.89			500	300		250	250	1,300
> 3 kW to 10 kW	48,949.61	657.64	64,000	500		700	3,250	17,000		85,450
> 10 kW to 100 kW	43,499.70	584.42	20,000				1,000	5,750		26,750
> 100 kW to 500 kW	39,900.36	536.07					1,000	3,000		4,000
Total (kW)			84,000	500	1,000	1,000	5,500	26,000	500	118,500

Source: KSEB

Mercom India Research

The lowest quoted project cost for a rooftop solar system up to 1 kW was ₹50,000 (-\$673)/kW, ₹47,000 (-\$623)/kW for a 1 kW to 2 kW system, ₹45,000 (-\$605)/kW for a 2 kW to 3 kW system, ₹44,000 (-\$592)/kW for a 3 kW to 10 kW system. For the systems of 10 kW to 100 kW, the lowest project cost quoted was ₹38,000 (-\$511)/kW and ₹36,000 (-\$484)/kW for systems of 100 kW to 500 kW.

Rooftop solar systems up to 3 kW are provided 40% subsidy

The CFA for the systems will be permissible only if the vendor uses domestic manufactured solar panels (using domestic manufactured solar cells) listed under the Approved List of Models and Manufacturers (ALMM) according to the MNRE’s order dated March 10, 2021.

The CFA of 40% on the benchmark cost will be provided for systems up to 3 kW. For systems above 3 kW and up to 10 kW, a CFA of 40% will be applicable for only the first 3 kW capacity, and for others, it will be 20%. For group housing societies and residential welfare associations, the CFA will be restricted to 20% for common facilities

Rates Discovered in Empanelment Auction for 8 MW of Residential Rooftop Solar Systems

Rooftop Solar System Capacity	Price Discovered in Empanelment Auction	
	₹/ kW	~\$/ kW
Upto 1 kW	50,000	673
Above 1 kW to 2 kW	47,000	623
Above 2 kW to 3 kW	45,000	605
Above 3 kW to 10 kW	44,000	592
Above 10 kW to 100 kW	38,000	511
Above 100 kW to 500 kW	36,000	484

Source : APEPDCL

Mercom India Research

up to 500 kW.

APEPDCL said it would provide a subsidy of ₹18,800 (-\$252) for a 1 kW rooftop solar system considering a 40% subsidy on MNRE’s benchmark cost of ₹47,000 (-\$623). Effectively, the cost of a 1 kW rooftop solar system for the consumer would be ₹31,200 (-\$420) which is ₹50,000 (-\$673) minus ₹18,800 (-\$252).

In February 2021, the MNRE had approved an 8 MW capacity under phase II of the rooftop solar program for APEPDCL. The Ministry has provided a 15-month timeline to allocate the approved capacity.

V Vijaya Lalita, Chief General Manager of Energy Conservation, Energy Audit, and Solar, APEPDCL, told Mercom, “The facility would be extended to districts like Visakhapatnam, Srikakulam, Vizianagaram, East Godavari, and West Godavari through grid-connected residential rooftop solar projects by APEPDCL.”

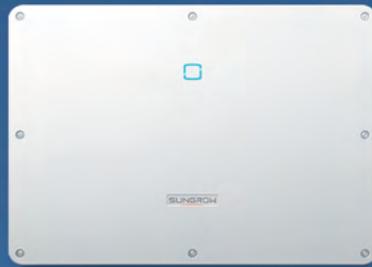
Mercom had earlier reported that Andhra Pradesh’s distribution companies had requested the state’s electricity regulatory commission to only allow gross metering for rooftop solar systems in the state. 📍



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Maharashtra Aims to Electrify 25% of Public Transport by 2025

Maharashtra announced its new electric vehicle policy, which aims to contribute 10% electric vehicles out of the total new vehicle registrations by 2025

By : Rakesh Ranjan Parashar

The Maharashtra Government has announced the Draft Electric Vehicle (EV) Policy, 2021. The policy aims to support the adoption of sustainable and clean mobility solutions in Maharashtra. The recommended policy will be valid until March 31, 2025, from the day of its public notification, following which it will be reviewed and extended.

The primary objective of the draft policy is to accelerate the adoption of EVs in the state so that they can contribute to 10% of new vehicle registrations by 2025.

The EV policy aims to foster the manufacturing of EVs in the state through a set of supply-side initiatives to attract investments, facilitate the establishment of manufacturing units, and encourage the production of EVs, EV components, including Advance Chemistry Cell (ACC) batteries, and EV supply equipment.

The policy aims to establish a gigafactory for manufacturing advanced technology batteries

The draft policy aims to achieve 25% electrification of public transport in the five targeted urban clusters in the state by 2025. The proposed policy also aims to convert 15% of the Maharashtra State Transport Corporation's existing bus fleet to electricity during the policy period.

Also, the proposed policy aims to establish a gigafactory for the manufacturing of ACC batteries in the state.

According to the draft policy, the state plans to achieve the target of 10% electric two-wheelers (E2Ws), 20% electric three-wheelers (E3Ws), and 5% electric four-wheelers (E4Ws) out of the total vehicle registrations in the state by

2025. Also, the policy aims to achieve at least 25% of the urban fleet operated by fleet aggregators or operators in the state to transition to EVs by 2025.

The state government also plans to develop 1,500 public and semi-public charging stations in Greater Mumbai, 500 charging stations in Pune, 150 charging stations in Nagpur, 100 charging stations in Nashik, 75 charging stations in Aurangabad, 30 charging stations in Amravati, and 20 charging stations in Solapur in the next five years.

The draft policy further plans to equip expressways of Mumbai-Nashik, Mumbai-Pune, Mumbai-Nashik, and Nashik-Pune with complete EV infrastructure.

Also, starting April 2022, all new government vehicles operating within major cities would be electric.

Demand incentives for Evs

The vehicles approved under the Faster Adoption and Manufacturing of Electric Vehicles in India Phase-II (FAME II) program would be eligible for incentives. The Maharashtra government will provide an incentive of ₹5,000 (-\$67)/kWh for E2Ws in the L1 and L2 categories, and the number of vehicles to be incentivized during the policy period will be 100,000. The maximum incentive per vehicle will be ₹10,000 (-\$134).

