

GREEN MARKET CAPSULE

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Tata Power Trading Company Limited (TPTCL)

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Power News

Technology in solar power transforms Indian energy sector

Renewable energy or solar energy is no longer a choice for increasing power generation capacity. It has become imperative to integrate a highly technological infrastructure to generate solar power and meet high energy demands. Being one of the most affordable producers of solar energy, the country drives the growth of the energy sector. The continuous drop in renewable energy cost makes the country realize the benefit of affordability in installing solar power systems than running coal-fired plants. The costs for setting up PV projects in India have significantly dropped by 80 percent between 2010 and 2019, according to an analysis report shared by IRENA in 2019.

Solar power systems significantly contribute to environmental sustainability. The other sources of energy production such as coal, oil and natural gas contribute to one-third of global greenhouse gas emissions. According to the estimates, around 85 percent of thermal energy production in the country is still coal-based which is the biggest cause of immense water and air pollution. As per the IEA analysis, the steps taken to ensure energy efficiency improvements in India cut 15 percent of additional energy demand, oil and gas imports, and air pollution and 300 million tonnes of CO₂ emissions between 2000 and 2018.

Considering the factors of environmental sustainability, the government of India ramps up its effort to transition to the adoption of solar power.

Allocation in solar module manufacturing

India has proven to be a leader in solar development. It has achieved its target of 20 GW by 2022, four years earlier than expected. To further help the country with the rapid transition to solar power, the Union Budget 2021 has announced the allocation of about ₹1.97 trillion from the financial year 2021-22. It will help bring scale and size to the solar photovoltaic (PV) manufacturing sector with a commitment of ₹45 billion for high-efficiency solar PV modules manufacturing. Additionally, to boost the overall growth of the renewable sector, the Union budget has proposed to allocate an additional fund of ₹15 billion to the Indian Renewable Energy Development Agency (IREDA) and ₹10 billion to Solar Energy Corporation of India (SECI). Apart from this, the Finance Minister has also announced the launch of the National Hydrogen Mission to produce green hydrogen using renewable power sources. It will also involve the development of infrastructure, framework standards and regulations for hydrogen technologies with facilitative policy support and target-oriented research and development.

Integration of technology

The continuous efforts by the Government of India in installing solar rooftops on public buildings, airports, railways networks, educational institutions, residential sector and commercial complexes are in full swing. Still, there are several challenges that the Indian solar sector has to overcome in order to manage large-scale solar facilities. To remove the hurdles, the industry players in the renewable energy sector are harnessing the power of Artificial Intelligence. They are leveraging AI's abilities supported by other emerging technologies such as IoT, sensors, big data, etc to provide predictive capabilities, improvement in forecasting and asset management. Furthermore, automation in solar systems also drives operational excellence, cost efficiency and production units.

Robust schemes and incentives

To accelerate the shift to solar energy, the Government is introducing huge solar plant schemes and offering incentives to households for solar panel installation. For instance, the government has recently launched a Grid Connected Solar Rooftop Programme to achieve a cumulative capacity of 40,000 MW from Rooftop Solar (RTS) Projects by the year 2022. The scheme provides a Central Financial Assistance (CFA) to the residential sector based on the production capacity. The government is implementing the scheme through Power Distributing companies (DISCOMs). Thus, a customer who plans to seek CFA can directly approach the DISCOMs operating in the area. With this scheme, there will be a steep surge in the production of energy which will require an adequate infrastructure for the evacuation of solar power injected into the grid.

Bottom-line: The widespread use of solar energy significantly reduces the impact on the environment. It utilizes the most abundant raw material in existence, i.e. the sun. Geographically, India is positioned near the equator and that contributes to the maximization of the country's solar energy potential. Further, with advancements in the technology of solar panels and increasing efficiency, it could be an appropriate time to adopt the technology solutions for households and governments alike. [Source](#)

Green hydrogen can spearhead India's transition to clean energy

Energy is a master resource which has the ability to catapult or cripple a growing economy. The rising threat of climate change has transitioned from climate-science conferences to billions being spent on disaster relief expenses. Global markets are increasingly demanding carbon-free products. Realizing the impending threat to their economies, several countries have announced net-zero targets. The top two energy consumers and emitters, the US and China, recently released a joint statement on climate change.

Electricity dominates the public discourse on the energy economy. However, it accounts for only 18% of India's total energy demand. The rest 82% comprises other energy sources such as coal, oil and gas, and biomass. Unfortunately, our energy sector is heavily import-dependent (85% for crude oil, 53% for gas and 24% for coal). The volatility in the prices of these fuels has a huge impact on the import bill, to the tune of \$160 billion. These numbers will double over the next decade as demand grows.

India will overtake the European Union as the world's third-largest energy consumer by 2030, according to the International Energy Agency (IEA). In its recent forecast, India will account for the biggest share of energy demand growth over the next two decades. This creates challenges but also new avenues of growth. India has the potential to completely re-imagine its energy economy in consonance with demand for clean and sustainable products. This can be achieved by leveraging the results of decades of innovation in the clean energy sector. In the process, India can show the way to developed countries that sustainability and rapid growth can go hand-in-hand.

Green hydrogen (H₂) is made by splitting water (H₂O) via renewable power. Over time, green hydrogen, as an energy carrier, can replace some of our energy imports. This is feasible, given India's record-low renewable power prices (₹1.99/\$2.7 cents per kWh). The Global Hydrogen Council has in a recent study classified India as a net exporter of green hydrogen from 2030, thanks to cheap renewable tariffs. Hydrogen is also a chemical feedstock with an existing global market of about 70 million tonnes. India already consumes about 6 Mt of hydrogen (8.5% of the global demand) annually that is made by reforming 18 Mt of import-dependent natural gas.

More than 25 nations have set up roadmaps for green hydrogen, including mandates and financial incentives to accelerate the transition to it. Wind and solar energy can provide the electricity to power homes and electric cars, but green hydrogen could be an ideal power source for energy-intensive industries like refining, steel, cement, heavy mobility and industrial heating. India is the world's third-largest emitter, with 3.6 gigatonnes of Co2 equivalent across sectors, and green hydrogen will have to play a role in our development transition.

Globally, governments are pushing to transform the existing hydrogen industry from a dirty/grey hydrogen ecosystem to a clean energy-based green hydrogen ecosystem. Some countries with rich gas and petroleum reserves are also pushing for a blue-hydrogen economy, as it opens up a new market for them. On the other hand, India, with limited local hydrocarbon resources and huge renewable potential, can become a major producer of green hydrogen on account of its low solar prices.

Green hydrogen is critical to meet India's target of 450 gigawatt of renewable energy by 2030. That target is extremely ambitious. Due to surplus generation of renewables in peak-generation hours, with further addition of renewables to its power grid, India will face a 'duck curve', as experienced by California. To utilize cheap solar power, currently at ₹2.0/kWh, we need to find other uses for solar power during its generation hours. Through the scaling up of green hydrogen from renewables, we will require a significant amount of renewable energy capacity addition to help India march towards its 450 GW target. Electricity typically accounts for 70% of the production cost of green hydrogen. Hence, surplus electricity from India's renewable plants can augment green hydrogen economics. This will also protect the grid.

West Asian countries, Chile and Australia are aiming to become major players in green hydrogen. An energy consortium in Australia has just announced plans to build a project called the Asian Renewable Energy Hub in Pilbara that would use 1,743 large wind turbines and 30 square miles of solar panels to run a 26-gigawatt electrolysis factory that would create green hydrogen to be sent to Singapore. India can learn from global trends and leverage its vibrant clean energy industry to shape its green hydrogen market.

Green hydrogen is a sunrise industry and will enable Indian entrepreneurs to capture new avenues of growth. Locally-available green hydrogen can attract high-value green industries, like green steel and green chemicals, to shift production to India. Localization of electrolyzer production and development of Green-H2 projects could create a new green technology market worth about \$18-20 billion in India and generate domestic jobs. In addition, there is a massive opportunity to create regional hubs to export high-value green products and engineering, procurement and construction services, given the nascent stage this industry is in.

So what should India do to build a global-scale green hydrogen industry? First, it should announce ambitious targets for green hydrogen and electrolyzer capacity by 2030 on similar lines as renewables. Second, mandate blending a certain percentage of green hydrogen with grey hydrogen for existing applications like oil refining and fertilizers, depending on the viability gap, and mandate new greenfield capacities of hydrogen applications like oil refining and fertilizers to use only green hydrogen from a future cut-off date (to avoid long term lock-ins). Third, India should aim to build a vibrant hydrogen products export industry, such as green steel, using a phased manufacturing programme. Fourth, India should form a regional alliance with South Korea, Japan and Singapore to export green hydrogen from coastal India to help them reach their net-zero ambitions. Fifth, capital cost contributes around 30% of green hydrogen costs, and dollar-linked contracts for procurement of hydrogen should be explored in relevant demand sectors, as is done for oil and gas. Last, India should plan to roll out a production-linked incentive scheme for electrolyzer manufacturing to address the huge global supply bottleneck. Green hydrogen is

the future of energy. It has the potential to radically reduce imports and catalyse India's transition to climate-action leadership. [Source](#)

Green certificates trading shrinks to 9.2 lakh in 2020-21

The renewable energy certificates market shrank to 9.2 lakh RECs in 2020-21 while 60.58 lakh RECs piled up till March-end due to a halt in trading, which also impacted the ability of distribution companies to meet their renewable purchase obligation (RPO). According to industry data, an inventory of 60.58 lakh RECs piled up till March 31, 2021, which includes 7.71 lakh solar and 52.88 lakh non-solar green certificates.

The data also showed that trading of just 9.2 lakh RECs was done in 2020-21 as the trading was suspended since July last year. REC trading was recorded at 89.27 lakh in 2019-20 and 126.08 lakh in 2018-19. The REC or green certificate trades were suspended in July 2020 after the Appellate Tribunal for Electricity (APTEL) decided to postpone the trading by four weeks while hearing three separate petitions related to an issue of fixing floor and forbearance prices of RECs by the Central Electricity Regulatory Commission (CERC). The trading did not resume as a result of an interim order by APTEL in July. The matter is still before the APTEL. The suspension of REC trade has significantly affected the discoms' ability to meet their RPO.

Under RPO, bulk purchasers like discoms, open access consumers and capacitive users are required to buy a certain proportion of renewable energy of RECs in lieu of that. They can buy RECs from renewable energy producers to meet RPO norms. One REC is created when 1 megawatt hour of electricity is generated from an eligible renewable energy source. REC trading is conducted on the last Wednesday of every month on the Indian Energy Exchange (IEX) and the Power Exchange India (PXIL).

Prabhajit Kumar Sarkar, the Managing Director and Chief Executive Officer of PXIL, said, "The suspension of REC trading has adversely affected compliance of RPO targets for obligated entities. We do feel that putting a suspension on marketplaces ought to be an action of last resort, since they affect not just a few contending parties but the entire sector adversely. The REC market has been playing a key role in facilitating the achievement of renewable energy targets and serving as a key segment for obligated as well as eligible entities to meet the committed RPO targets. Considering the state of the REC market and impact on participating entities, we feel that the early reopening of the REC market would be beneficial for the participants and the sector," he added.