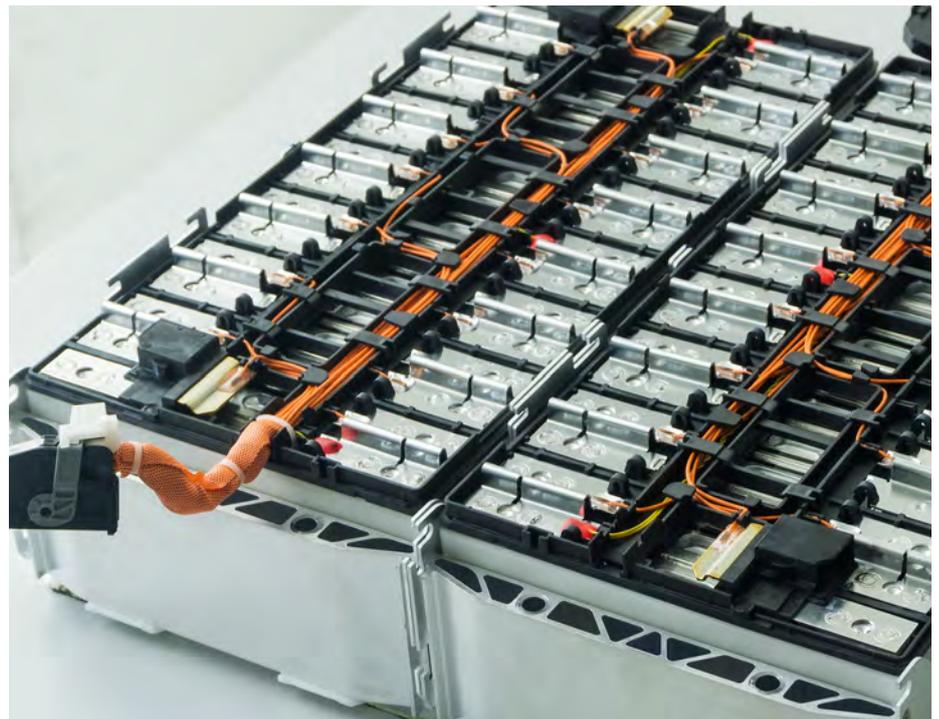
For E3W autos in the L5M category, the government will provide an incentive of ₹5,000 (-\$67)/kWh, and the number of vehicles to be incentivized is 15,000. The maximum incentive per vehicle for E3W autos in the L5M category will be ₹30,000 (-\$402). L5M category includes passenger carrier (auto-rickshaw) with gross vehicle weight equal to 1,500 kilograms.

Also, for electric cars in the M1 category (motor vehicles used for carrying passengers, having no more than eight seats in addition to the driver's seat), an incentive of ₹5,000 (-\$67)/kWh will be provided, and the number of vehicles to be incentivized is 10,000. The maximum incentive per electric car will be ₹150,000 (-\$2,011).

For E4W goods carriers in the N1 category (motor vehicles used for carrying goods and having a gross vehicle weight not exceeding 3.5 tons), an incentive of ₹5,000 (-\$67)/kWh will be provided for 10,000 such vehicles. The maximum incentive per vehicle will be ₹100,000 (-\$1,340).

An incentive of 10% of vehicle cost will be provided to 1,000 e-buses. The maximum incentive per e-bus will be ₹2 million (-\$26,818).

The draft policy also states that buyers purchasing the EVs (except e-buses) before December 31, 2021, will be eligible for an 'early bird discount'





of ₹5,000 (-\$67.05)/kWh of the vehicle battery capacity. The maximum early bird discount per vehicle has been capped at ₹100,000 (-\$1,340).

For vehicles sold without batteries, 50% of the incentive amount will be provided to the original equipment manufacturer (OEM). The remaining incentive amount (up to 50%) will be provided to the battery swapping energy operator to incur the cost of any deposits required from the end-user to use the type-approved swappable battery along with the corresponding OEM vehicle.

Scrappage incentive

All the EVs sold in the state will be exempted from road tax until the duration of the policy. The vehicles eligible for demand incentives under this policy will be eligible for the scrappage incentive.

For E2Ws, the scrappage incentive will be up to ₹7,000 (-\$94), and for E3Ws, the scrappage incentive will be up to ₹15,000 (-\$201). For E4Ws, the incentive will be up to ₹25,000 (-\$335).

Buyback incentive and battery warranty incentive

OEMs who offer buyback programs for vehicles that are up to five years old at a value reduced by not more than 7.5% per year of the age will be eligible

1,500 public and semi-public charging stations planned in Greater Mumbai

for additional incentives. An OEM can avail both the incentives simultaneously. However, the total incentive amount will be limited to ₹12,000 (-\$161).

The assured buyback guarantee will be 6% of the total vehicle cost capped at ₹10,000 (-\$134). For a battery with a warranty of at least five years, the warranty incentive will be 4% of the total vehicle cost capped at ₹6,000 (-\$80).

Charging infrastructure incentives

The charging station will be eligible for the incentives only after the commencement of the station's operation. The operational guidelines will define the eligibility criteria for availing of these incentives. Public and semi-public charging stations availing of FAME II charging infrastructure will not be eligible for these benefits.

For the slow type of public charging stations, the state government will provide an incentive of 60% of the cost, and the maximum incentive available will be ₹10,000 (-\$134). The maximum number of charging stations to be incentivized is ₹15,000 (-\$201). For moderate and fast charging public charging stations, the incentive amount will be 50% of the cost of the charging station, and the maximum incentive available will be ₹500,000 (-\$6,704), with the maximum number of public charging stations to be incentivized being 500.

The tariff applicable for all the EV charging stations and battery swapping stations in the state will be as per the order issued by Maharashtra Electricity Regulatory Commission.

The Government of Maharashtra will implement a time-bound, single-window process for installing EV connections that offer EV-specific tariffs.

Urban local bodies of all National Clean Air Program (NCAP) cities should prepare a charging infrastructure plan for their cities to cater to 2025 levels of EV penetration. The plan should identify charging station locations and land parcels available with different government and land-owning agencies that could be made available for charging infrastructure installation at concessional rentals.



The 15th Finance Commission (FCC) has allocated a grant to 42 NCAP cities for 2020-21 to improve air quality as per their approved city action plans. The FCC has allocated the grants to six cities in Maharashtra. Funds will be made available from this FCC grant in the NCAP cities to support the distribution companies in setting up the charging infrastructure and the upstream infrastructure upgradation.

Supply-side incentives

Incentives will be provided to make the state more lucrative 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 Government of Maharashtra will also offer competitive incentives that will significantly enhance and complement the incentives offered under the Government of India's production-linked incentive program.

The state also aims to create an ecosystem for environment-friendly scrapping of vehicles (including EVs). It plans to prepare a State Scrapping Policy, which will be notified in due

course by the Transport Department of Maharashtra.

In partnership with the interested OEMs and service providers, the Government of Maharashtra will develop skill enhancement centers for delivering vocational courses on the EV ecosystem.

Other aspects

The policy will aim to fast-track and ensure time-bound registration of EVs, including EV fleets owned by

An incentive of 10% of vehicle cost will be provided to 1,000 e-buses

aggregators, last-mile delivery providers, and logistics players.

All the EVs in the state will be registered with green number plates, irrespective of vehicle type.

No permits will be required for e-autos per the Ministry of Road

Transport and Highways' notification, and it will be strictly implemented.

The policy will encourage fleet aggregators to operate EVs, as per the Motor Vehicle Aggregator Guideline, 2015, issued by the Ministry of Road Transport and Highways.

The policy also states that new residential buildings will be mandated to have at least 20% of the total parking spaces as EV ready, of which 30% will be in the common parking spaces or parking spaces unallotted to any individual residence owner.