Earlier in July, APTEL had postponed the REC trading scheduled on July 29 by four weeks till August 26, after hearing three separate appeals filed by the Green Energy Association, the Indian Wind Power Association and Techno Electric and Engineering Company Ltd against the CERC order issued on fixing REC floor and forbearance prices.

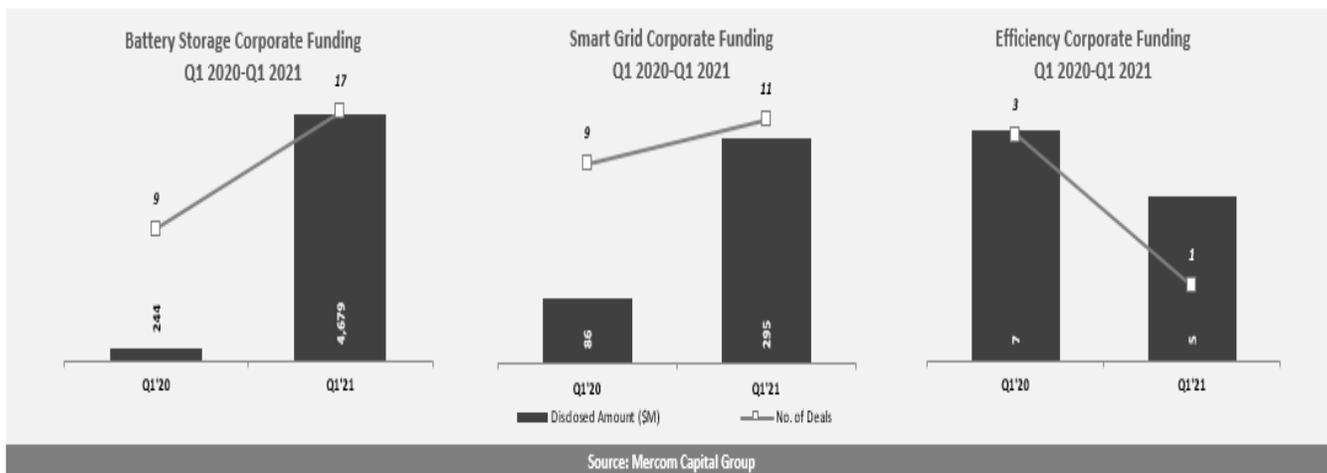
In the order issued on August 26 after hearing the three appeals again, APTEL had said, "Interim order, if any, shall continue till the next date of hearing. List the matter for hearing on September 4 and 5." Later the REC trading was not done from August 2020 onwards consequently because the interim order was for suspension of trade. The PXIL and the IEX had filed impleadment applications on July 27, 2020 requesting early resolution of the matter. Thereafter multiple hearings in the matter were held till September 25, 2020, when judgement was reserved by the APTEL on the issue with a condition that interim order would remain enforced. That means the REC trading would not be conducted till the final judgement is pronounced. Later in November 2020, the APTEL Member S D Dubey retired on completion of his tenure. The new APTEL Member R K Verma took charge as Member (Technical) in December 2020 and hearings in the matter were taken up again.

In the recent hearing on April 19, 2021, the APTEL in its daily order has fixed the next date of hearing as on April 28, 2021. According to a CERC order in June 2020, the floor price of solar and non-solar RECs had been reduced to zero from Rs 1,000 earlier. Similarly, the forbearance (ceiling) price of solar and non-solar was reduced to Rs 1,000 for both from Rs 2,400 and Rs 3,000, respectively.

The forbearance price and floor price fixed by the CERC were effective from July 1, 2020 to June 30, 2021 or until further orders of the commission. In June 2020, the Supreme Court had refused to entertain Green Energy Association's (GEA) appeal on stopping REC price revision by the CERC. Thereafter, three separate appeals were filed by the Green Energy Association, the Indian Wind Power Association and Techno Electric and Engineering Company Ltd against the CERC order issued on fixing REC floor and forbearance prices in APTEL last year. [Source](#)

Corporate Funding for Battery Storage Companies Up 52% With \$4.7 Billion in Q1 2021

The venture capital (VC) funding for battery storage, smart grid, and energy efficiency companies in Q1 2021 saw a growth of 410% and stood at \$1.3 billion, compared to \$252 million in Q1 2020, according to Mercom Capital Group's latest report Q1 2021 Funding and M&A Report for Storage, Grid, and Efficiency.



Storage

Total corporate funding (including VC, debt, and public market financing) for battery storage companies in Q1 2021 stood at \$4.7 billion in 17 deals against \$3.1 billion in 19 deals in Q4 2020. The figures were up significantly compared to \$244 million in nine deals in Q1 2020.

VC funding, which included private equity and corporate venture capital raised by battery storage companies, came to \$994 million in 13 deals compared to \$164 million in six deals in Q1 2020. The report stated that 33 VC investors participated in battery storage funding in Q1 2021.

The top VC-funded battery storage companies this quarter were: Sila Nanotechnologies which raised \$590 million; Forsee Power (\$127 million); Powin Energy (\$100 million); Enevate(\$81 million); and Malta (\$50 million). In Q1 2021, the announced debt and public market financing for battery storage technologies were much higher, with \$3.7 billion in four deals against \$2.7 billion in eight deals in Q4 2020.

There were four merger and acquisition (M&A) transactions in Q1 2021, compared to eight M&A transactions in Q4 2020. There were nine battery storage project M&A transactions in Q1 2021, out of which only one disclosed the amount.

Battery Storage and Smart Grid Top VC Funded Deals in Q1 2021

Company	Amount (\$M)
	590
	127
	125
	100
	81
	50
	50

Source: Mercom Capital Group

Smart Grid

The total corporate funding in the smart grid was higher by 243% and stood at \$295 million in 11 deals against \$86 million in nine deals in Q1 2020. The VC funding for smart grid companies increased by 254% in Q1 2021 with \$287 million compared to \$81 million in Q1 2020. The report said that 28 investors participated in the smart grid VC funding rounds this quarter.

The top five VC-funded smart grid companies included: Volta Charging, which raised \$125 million; FreeWire Technologies, which secured \$50 million; Wallbox \$40 million; David Energy \$19 million; and WiTricity \$18 million. The report said that \$8 million was raised in one public market financing deal in Q1 2021. There were no debt and public market financing deals in Q4 2020. In Q1 2021, there were six M&A transactions compared to three in Q4 2020 and five transactions in Q1 2020.

Energy Efficiency

The total corporate funding in energy efficiency in Q1 2021 stood at \$5 million in one deal compared to \$196 million in five deals in Q4 2020. Energy efficiency companies raised \$5 million in VC funding in Q1 2021 in one deal against \$196 million in five deals in Q4 2020. There were no M&A transactions in this segment in Q1 2021. In Q1 2020, there was one M&A transaction worth \$1.4 billion. The total corporate funding for the battery storage, smart grid, and energy efficiency sectors in 2020 was up 112% at \$8.1 billion in 2020 from \$3.8 billion in 2019. [Source](#)

India needs \$401 bn capex to fight climate change: Report

The country needs over USD 400 billion in capital investment which could save over 100 GW of energy and 1.1 billion tonne of greenhouse gasses between 2015 and 2030, if it goes ahead with the measures to control pollution under the Paris climate agreement, says a report. Since the country is set to far exceed most of its 2015 Paris Agreement targets on climate change, analysts are keenly watching whether India raises its pollution curtailment targets or signals a 'net carbon neutrality' deadline at the two-day Climate Summit that began on Thursday.

The government's push towards blending ethanol up to 25 per cent and move towards green hydrogen are encouraging, Bank of America Securities said in a note on Thursday-- which is the Earth Day and also the opening day of the two-day climate summit being pushed by US President Joe Biden. "Over 2015-30, India could drive USD401 billion in capex, which could lead to over 106 gw in energy savings, and 1.1 billion tonne per annum reduction in Co2 and impacting 99 stocks with a market capitalisation of USD 1.4 trillion," BofA said in a note.

The report expects India to step up its emission curtailment targets by 2047 and announce the same at the summit. Several large global economies have committed to be carbon neutral by 2050; and China has set a 2060 target. The US has rejoined the Paris Agreement under Biden and could make major announcements at the summit. The BofA has identified two more new themes in India's fight against pollution-- blending ethanol, and green hydrogen-- adding to the seven themes already identified. The government had ramped up ethanol blending within petrol ratio from 1.4 per cent in 2014 to 5 per cent in 2020, 10 per cent by 2022 and to 25 per cent by 2025.

However, achieving 25 per cent ethanol blending by 2025 could be a challenge as it will require 10 billion litres of ethanol per annum vs current production of only 3 billion litres. On the green hydrogen drive, the report expects India to gain traction for green hydrogen sometime soon as the government is finalizing the National Hydrogen Energy Mission which would require fertilizers, steel and petrochemicals industries to shift to green hydrogen.

The government has indicated plans to blend hydrogen with CNG and leverage the CNG pipeline infra to reduce hydrogen transportation costs. A pilot project with 50 buses running on hydrogen-CNG fuel is currently underway in New Delhi. Another pilot on hydrogen vehicles is being planned by NTPC, which could set up 1 mw electrolyzers in New Delhi and Leh, as a part of the project. Besides, Reliance has also indicated plans to use green hydrogen. The Wall Street brokerage feels that these nine climate/pollution control themes can impact 99 stocks with cumulative market cap of USD 1.3 trillion.

It can be noted that the Railways which has set 100 per cent electrification target by FY23, has already recorded its highest ever route electrification in FY21 at 6000 km, which is 14 per cent higher than the previous best in FY19, taking the electrified route to 71 per cent of the total. Also, 23 per cent or 657 km of the mega rail project, DFC or the dedicated freight corridor is already live from December last and another 12 per cent will go live by April end.

On the renewable energy front driven by one of the largest RE programmes globally (175gw/ 450gw target by 2022/2030), share of non-fossil fuel-based energy in installed power capacity of has already reached 38 per cent as against the Paris Agreement target to achieve 40 per cent by 2030. To further support this, the government has approved a Rs 4,500-crore production linked incentive scheme to create 10 gw solar PV manufacturing capacity vs the current capacity of just 3 gw for solar cells and 5 gw for modules. [Source](#)

CEA, CEEW launch Renewable Dashboard for detailed operational info on RE projects in India

New Delhi, Apr 21 (PTI) The Central Electricity Authority (CEA) and CEEW's Centre for Energy Finance (CEEW-CEF) on Wednesday launched the India Renewables Dashboard. The dashboard is a joint effort to provide detailed operational information on renewable energy (RE) projects in India, according to a statement. This information on dashboard is freely available to policymakers, developers, financiers, and the public.

It was launched by Sandesh Kumar Sharma, member (planning) of CEA, the statement added. The dashboard, supported by the Shakti Sustainable Energy Foundation, captures daily generation data at the state, regional and national levels for the aggregate 93 gigawatts (GW) of installed RE capacity in India. It also captures this data at a plant level for a subset of projects.

Previously, such data required manual aggregation and was not easily accessible. The India Renewables Dashboard addresses this challenge by automating the process of updating daily RE generation. Further, users can download the data in multiple formats and conduct their own bespoke analyses. This will allow them to gain invaluable insights for improving project implementation, infrastructure planning and power generation forecasting in the renewables sector.