All dedicated off-road public parking spaces should convert at least 25% of their total capacity to be EV-ready by 2023.

The Government of Maharashtra is also planning to create a State EV Fund. The fund will be used to promote EV adoption, including providing incentives for EVs and EV infrastructure. The 'State EV Fund' will aggregate the funds allocated from different instruments like green tax and green cess.

Recently, the Goa government issued the draft 'Goa Electric Mobility Promotion Policy, 2021'. The policy would be enforced for five years, from the date of its notification in the official gazette. 📄

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Government Caps Net Metering for Rooftop Solar at 500 kW

The rooftop solar installations up to 500 kW will have the net metering facility as per the new update to the electricity rules

By : Rahul Nair

The Ministry of Power (MoP) has finally issued the much-awaited amendment to the Electricity (Rights of Consumers) 2020 Rules concerning net metering for rooftop solar installations. The amendment permits net metering to the prosumer for loads up to 500 kW or up to the sanctioned load, whichever is lower.

Under the latest Electricity (Rights of Consumers) Amendment Rules, 2021, the arrangements for net-metering, gross-metering, net-billing, or net feed-in would follow the regulations made by the State Commission from time to time.

The Amendment

The latest amendment considers net billing or gross metering for rooftop solar systems over 500 kW capacity. For the net metering facility, a single bidirectional energy meter is used at the point of supply where the energy imported from the grid and the energy exported from the grid-interactive rooftop solar system of a prosumer is computed at two different tariffs.

As per the new amendments,

net metering will be allowed to the prosumer for loads up to 500 kW or up to the sanctioned load, whichever is lower, and gross metering for loads over 500 kW.

The amendment further adds that in either case of net-metering or gross metering, DISCOM may install a solar energy meter to measure the gross solar energy generated from the grid-interactive rooftop solar system for renewable energy purchase obligation (RPO) credit, if any.

Previously, net metering was capped at 1 MW

The amendment has also permitted gross metering for prosumers who would like to sell all the solar energy generated to DISCOM instead of using net metering. The Commission would decide the generic tariff for gross-metering as per tariff regulation.

Another important point added in the order is that the state regulatory

commissions may choose to introduce time-of-the-day tariffs where prosumers are incentivized to install energy storage for storing the solar energy or feeding it to the grid during peak hours. This could help the grid to manage the demand response.

“This order approving net metering for solar systems up to 500 kW removes the uncertainty that was hanging over the market and allows the rooftop market to get moving again,” said Raj Prabhu, CEO of Mercom Capital Group.

Background

Net metering, one of the vital policy drivers for rooftop solar adoption, has witnessed a series of revisions in India in the past few months.

Net metering for rooftop solar systems was capped at 1 MW until the government proposed to drastically cut it to 10 kW in December 2020. Several stakeholders believed the government’s proposal would destroy the rooftop solar market. After severe opposition and representation by the industry, the government relented, considering net metering for capacity up to 500 kW. ☎

Battery Storage Firms Raise \$9.6 Billion in Corporate Funding in 1H 2021

Global corporate funding for battery storage, smart grid, and efficiency companies increased 593% to \$10.4 billion in 1H 2021, according to Mercom Capital Group's latest report

By : Harsh Shukla



Global corporate funding, including venture capital (VC) funding, public market, and debt financing for battery storage, smart grid, and efficiency companies in the first half (1H) of 2021, was up over 593% year-over-year (YoY) with \$10.4 billion compared to \$1.5 billion raised in the same period last year, according to Mercom's recently released report.

In 1H 2021, global VC funding also jumped 468% to \$4.9 billion in 28 deals compared to \$858 million in the same period last year. The report said investments would continue to increase as battery storage companies would play a vital role in transitioning to renewables from fossil fuels.

As per the report, global VC funding for battery storage, smart grid, and efficiency companies stood at \$3.6 billion in 28 deals in the second quarter (Q2) of 2021, a 177% increase compared to \$1.3 billion in 24 deals in Q1 2021. Global VC funding was 493% up YoY compared to the \$605 million raised in 26 deals in Q2 2020. A multi-billion-dollar deal in the battery storage sector

was the reason behind high funding activity in this quarter.

Battery storage

In the first half of 2021, battery storage companies raised \$9.6 billion in corporate funding from 41 deals compared to \$716 million raised in 19 deals in the same period last year. The report stated that funding levels had improved every quarter since Q1 2020. The funding activity was slumped in Q1 2020 due to the Covid-19 impact.

Global VC funding in battery storage companies stood at \$4.4 billion in 33 deals in 1H 2021, a 720% rise compared to \$536 million in 14 deals in the same period last year. In Q2 2021, Northvolt's \$2.75 billion funding round was a big chunk of funding increase.

Some of the top VC funding deals in 1H 2021 included \$2.75 billion raised by Northvolt, \$590 million raised by Sila Nanotechnologies, \$139 million raised by SES, \$132 million raised by EnergyNest, and \$130 million raised by Solid Power.

A total of 106 VC investors participated in battery storage funding in 1H 2021.

The report stated that in 1H 2021, announced debt and public financing market activity escalated to \$5.2 billion in eight deals compared to \$180 million in five deals in the same period last year.

In 1H 2021, the sector witnessed five

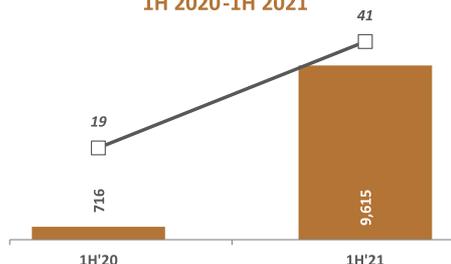
VC funding for battery storage jumped 720% in 1H 2021 compared to 1H 2020

announced battery storage funding deals, totaling \$781 million compared to \$26 million in five deals in 1H 2020.

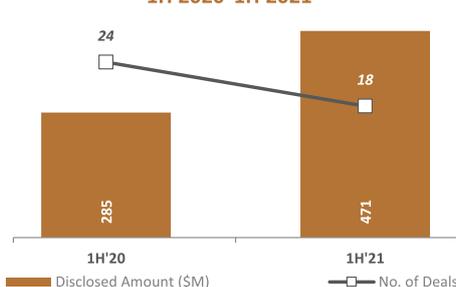
There were nine (two disclosed) battery storage merger and acquisition (M&A) transactions in 1H 2021, while M&A transaction in 1H 2020 was eight (all undisclosed).



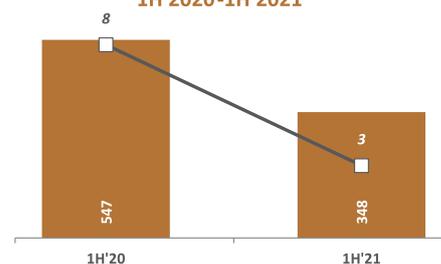
Battery Storage Corporate Funding
1H 2020-1H 2021



Smart Grid Corporate Funding
1H 2020-1H 2021



Efficiency Corporate Funding
1H 2020-1H 2021



Source: Mercom Capital Group

Smart grid

In the first half of 2021, smart grid companies raised \$463 million in VC funding, a 68% increase compared to \$275 million raised in the same period last year.