According to the India Renewables Dashboard, India's solar power generation on April 20, 2021, was 172.3 million kWh and its total wind power generation on the same day was 168.3 million kWh. This represented a combined 8.3 per cent share for the two sources in total electricity generation on that day. The highest daily generation figures recorded in the past 12 months for solar and wind are 216.5 million kWh and 444.5 million kWh, respectively. [Source](#)

SJVN Releases Tender to Acquire Hydro, Solar, and Wind Projects Across India

SJVN Limited has invited expressions of interest from independent power producers, power generating companies, developers, state electricity boards, and lenders for offering their hydro, solar, and wind projects in India for acquisition. The last date to submit the applications for the first tranche is May 31, 2021. Bids will be opened on June 1.

SJVN is a joint venture between the government of India and the Himachal Pradesh government. Predominantly a hydropower producer, SJVN is aggressively looking to expand its solar and wind power capacity. In July 2020, SJVN had issued a notice inviting expressions of interest from interested parties to offer their solar and hydropower projects for acquisition.

The present installed capacity of SJVN is 2,015 MW comprising 1,912 MW of hydropower, 97.6 MW of wind power, and 5.6 MW of solar power. The company plans to acquire hydro, solar, and wind power projects under construction and in operation. Projects in the survey and investigation stage are also considered for acquisition.

Any independent power producer, power generation companies, power project developers, state electricity boards, and lenders owning hydro, solar, and wind power projects in Indian states having requisite statutory clearances regarding land and other facilities and power purchase agreements are eligible for offering hydro, solar, and wind projects for possible acquisition by SJVN. Hydropower projects of any capacity can be offered for acquisition. For solar projects, the minimum eligible capacity is 25 MW and above, and for wind projects, the capacity must be 50 MW and above.

Speaking at a Mercom webinar, N.L. Sharma, Chairman and Managing Director of SJVN, had said that SJVN plans to develop 5 GW of renewable energy by 2023-24, 12 GW by 2030, and 25 GW by 2040. It had already started expanding in the renewable energy sector, especially solar and wind, to meet its shareholders' expectations. To achieve its target, SJVN would also acquire solar and wind projects that match its technical and financial criteria.

SJVN has been issuing tenders for expanding renewables in all segments. Recently, it had floated a tender seeking services from firms to arrange for land, connectivity, open access, and power purchase agreements for 1 GW of grid-connected solar projects in the country. SJVN had also issued a tender to procure 1,250 acres of land for solar projects in Bihar. According to Mercom's India Tender Tracker, SJVN has tendered 1.2 GW of solar power projects as of March 2021. [Source](#)

'Enormous potential' for wind-solar hybrid power in India

India presents an "enormous potential" for the development of solar and wind hybrid power systems, with more than 12.3GW of collocated tenders issued in the country to date. That's according to a recent report from market analyst JMK Research, which argues that combining both intermittent power systems into one hybrid project would ensure greater reliability and stability in India's electricity grid. Last October, JMK Research predicted that India's wind-solar hybrid capacity will reach 11.7GW by 2023.

The Indian government released its National Wind-Solar Hybrid Policy in 2018 in an effort to enhance the country's grid stability and provide a framework for large-scale projects, and India's developers have already started working towards more hybrid deployment this year. In January, the Solar Energy Corporation of India (SECI) carried out an auction that saw 1.2GW of capacity awarded to companies such as Adani Green Energy, whose subsidiary received a contract to build a 600MW solar-wind hybrid project.

The total capacity issued in tenders for hybrid systems in the country currently stands at 12.33GW, with 6.26GW of this capacity allocated, according to JMK Research, which added that Adani and ReNew Power are "the most active players" in India's wind-solar hybrid market. Hybrid tenders, the report said, have received a "good response from the market, and are mostly fully subscribed with the lowest winning tariff in the range of Rs 2.41/ kWh- Rs 3.24/ kWh." [Source](#)

Renewable energy sector misses target for 5th year in a row

New capacity addition in the renewable energy sector fell far short of its target in Covid-battered fiscal year 2021 (FY21) with the sector adding just a little over half of what was originally intended. With the lower addition in FY21, the sector has missed its capacity addition target for the 5th year in a row. As against the capacity addition target of 14380 MW for FY21, the renewable energy sector added only about 7356 MW, which is just 51 per cent of the target for the fiscal. In FY20, the sector added 8711 MW of new capacity to the grid.

"The lower capacity addition can be attributed to the lockdown and supply-side disruptions (which slowed movement of inputs and has led to an increase in prices), labour shortages as well as constrained finances and liquidity pressures faced by the developers. Also, the restriction on the imports of inputs for solar power has aggravated the constraints faced by developers. Project timelines have been extended as a result, further aggravating the financial stress of developers," a CARE ratings report said.

Solar segment shines

With the addition of 7356 MW in FY21, the cumulative renewable energy capacity has increased to 94.4 GW as of March 31, 2021. The Solar segment has now overtaken Wind and tops the capacity addition table with a total capacity of 40.09 GW, as compared to the wind segment's capacity of 39.24 GW. Bio-power and small hydro had capacities of 10.31 GW and 4.79 GW respectively.

In the last three years, new capacity additions slipped below 10,000 MW, while in FY18 and FY17, the clean energy sector added 11,754 MW and 11,320 MW respectively. "Projects worth 49.7 GW are at various stages of implementation and projects of 25.91 GW capacity are under various stages of bidding," said a note from the Union Ministry of New & Renewable Energy.

The Government has set a target of achieving 175 GW installed renewable energy capacity (excluding large hydro) by December 2022. Even if all the projects, which are under implementation or bidding, get completed and come on-stream before the end of next year, the target will be missed.

However, the Government has been taking various measures to accelerate capacity-addition in the renewable sector. They include recent Production Linked Incentive (PLI) scheme and additional capital infusion to Solar Energy Corporation of India and IREDA, among others. [Source](#)

CSC, Tata Power to set up 10,000 solar micro grids in rural areas

New Delhi: The government's e-governance services arm CSC on Thursday announced a collaboration with Tata Power to set up solar-powered micro grids and water pumps in rural areas across the country. To begin with, Tata Power has proposed to set up 10,000 micro grids to support rural consumers through Common Service Centres (CSCs). CSC e-Governance Services India Managing Director Dinesh Tyagi said the collaboration will amplify the government's ongoing campaign to provide clean and sustainable energy to households and businesses in rural areas.

"This partnership will increase energy access and provide an economic opportunity to the company by providing off-grid or microgrid power. This will help rural customers move away from burning relatively expensive fuels such as kerosene and can provide basic energy services and meet economic needs," Tyagi said in a statement. Under the partnership, over 3.75 lakh CSCs will be involved in supplying solar water pumps to farmers and help in setting up micro grids in residential and commercial establishments in rural areas.

The partnership is initially expected to create employment to a minimum two persons in each panchayat where microgrid are proposed to be installed, thereby leading to generation of 20,000 jobs for rural youth. CSC CEO Sanjay Kumar Rakesh said the association with Tata Power will help it reach out to farmers and rural enterprises with clean energy solutions and will not only create new employment opportunities for Village Level Entrepreneurs (VLEs) but also offer Tata Power a grasp over the potential rural market. The micro grids will be supported by CSC VLEs at the ground level. VLEs will help in providing connection to rural citizens, including MSME units for commercial purposes. The power available through these units would be affordable, qualitatively better, decentralized and serviced by a local entrepreneur, as per the statement. VLEs will also be trained in installation of domestic and commercial connection.

"This association will also meet the energy requirements of CSCs and address the need of 24-hours supply of electricity to BharatNet in villages. A micro-grid has been piloted in five villages of Lakhimpur Kheri in Uttar Pradesh and learning from this will be useful in full rollout," the statement said. CSC has also approached Tata Power with a request to support a rental model for solar water pumps that can be

provided to 6,000 Farmer Produce Organisations (FPOs), which CSC is setting up to support farmers across the country. [Source](#)

Allows Net Metering for Distributed Renewable Energy Under RESCO Model

The Rajasthan Electricity Regulatory Commission (RERC) has permitted net metering and net billing arrangement for grid-connected distributed renewable energy systems under the renewable energy service company (RESCO) model. The regulations will apply to all grid-connected distributed renewable systems to be commissioned on or after July 1, 2021. The Commission said that the net metering and net billing (gross metering) arrangement would be allowed for eligible consumers who lease out or rent the space for setting up the system. The RESCO and the consumer should also agree to the payment terms. There would be no tripartite agreement between the RESCO, consumer, and the distribution licensee.

The regulations will apply to distribution licensees and consumers availing supply from such licensees. The eligibility for net metering facility will be as specified under the Electricity (Rights of Consumers) Rules, 2020 and the amendments made. The regulations will apply to the net-metering arrangement, net billing arrangements, and grid-connected distributed renewable energy generating systems that have not opted for net metering or net billing arrangement.

The renewable energy generating system's cumulative capacity to be allowed at a particular distribution transformer should not exceed 50% of the transformer capacity. The maximum renewable energy generating system capacity to be installed at any premises should not exceed 100% of the consumer's sanctioned load or contract demand. The capacity of generating system to be installed at the premises should be more than one kW under the net billing arrangement or the net metering arrangement.

The system connected behind the consumer's meter, operating in parallel with the distribution licensee's grid and not opting for net billing or net metering arrangement, will be allowed only after intimating the respective distribution licensee. The consumer should ensure that no energy is injected into the grid from such a system installed behind the consumer's meter. The net metering arrangement will include a single-phase or a three-phase net meter, as may be required, located at the point of interconnection as ascertained by the distribution licensee.

The accounting of electricity exported and imported by the consumer will become effective from the date of connectivity of the renewable energy generating system with the distribution network. The distribution licensee should undertake meter reading of both the generation meter and the net meter, as applicable, according to the regular metering cycle. For the net billing arrangement, the distribution licensee should enter into an agreement at the weighted average tariff discovered through competitive bidding in the previous financial year, plus an incentive of 25%. In case no bidding is done in the previous financial year, then the latest tariff discovered through competitive bidding plus an incentive of 25% will be applicable.

For net metering, If the quantum of electricity exported by a domestic consumer exceeds the quantum imported during the billing period, the excess energy exported by such a consumer will be purchased by the distribution licensee at the weighted average tariff of large-scale solar projects of 5 MW and more, discovered through competitive bidding.

If the quantum of electricity imported by the consumer exceeds the quantum exported, the distribution licensee will raise its bill for the net electricity consumption after adjusting the credited unit. The

unadjusted net credited units of electricity at the end of each financial year for the domestic category consumer will be purchased by the distribution licensee.

The quantum of electricity generated from the self-owned renewable energy generating system under the net-metering arrangement will be exempted from banking charges, wheeling charges, cross subsidy surcharge, and additional surcharge. The electricity generated from the RESCO-owned generating system under the net-metering arrangement will be exempted from banking charges and wheeling charges.

Similarly, the quantum of electricity generated from the self-owned or the RESCO-owned generating system under the net billing arrangement will be exempted from banking charges, wheeling charges, cross subsidy surcharge, and additional surcharge.