However, VC funding for smart grid companies declined 39.10% to \$176 million in seven deals in Q2 2021, compared to \$287 million in 10 deals in Q1 2021. The funding amount also went down 9% YoY compared to \$194 million raised in 14 deals in Q2 2020.

Some of the top VC funding deals in 1H 2021 included \$125 million raised by Volta Charging, \$95 million raised by Mainspring Energy, \$50 million raised by FreeWire Technologies, \$40 million raised by Wallbox, and \$31 million raised by Voltus.

In 1H 2021, announced debt and public market financing for smart grid companies stood at \$8 million in one deal, a 20% decline compared to \$10 million in three deals in the same period last year.

There were 11 (all undisclosed) smart grind M&A transactions in 1H 2021 compared to six transactions (all undisclosed) in 1H 2020.

Efficiency

In the first half of 2021, energy efficiency companies raised \$5 million, an 89% decline compared to \$47 million raised in 1H 2020.

In Q2 2021, one energy company raised an undisclosed amount of VC funding. While \$40 million was raised in four deals in Q2 2020. In Q1 2021, an energy efficiency company raised \$5 million.

As per the report, in 1H 2021, announced debt and public market

financing for energy efficiency company declined 31% to \$343 million in one deal from \$500 million in one deal in the same period last year.

In 1H 2021, there was one efficiency M&A transaction of \$300 million, compared to one transaction of \$1.4 billion in 1H 2020. ☹

Battery Storage, Smart Grid, and Efficiency Top VC Funded Deals in 1H 2021

Company	Amount
 northvolt®	\$2,750M
 SILA NANOTECHNOLOGIES	\$590M
 SES Beyond Li-ion™	\$139M
 EnergyNest The Thermal Battery company™	\$132M
 Solid Power	\$130M
 FORSEE POWER	\$127M
 VOLTA	\$125M
 POWIN	\$100M

Source: Mercom Capital Group

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Punjab's Rooftop and Net Metering Regulations

Punjab has announced regulations to install rooftop solar systems and has allowed the net metering facility to the consumers with an approved load of up to 500 kW

By : Rakesh Ranjan Parashar







The Punjab State Electricity Regulatory Commission (PSERC) has issued the draft Grid-Interactive Rooftop Solar Regulations, 2021.

The proposed regulations will apply to net metering arrangements, net billing arrangements, and gross metering arrangements.

As per the proposed regulations, all consumers falling under the jurisdiction of supply of the distribution licensee (DISCOM) could install a rooftop solar system under net metering, net billing, or gross metering arrangements. The DISCOM would provide the net metering facility to the consumers with an approved load of up to 500 kW.

The minimum capacity of the rooftop system under the net metering arrangement has been set at 1 kW. The minimum capacity under the gross metering arrangement would be 50 kW for a single consumer.

The Commission has directed that the maximum capacity of a rooftop solar system, except for domestic category consumers, should not exceed 50%

of the approved load or the contract demand of the consumer. The maximum

The minimum rooftop solar capacity under the net metering arrangement is 1 kW

capacity for domestic consumers should not exceed the approved load or contract demand of the consumer, the Commission noted.

The proposed regulations specify that DISCOM should provide rooftop solar systems to consumers as long as the total capacity of the rooftop systems does not exceed the target capacity. The cumulative capacity of all rooftop

systems to be interconnected with the distribution network should not exceed 80% of the rated capacity of the distribution transformer.

The DISCOM would have to update the distribution transformer level capacity and the cumulative capacity of the rooftop solar systems installed under net metering and net billing arrangements every year by April 30.

Interconnection with grid

According to the proposed regulations, the voltage level for interconnection with the grid should be the voltage level at which DISCOM has given the supply to the consumer.

The rooftop system may be installed with or without battery backup. If the rooftop solar system is installed with a battery backup, the inverter should have an appropriate arrangement to prevent the battery power from flowing into the grid in the absence of grid supply, and a manual isolation switch should also be provided.

The rooftop solar system must be capable of detecting an unintended



islanding condition.

Metering

All the meters installed at the rooftop solar systems should comply with the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006. All meters must have an advanced metering infrastructure facility with RS 485 (or higher) communication port.

The generation meter should be installed as an integral part of the rooftop solar system, where the electricity is generated by the rooftop system and delivered to the main panel.

The net metering equipment (bi-directional) and the generation meter (uni-directional) should be installed and maintained by the DISCOM at the cost of the consumer.

If DISCOM provides the meters, the consumer would be liable to pay meter rental.

If the rooftop system is set up under net billing or gross metering arrangement, the DISCOM would have to install an additional check meter or generation meter.

The rooftop solar system will be exempted from wheeling, cross-subsidy, transmission and distribution, and banking charges

Application and registration

The distribution licensee would have to facilitate setting up rooftop systems on the consumers' premises.

A consumer intending to set up the rooftop solar system should apply online along with a processing fee of ₹50 (-\$0.67)/kW, subject to a maximum of ₹10,000 (-\$134).

The DISCOM must complete a technical feasibility study within 20 days of the date of acknowledgment issued to the applicant.

If technical feasibility meets set parameters, DISCOM would have to approve the application and provide the letter of approval (LoA).

In case of any deficiencies found in the application or during the technical feasibility study, the same should be intimated to the applicant within 20 days from the date of issuance of acknowledgment of the application.

The consumer shall set up the plant within 180 days of receiving the LoA.

In case of delay, the consumer should submit an application to the DISCOM along with an extension fee of ₹25 (-\$0.33)/kW, subject to a maximum of ₹5,000 (-\$67) at least 15 days before the lapse of 180 days. The approval granted would lapse automatically if the project



Policy

is not set up even in the extended two months. If the consumer fails to install the system within 180 days or gets the period extended, the application will be canceled.

Net metering energy accounting and settlement

The proposed regulations state that if the electricity injected by the rooftop system exceeds the electricity consumed from the licensee's supply system during the billing period, such excess injected electricity will be carried forward to the next billing period.

If the electricity supplied by DISCOM during any billing period exceeds the electricity injected in the grid, DISCOM would be required to raise a bill for the net electricity consumption as per the applicable tariff of that category after considering any excess electricity carried forward from the previous billing period.

The DISCOM will purchase the excess electricity at the end of the settlement period at the feed-in tariff approved by the Commission.

The rooftop system installed under these regulations will be exempted from

all wheeling, cross-subsidy, transmission and distribution, and banking charges.

Gross metering energy accounting and settlement

The energy consumed by the consumer during the billing cycle would be billed at the retail tariff applicable for the relevant category as determined by the Commission. In contrast, energy generated during the billing cycle would be billed at feed-in-tariff approved by the Commission.

Renewable purchase obligation

The amount of solar generation by the consumer, who is not defined as an obligated entity, from the rooftop solar system will qualify towards compliance of renewable purchase obligation for the distribution licensee.

Penalty and compensation

In case of failure to meet timelines, the distribution licensee should take approval from the Commission. If the distribution licensee fails to meet the deadline without a valid cause, the licensee should be liable to pay compensation to the consumer at

₹500 (-\$6.69)/day for each day of delay for systems not exceeding 10 kW. For systems exceeding 10 kW, the compensation will be ₹50 (-\$0.67)/kW for the daily delay, subject to a maximum of ₹2,000 (-\$26.75) for each day of delay.

Termination of agreement

The consumer may terminate the agreement at any time by giving 30 days' prior notice to the licensee. If the consumer breaches any term of the agreement and does not remedy it within 30 days without any valid reason, DISCOM may terminate the agreement without further notice.

Recently, the Ministry of Power issued the much-awaited amendment to the Electricity (Rights of Consumers), 2020, Rules concerning net metering for rooftop solar installations. The amendment permits net metering to the prosumer for loads up to 500 kW or up to the sanctioned load, whichever is lower.

In January this year, PSERC said that it would develop a staff paper, suggesting amendments to the Net Metering Regulations, 2015. 

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Reliance to Invest in Solar, Battery, Hydrogen, and Fuel Cell

RIL will invest ₹750 billion to build four gigawatt-scale factories that will manufacture and fully integrate critical components of the 'new energy' ecosystem

By : Rahul Nair



Reliance Industries (RIL) will invest ₹750 billion (~\$10 billion) to build an integrated solar photovoltaic (PV) factory, advanced energy storage battery manufacturing unit, green hydrogen, and fuel cell facility in Gujarat's Jamnagar. The plans were announced by the Chairman, Managing Director, and largest shareholder of RIL, Mukesh Ambani, during the 44th Annual General Meeting of the shareholders.

Ambani informed his shareholders that RIL has started developing the Dhirubhai Ambani Green Energy Giga Complex on 5,000 acres of land in Jamnagar. The project is slated to be amongst the largest such integrated renewable energy manufacturing facilities globally.

RIL has plans to build four factories of gigawatt-scale that will manufacture

Reliance to invest ₹750 billion to build an integrated solar factory, battery manufacturing unit, green hydrogen, and fuel cell facilities

and fully integrate critical components of the 'new energy' ecosystem.

One of them would be an integrated solar PV module factory. The first integrated solar PV gigawatt factory will start with converting raw silica to polysilicon, which we will then convert to ingot and wafers. These wafers would be used to make high-efficiency solar cells and finally assembled into high-

efficiency solar modules.

The second set-up is meant for housing an advanced energy storage battery factory. RIL is exploring new and advanced electrochemical technologies that can be used for such large-scale grid batteries to store energy. The company plans to collaborate with global leaders in battery technology to achieve the highest reliability for round-



the-clock power availability through a combination of generation, storage, and grid connectivity.

The third unit - an electrolyzer factory - would be used to produce green hydrogen. According to the company, green hydrogen is a unique energy vector that can enable deep decarbonization of many sectors such as transportation, industry, and power. One of the most common methods of generating green hydrogen is by electrolysis of pure water through electrolyzers. RIL will set up an electrolyzer gigawatt factory to manufacture modular electrolyzers of the highest efficiency and lowest capital cost. These can be used for captive production of green hydrogen for domestic use and global sale.

The fourth facility - a fuel cell factory - would convert hydrogen into motive and stationary power. "In the new era, fuel cells will progressively replace internal combustion engines. Fuel cell engines can power automobiles, trucks, and buses. They can also be used in stationary applications for powering data centers, telecom towers, emergency generators, and microgrids and industrial equipment," Ambani said.

RIL would invest the amounts in these initiatives over the next three years to realize an end-to-end renewable

energy ecosystem.

The Jamnagar complex will provide infrastructure and utilities to manufacture ancillary material and equipment needed to support these gigawatt factories to ensure all critical materials are available in time. RIL will also lend support to independent manufacturers with the right capabilities to be part of the ecosystem.

"RIL would invest an additional ₹150 billion (-\$2.02 billion) in the renewables value chain, partnerships, and future technologies, including upstream and downstream industries. "Our overall initial investment from our internal resources in the new energy business will be ₹750 billion (-\$10.11 billion) in three years," Ambani added.

RIL also has plans to build two additional divisions.

The 'Renewable Energy Project Management and Construction Division' will provide gigawatt-scale end-to-end solutions for large renewable plants across the world. It will enable and partner with thousands of green micro, small and medium enterprise entrepreneurs, who can deploy kilowatt to megawatt-scale solutions in agriculture, industry, residences, and transportation.

The Renewable Energy Project Finance Division will provide financial

solutions to the stakeholders, providing a platform to source long-term global capital for green investments at attractive terms.

Ambani said, "We will seek support from our relationship banks and global green funds for this purpose. Simultaneously, we will also facilitate a platform to provide financing for the entire ecosystem of small businesses and entrepreneurs who invest alongside us."

In 2017, the Indian Renewable Energy Development Agency (IREDA) provided a loan to the tune of ₹3 billion (-\$45.7 million) to Reliance Money, a brand by Reliance Commercial Finance Limited, a subsidiary of Reliance Capital Limited - part of the Anil Dhirubhai Ambani Group (ADAG) - for renewable energy and energy efficiency projects. To date, Reliance Commercial Finance Limited has financed or co-financed renewable energy projects of more than 1,800 MW, including both wind and solar energy projects, according to the company.

The previous renewable energy investment of RIL was the acquisition of Kanoda Energy Systems a company with a presence in the fields of solar advisory, product design, and technology validation, engineering, procurement & construction, and operation & maintenance (O&M) of solar projects. 



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Solar's Share in India's Installed Power Capacity Rises

India's installed renewable energy capacity is inching up, accounting for a share of 37.4% in the overall power mix at the end of Q2 2021

By : Rahul Nair



India's installed renewable energy (including large hydro projects) capacity stood at 143.9 GW, accounting for a share of 37.4% in the overall power mix at the end of the second quarter (Q2) of 2021, according to preliminary data from the Central Electricity Authority (CEA), Ministry of New and Renewable Energy (MNRE) and Mercom's India Solar Project Tracker.

The share of renewable energy saw a marginal increase from the previous quarter (Q1 2021), when total renewable installations stood at 141.4 GW with a share of 36.94%. Meanwhile, at the end of Q2 2020, the installed renewable energy (including large hydro projects) capacity was 135.22 GW, accounting for 36.26% of the total power mix.

Based on the preliminary numbers, solar installations increased, accounting for 11.2% of the total installed capacity compared to 10.69% in Q1 2021. Wind installations also showed a marginal growth and accounted for 10.26% of the total capacity at the end of Q2 2021.

Meanwhile, biomass and small hydro accounted for 2.64% and 1.25%, respectively, in Q2 2021. Among

Installed renewable energy capacity stood at 143.9 GW at the end of Q2 2021

renewables, solar accounted for nearly 30% of the total installed capacity at the end of June 2021.