The quantum of electricity generated from the system under the net billing arrangement or net metering arrangement will qualify towards compliance of the renewable purchase obligation (RPO) for the distribution licensee in whose area of supply the consumer is located. Recently, RERC clarified that the net metering facilities for rooftop and small grid-connected solar systems would be valid up to June 30, 2021. Under the 'Grid-Connected Distributed Renewable Energy Generating Systems Regulations, 2020,' net metering for rooftop solar and small grid-connected solar projects commissioned expired on March 31, 2021. [Source](#)

Rooftop Solar Cannot Thrive in a Restrictive Policy Environment

Rooftop solar has immense growth potential in India. However, the rooftop segment has been slow to get off the ground, thanks to inconsistent and restrictive government policy. A total of 719 MW of rooftop solar capacity was added in 2020, a 34% decline year-over-year. Things turned around for the rooftop solar market in the second half of the year, with installations improving significantly. The fourth quarter was the strongest for rooftop installations, and the momentum was expected to continue into Q1 2021.

The second session on the second day of the Mercom India Solar Summit 2021 asked the all-important question, 'Can Rooftop Solar Come out of Ground Mount's Shadow and Be The Next Big Thing?' The session was moderated by Mercom India's Managing Director, Priya Sanjay. The panel included: Abhishek Ranjan, Vice President, BSES Delhi; Shishir Singh, Assistant General Manager Tata Power DDL; Pinaki Bhattacharyya, Managing Director, and CEO AMP Energy India.

Rooftop Solar a Laggard

The rooftop solar sector has been lagging for a long time behind utility-scale solar installations. Cumulative installations crossed the 5 GW mark at the end of 2020, according to Mercom India Research. There is a long way to go with another 35 GW to be installed by 2022 if the target of 40 GW has to be met.

In terms of states, Gujarat leads in rooftop installations contributing to around 26% of the country's installations, followed by Rajasthan and Tamil Nadu. Gujarat's dominance in the rooftop segment can be attributed to highly rated DISCOMs, coupled with favorable policies. The residential segment has been growing at a slow pace but has enormous potential if backed by government subsidy. There is a strong surge towards rooftop installations from the C&I sector, which saw 33% installations in the last quarter of 2020.

The levelized cost of energy (LCOE) of rooftop solar is on an average 50-60% lower than commercial and industrial retail electricity tariffs in various states in India. This makes for a great case for commercial and industrial consumers to install rooftop solar to save on their energy bills. Even with rooftop solar being cheaper, it still has a long way to go and needs a push from the government to come out of large-scale solar's shadow.

The Delhi Model

Ms. Sanjay wanted to know from Shishir Singh of Tata Power the reasons behind the success of rooftop solar in Delhi. According to Singh, almost all DISCOMs in India are struggling, and the AT&C losses are around 22% pan-India. "When we started back in 2002 in Delhi, we had 56% losses, and this year, we have closed our books at 8% loss. We call it a victory curve that saved thousands of crores for the government. When it comes to other states, particularly in rural areas, we see 60-70% losses. Three functional areas need to be thoroughly covered – technical, commercial, and enforcement. With these three areas covered, AT&C losses can be brought down significantly."

Singh said that the government had invested heavily in technical infrastructure with programs such as IPDS (Integrated Power Development Scheme) with almost ₹1 trillion (~\$13.32 billion). "The key to mitigating AT&C loss is to focus on commercial activity- installation of meters, recording its readings, minimizing the provisional billing, among others," he said.

10 kW Net Metering

A few hours after the Mercom India Solar Summit concluded, the Ministry of Power issued a draft amendment to the Electricity Act, under which the 10 kW net metering cap is proposed to be raised to 500 kW. According to Pinaki Bhattacharyya from Amp Energy, rooftop solar installations were on the rise until 2018, across the spectrum, including both residential and commercial. Gross metering started in 2018.

"Incidentally, the government financing for the segment was poor since it fell into the hands of banks, who were not disbursing loans effectively, especially at a time when the segment was growing. In the midst of all this, the government started tinkering with net and gross metering, making the market uncertain. The 10 kW restriction will kill the sector. We have to co-exist with the DISCOMs, who are also getting privatized. The system cannot be turned to save just the DISCOMs; we need a platform where we can co-exist," he said.

He added that no serious developer or investor would accept the cap on net metering. "Even SECI is not floating tenders because of this policy confusion."

Singh said, "Since most DISCOMs are run by governments, they would not want solar installations to eat away their revenue. Tata promotes residential solar for socio-economic reasons. We take the help of Tata Power Solar for installations and finance our consumers through Tata Capital; we are covering the entire value chain. In fact, consumers of TP-DDL can get their installations done at reasonable costs through Tata Power Solar."

According to Abhishek Ranjan from BSES Delhi, "We asked ourselves 'what is the value of rooftop solar which needed detailed commercial and technical studies to assess who our target is- residential or C&I.' In 2018, we started a solarization project to solarize our residential consumers, although we are not ignoring our other clients including MSMEs and C&I. Yet the focus was on residential, and we have never looked back."

Reforms

Bhattacharya told the session that the capacity restriction on rooftop solar installations should be abolished. "Rooftop installations have a very low environmental impact since no land acquisition is needed. Secondly, OPEX plants are well maintained than CAPEX plants and should be encouraged. DISCOMs that are privatized are working smoothly, but those that aren't are using the regulatory framework to hinder rooftop solar installations. We hope that an amendment to the Electricity Act will fix this issue."

On the financing side, although there are multi-lateral lines of finance available, the disbursement never took off effectively.

"Channelizing finance into the sector is crucial, and the government needs to declare solar sector under priority sector lending. We are left on our own. There is no clarity regarding the feed-in tariff when it comes to gross and net metering. It is essential that the government raises the cap on net metering to 250 kW or 500 kW. The feed-in tariff has to be fair."