According to Mercom's India Solar Project Tracker, government agencies announced tenders for 8.5 GW of solar projects in the second quarter of the calendar year (CY) 2021, a 19% decrease compared to 10.6 GW in the previous quarter. However, the figures were up 60% compared to the same period last year, when only 5.3 GW of solar tenders were announced.

Energy from conventional sources

At the end of Q2 2021, conventional power sources had a cumulative

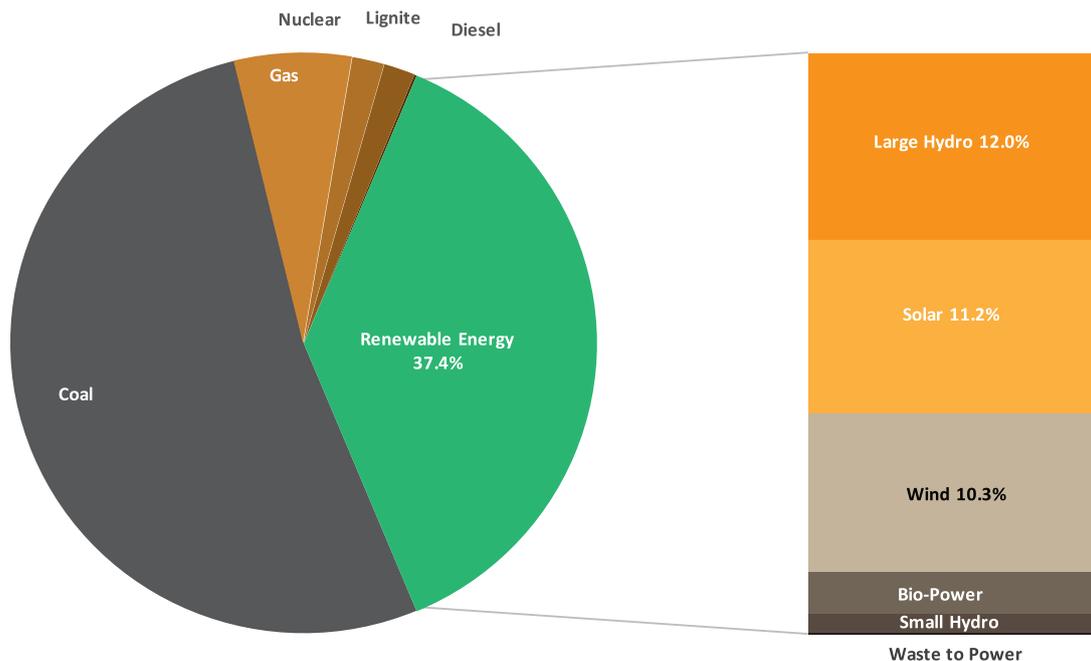
installed capacity of nearly 240 GW, accounting for 62.59% of the total installed capacity - a small decrease from the last quarter's number of 63%. The segment included power generated from thermal-based sources, including coal (52.49%), gas (6.48%), lignite (1.72%), and diesel (0.13%); nuclear power made up 1.76% of the total cumulative installed power capacity mix.

Coal continued to lead the way with nearly 202 GW of installations at the end of Q2 2021, a marginal decrease from 202.6 GW at the end of Q1 2021. The overall market share of coal dipped slightly and stood at 52.49%, along with the installed capacity of coal in Q2 2021. Large hydropower projects had the second largest market share with 12.04% of the total installed capacity.

According to the International Energy Agency, coal accounts for 70% of India's power generation, while solar is less than 4%. However, solar energy will witness exponential growth and match coal's share in the Indian power generation mix by 2040 or earlier. The share of coal is expected to decline from 44% in 2019 to 34% in 2040. 

India - Cumulative Installed Power Capacity Mix (%)

Renewables (including Large Hydro) comprise ~37% of India's total installed capacity, with solar accounting for ~11%. Among renewables, solar accounts for ~30% of the installed capacity



Data from CEA, MNRE, Mercom India Solar Project Tracker (Installed Capacity as on 30 June 2021)

Source: Mercom India Research

Increasing DISCOM Dues to Renewable Generators

Despite the ₹900 billion (~\$12.03 billion) stimulus package announced for power distribution companies in May last year, the amount owed by the DISCOMs to generators has been mounting

By : Harsh Shukla



Distribution companies (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 (MoP).

The amount was slightly lower compared to \$124.2 billion (-\$1.66 billion) spread over 193 pending invoices at the end of May 2021.

According to MoP's payment ratification and analysis portal (PRAAPTI), outstanding payments to renewable power generators stood at ₹9.58 billion (-\$128.87 million) at the end of June 2021. An increase from the ₹8.69 billion (-\$116.63 million) outstanding at the end of May 2021.

DISCOMs paid around ₹32.21 billion (-\$433.16 million) in outstanding amounts and ₹125.4 billion (-\$1.68 billion) in overdue amounts, increasing 25% and 52%, respectively, when compared to the May figures.

According to the data released by the portal, the overdue amount to power generators at the end of June stood at ₹889.85 billion (-\$11.97 billion), an increase of 32% compared to ₹672.98

Tamil Nadu, Maharashtra, and Rajasthan had the highest payment backlog for June

billion (-\$9.05 billion) in May 2021.

At the end of the month, the outstanding amount was ₹144.74 billion (-\$1.95 billion), an increase of 10% compared to \$131.42 billion (-\$1.77 billion) in the previous month.

Among the states, Tamil Nadu had the highest backlog with an overdue amount of ₹182.34 billion (-\$2.45 billion), followed by Maharashtra and Rajasthan with an overdue amount of ₹166.06 billion (-\$2.23 billion) and ₹101.74 billion (-\$1.36 billion), respectively.

In terms of ease of payments by

DISCOMs, Tamil Nadu, Maharashtra, Rajasthan, Karnataka, Telangana, Jammu and Kashmir, and Andhra Pradesh remained at the bottom of the rung. Some of the best performing states for the month were Goa, Gujarat, Chhattisgarh, Kerala, Tripura, Himachal Pradesh, Uttarakhand, Bihar, Arunachal Pradesh, Assam, and Nagaland. Nagaland had no overdue amount, the portal stated.

Non-conventional energy generators to whom the DISCOMs owed most included Tata Power, Adani Green Energy, and Hero Future Energies, with ₹25.79 billion (-\$346.82 million), ₹17.18 billion (-\$231.03 million), and ₹10.5 billion (-\$141.22 million), respectively.

Recently, the Ministry of Power has issued detailed guidelines for the reform-based result-linked power distribution program over the next five years. The program is expected to improve the quality and the reliability of power supply to consumers through a financially sustainable and operationally efficient distribution sector. Earlier in June 2021, finance minister Nirmala Sitharaman had announced a ₹3.03 trillion (-\$40.82 billion) outlay for the program. 

DISCOMs' Dues to Power Generators

Particulars	Upto Month Of June 2021		Upto Month Of May 2021		% Change
	₹ in Billion	~\$ Billion	₹ in Billion	~\$ Billion	
Overdue amount at the beginning of the month	854.15	11.49	617.28	8.30	38.4%
Total amount billed to DISCOMs	189.92	2.55	158.07	2.13	20%
Amount paid by DISCOMs against overdue	125.4	1.69	82.49	1.11	52%
Amount paid by DISCOMs against outstanding	32.21	0.43	25.74	0.35	25%
Overdue amount at the end of the month	889.85	11.97	672.98	9.05	32%
Outstanding amount at the end of the month	144.74	1.95	131.42	1.77	10%

Overdue* invoices are those which remain fully or partly unpaid past the due date

Source: PRAAPTI

Mercom India Research

Industry News and Policy Briefs

Independent power producer **ACME Solar** raised \$334 million for 12 of its solar projects through the issuance of **offshore green bonds**. U.S. dollar-denominated green bonds will fund the debt investment.

The **Geological Survey of India**, part of the **Ministry of Mines**, has taken up seven projects for lithium exploration across different states in India. Lithium is the crucial element in manufacturing batteries for phones, electronic devices, and electric vehicles.



The larger bench headed by the **Chief Justice of the High Court of Andhra Pradesh suspended** the earlier order passed by the single-judge bench quashing the request for selection and the draft power purchase agreements issued by the Andhra Pradesh Green Energy Corporation Limited for 6.4 GW of solar projects.

Virescent Infrastructure, a renewable energy platform of global investment company **KKR**, filed a draft placement memorandum with India's Securities and Exchange Board and the National Stock Exchange of India to list its infrastructure investment trust on the stock exchange. The company expects to raise gross proceeds of ₹4.25 billion (-\$57.12 million) through this listing for its solar assets in India.



The distributed solar company, **Fourth Partner Energy**, announced that it had acquired distributed solar portfolio with an 8.9 MWdc capacity from **Statkraft India**. Of this capacity, 5 MW is an open access solar project, and the rest is rooftop solar. The company said it is growing its onsite and offsite solar footprint in the subcontinent and across key markets in South and Southeast Asia. In addition, it aims to have 3 GW installed solar capacity by 2025.

The **Solar Energy Corporation of India** paid around **₹6.61 billion (-\$89 million)** to solar and wind developers for the power it purchased in June 2021. The disbursement accounted for 90.65% of the total amount disbursed by the agency in June 2021.

Adani Electricity Mumbai Limited (AEML), Adani Transmission Limited's distribution arm, raised \$300 million in sustainability-linked bonds as part of its \$2 billion **global medium-term notes program**. The issue marks the first-ever global medium-term notes program by an energy utility player in India. The global medium-term notes program and the sustainability-linked bond issuance are part of AEML's capital management plan.

Hyderabad-based energy technology company GODI India raised funds from **Blue Ashva Capital** through its Blue Ashva Sampada Fund. The company will use the funds to set up supercapacitor and lithium-ion (Li-ion) cell manufacturing facilities in India.

The **Ministry of Power** released its **ninth annual integrated ratings** for the state **DISCOMs** for the financial year (FY) 2020. Overall, 16 DISCOMs (out of 41) registered improvements in their cost coverage ratios. Out of these, six DISCOMs registered more than 10% improvement in their cost coverage ratio.



The Indian power sector's **first infrastructure investment trust (InvIT), IndiGrid**, announced the completion of the acquisition of a 100% stake in two solar assets with a cumulative capacity of 100 MW (AC) from Madrid-based developer **Fotowatio Renewable Ventures** at an enterprise value of ₹6.6 billion (-\$88.4 million).

Electric scooter manufacturer Hero Electric announced that it had **raised ₹2.2 billion (-\$29.5 million)** as the first part of its Series B funding. Gulf Islamic Investments and Hero Electric's existing investor OAKS Asset Management (formerly Alpha Capital), led the funding round.

Indi Energy, an Indian energy storage start-up, raised an undisclosed amount in seed funding from **Mumbai Angels Network**, a start-up investment platform for early-stage venture investment. Indi Energy said it would use the funding amount to enhance its research and development activities and scale up its proprietary sodium-ion battery technology, which is made from agricultural waste.



The **Goa government** issued the draft **'Goa Electric Mobility Promotion Policy, 2021'**. The policy would be enforced for five years, from the date of its notification in the official gazette. In February this year, Goa's Minister of Power, Environment, and New & Renewable Energy Nilesh Cabral had emphasized the importance of ushering in electric two-wheelers in the state.

The **Supreme Court of India** lifted the suspension order imposed by the **Bombay High Court** on the DISCOM privatization process, according to the update provided to the Bombay Stock Exchange by **Torrent Power**. The tendering process for a 51% equity shares in the power DISCOMs for the union territories of Dadra & Nagar Haveli and Daman and Diu was earlier halted due to the court order.



Rooftop solar solution provider **MYSUN** joined hands with **Tata Cleantech Capital** to raise ₹150 million (-\$2 million) in debt funding. Tata Cleantech Capital is a joint venture between Tata Capital Limited and International Finance Corporation.



Global Power Synergy Public Company Limited, a power subsidiary of Thailand-based **PTT Group**, announced that its subsidiary **Global Renewable Synergy Company** had acquired a 41.6% stake in renewable power developer Avaada Energy for THB 14.582 billion (-\$453 million).

The **State Bank of India**, one of India's largest public sector banks, declared results for the financial year (FY) 2020-2021, which claimed that the bank had approved over ₹319.18 billion (-\$4.26 billion) in renewable energy project finance in India as of March 2021.

Reliance Industries Limited formed **Reliance New Energy Solar Limited (RNESSL)**, investing ₹100,000 (-\$1342) for 10,000 equity shares of ₹10 (-\$0.13) each. In its BSE filing, the company said RNESSL is incorporated to undertake activities related to solar energy, and it is yet to commence its business operation.

According to data released by the **Ministry of Power**, distribution companies owed ₹124.2 billion (-\$1.66 billion) to renewable energy generators (excluding disputed amounts) in **overdue payments** across 193 pending invoices at the end of May 2021.

Ola Electric Mobility and Bank of Baroda signed one of the largest long-term **debt financing** agreements in the Indian electric vehicle (EV) industry. The ten-year debt of \$100 million will be used for the financial closure of Phase-1 of Ola Futurefactory - Ola's global manufacturing hub for its electric two-wheelers.



Policy Briefs

States



The **Uttarakhand Electricity Regulatory Commission** issued a consultation paper to determine the threshold limit to develop an intra-state transmission system through tariff-based competitive bidding. According to the consultation paper, the transmission system requires adequate and timely investments coupled with efficient and coordinated action to develop a robust and integrated power system.

The **Karnataka Electricity Regulatory Commission** proposed **net metering** for rooftop solar installations up to 500 kW from the earlier suggested cap of 10 kW. Earlier in February this year, the Commission had proposed allowing net metering for rooftop solar projects between 1 kW and 10 kW and gross metering for capacity over 10 kW.

The **Rajasthan government** released the **Rajasthan Electric Vehicle Policy, 2021**, and it became the latest state to follow Goa, Delhi, Gujarat, Maharashtra, and West Bengal. The policy is focused on ramping up sales of electric two-wheelers (E2W) and electric three-wheelers (E3W), also called e-rickshaws, in the state.

The **Himachal Pradesh Electricity Regulatory Commission** issued a generic levelized tariff for solar projects (up to 5 MW) for the financial year (FY) 2021-22.



Center

According to the **Ministry of New and Renewable Energy's** newly introduced **amendments** to the competitive bidding process guidelines for grid-connected wind-solar hybrid projects, the **Solar Energy Corporation of India** will be treated as a procurer and not a nodal agency. SECI had been designated as a nodal agency in the earlier wind-solar hybrid projects bidding guidelines.



The **Ministry of Power** issued detailed guidelines for **reform-based result-linked power distribution program** over the next five years. The program aims to improve power supply quality and reliability 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.

The **Ministry of Power** provided an option for **distribution licensees** to continue or exit from PPAs for projects that have completed 25 years of operation or the tenure specified in the PPA with the central generating stations.



Mitsubishi UFJ Financial Group announced the completion of a five-year syndicated financing deal of \$163 million for **Azure Power's** 300 MW solar project. The project is being developed in Rajasthan.



The **Central Electricity Regulatory Commission** granted a transmission license to Bikaner-II Bhiwadi Transco, a special purpose vehicle of **Power Grid Corporation of India**, to establish a transmission system strengthening program for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II-Part F, on build, own, operate, and maintain basis.

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Major Tender and Auction Announcements in July

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



Top Large-Scale Solar Tenders

The Solar Energy Corporation of India (SECI) has released a tender for developing **1,200 MW** of interstate transmission system (ISTS)-connected solar power projects (**Tranche X**) in **Karnataka**.

NHPC has invited bids from engineering, procurement, and construction (EPC) contractors for a **600 MW ISTS-connected** solar photovoltaic project and associated power transmission lines.

NTPC Limited has invited bids for an EPC package with land development for **500 MW** of grid-connected

solar projects anywhere in **India**.

REC Power Distribution Company has issued a notice inviting tender EPC contractors to set up **125 MW** of solar photovoltaic (PV) power projects at two locations in **Uttar Pradesh**.

SECI has invited bids for EPC services for a **100 MW** solar power project with land in **Chhattisgarh**.

Bharat Heavy Electricals Limited (BHEL) has invited bids for the operation and maintenance (O&M) of a **1.5 MW** solar project at Ramachandrapuram in **Hyderabad**.

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Rooftop Solar Tenders

The **Uttar Pradesh New and Renewable Energy Development Agency** has announced a tender for **empanelment** of vendors and inviting rate contract for the supply, erection, testing, and commissioning of **off-grid solar** PV projects of various capacities. The tentative capacity is **3 MW**, which may vary widely, depending upon the demands received by UPNEDA.

The **Punjab Energy Development Agency** has announced a tender for designing, manufacturing, supply, erection, testing, and commissioning **residential hybrid solar PV projects** across Bathinda city Punjab.

The **Jaipur Vidyut Vitran Nigam** has invited bids to

design, supply, install, and commission a **4.99 MW** of grid-connected solar project under the renewable energy service company (**RESCO**) model and its associated 33 kV line to connect the project with the concerned substation.

Mahanadi Coalfields, a subsidiary of Coal India Limited, has invited bids for **O&M** of a **2 MW** solar project at its Burla headquarters in Sambalpur district of Odisha for two years.

Rajasthan Electronics and Instruments issued a notice inviting tender for the **O&M** of grid-connected solar PV projects of **2,000 kW** installed in Rajasthan.

Auctions

SECI's tender for **1,785 MW** of solar projects in Rajasthan (**Tranche-IV**) has received a huge response from the bidders, oversubscribed by **9.3 GW**.

Avaada Energy and **O2 Power** were declared winners in the Rewa Ultra Mega Solar's auction for **550 MW** of solar projects at the **Agar Solar Park** in Madhya Pradesh. Of this capacity, Unit 1 Agar comprises **200 MW**, and Unit 2 Susner comprises **350 MW**.

Tata Power and **Azure Power** were winners in the **Maharashtra State Electricity Distribution Company's** auction to procure power from **500 MW** of grid-connected

interstate and intrastate **wind-solar hybrid** projects on a long-term basis.

The Rewa Ultra Mega Solar's tender for **500 MW** of solar projects at the **Neemuch Solar Park** in Madhya Pradesh has received a strong response from the bidders and has been oversubscribed by 7 GW.

NTPC Renewables and Talettutayi Solar Projects Nine (**SolarArise**) were declared winners in the Rewa Ultra Mega Solar's auction for **450 MW** of solar projects at the **Shajapur** Solar Park in Madhya Pradesh.

Other Tenders

GAIL (India), a natural gas company, has invited expression of interest (**EoI**) to **acquire** operational solar power projects located in solar parks. GAIL is exploring opportunities in the renewable energy sector with a target of **1,000 MW** capacity.

Convergence Energy Services, a wholly-owned subsidiary of Energy Efficiency Services Limited (**EESL**), has floated a tender to procure **60 MW** of solar PV modules (330W and above) in Maharashtra.

Defense Laboratory, a research arm of the Ministry of Defense, has issued an expression of interest to select a development cum production partner to fabricate **flexible dye-sensitized solar cell** modules.

Power Grid Corporation of India has floated a tender for a substation package for the extension of 765/400/220 kV **Bhadla-II** pooling substation under the transmission system strengthening program to evacuate power from the solar energy zones in Rajasthan (**8.1 GW**) under Phase-II.



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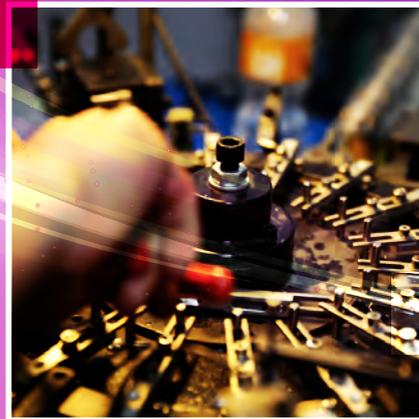
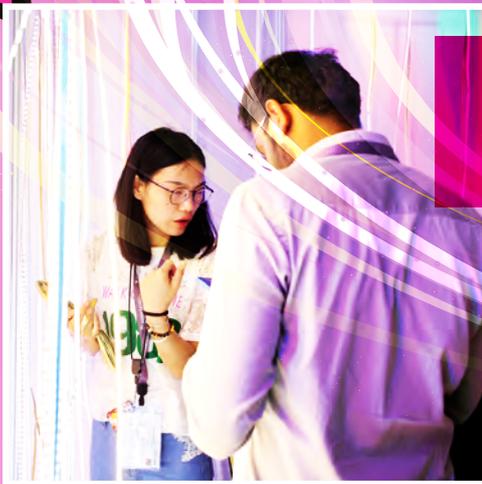
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