Ranjan said, "The real question is why should DISCOMs resist rooftop solar. It is because the C&I segment is adopting it and if they adopt it fervently, and they are the ones who are feeding the cross-subsidy quantum. With them going over to solar, the DISCOMs will lose out on the quantum. Historically, the portfolios of DISCOMs across India are far greater than our baseload. Therefore, the cost structure needs to be reworked. DISCOMs are worried if their fixed cost components are not met or even reduced."

According to Bhattacharya, the larger challenge is module pricing due to duties that will adversely impact rooftop installations' viability. "There are four factors in the Indian sector- Consumer, Generator, Financier, Government. Solar is very attractive for the customer. On the financing side, several rooftop consumers do not have the right credit rating. As a result, projects are not bankable. It requires credit enhancement tools. A consistent policy will help generators, especially policies that help push the sector upwards. Rooftop solar in its current form cannot overshadow utility-scale; it can only if the government implements the right policies. The government needs to issue proper clarifications on all its policy matters."

According to Mr. Ranjan, DISCOMs are unwilling to forego the C&I segment to rooftop solar as they bear the cross-subsidy burden, so they need to instead reduce the subsidized base (the residential consumers) by pushing and supporting them to deploy rooftop solar. [Source](#)

'Green hydrogen' forecast to cost less than natural gas by 2050

Paris: "Green hydrogen" produced using renewable energy will soon plunge in cost, becoming cheaper than natural gas in many areas, according to a study released Wednesday by the research group BloombergNEF. Hydrogen is considered a leader in the race to develop sustainable energy sources and slash carbon emissions.

But it is expensive to produce and the electricity needed generates a lot of carbon dioxide emissions or other pollutants. Green hydrogen is produced via electrolysis -- an electrical current passing through water -- with wind, solar or hydroelectric power providing the electricity. BloombergNEF (BNEF) researchers forecast its cost will fall steadily in the future, in large part due to lower prices for solar photovoltaic power (PV).

"We now think that PV electricity will be 40 percent cheaper in 2050 than what we had thought just two years ago," BNEF specialists said in a report. "The costs of producing 'green' hydrogen from renewable electricity should fall by up to 85 percent from today to 2050," they concluded. In the majority of 28 markets covered by the study, green hydrogen production could cost less than one US dollar per kilogramme by 2050.

In 15 of those markets -- which represented one-third of global gross domestic product in 2019 -- it was forecasted to become cheaper than natural gas. By just 2030, green hydrogen was projected to cost less than "blue hydrogen," which is produced with electricity generated by fossil fuels using a process that captures greenhouse gas emissions.

It is expected to cost less than even dirtier "grey hydrogen", which lacks that process, by 2050. "Such low renewable hydrogen costs could completely rewrite the energy map," BNEF hydrogen analyst Martin Tengler said. In the future, "at least 33 percent of the world economy could be powered by clean energy for not a cent more than it pays for fossil fuels", he added.

For that to happen however, "the technology will require continued government support," Tengler acknowledged. One reason for strong interest in hydrogen technology is that when it is used to fuel motors, the only emission is water vapour. It has therefore raised hopes that it could help clean up heavy industry and transportation. However at present the process requires large amounts of energy generated using coal or natural gas. [Source](#)

Cabinet okays Rs 4,500 crore PLI scheme to boost solar equipment manufacturing

The Union Cabinet on Wednesday approved a Rs 4,500 crore production-linked incentive (PLI) scheme to boost domestic manufacturing capacity of solar PV modules. The PLI scheme is aimed at adding 10,000 MW manufacturing capacity of integrated solar PV modules entailing direct investment of Rs 17,200 crore. The PLI scheme is likely to create direct employment of around 30,000 and indirect employment of 1.2 lakh, according to the government.

The Cabinet, headed by Prime Minister Narendra Modi, has approved the Ministry of New & Renewable Energy's proposal for implementation of the PLI scheme 'National Programme on High Efficiency Solar PV (Photo Voltic) Modules' for achieving manufacturing capacity of Giga Watt (GW) scale in high efficiency solar PV modules with an outlay of Rs 4,500 crore, an official statement said.

Solar energy capacity addition presently depends largely upon imported solar PV cells and modules as the domestic manufacturing industry has limited operational capacities of solar PV cells and modules, it added. The National Programme on High Efficiency Solar PV Modules will reduce import dependence in a strategic sector like electricity, the statement said adding it will also support the Aatmanirbhar Bharat initiative.

Solar PV manufacturers will be selected through a transparent competitive bidding process. The PLI will be disbursed for 5 years post commissioning of solar PV manufacturing plants, on sales of high efficiency solar PV modules. Manufacturers will be rewarded for higher efficiencies of solar PV modules and also for sourcing their material from the domestic market. Thus, the PLI amount will increase with increased module efficiency and increased local value addition.

The government said the scheme is aimed at additional 10,000 MW capacity of integrated solar PV manufacturing plants. This PLI scheme will see a direct investment of around Rs 17,200 crore in solar

PV manufacturing projects and demand of Rs 17,500 crore over five years for “Balance of Materials”, the statement said.

It will also help generate direct employment of about 30,000 and indirect employment for about 1,20,000 persons. Besides, the scheme will also help in import substitution of around Rs 17,500 crore every year, and will give impetus to R&D to achieve higher efficiency in solar PV modules, the government said.

[Source](#)

National Average Power Purchase Cost of ₹3.85/kWh Set for Open Access Solar Projects

The Central Electricity Regulatory Commission (CERC) has set the national Average Power Purchase Cost (APPC) for open access at ₹3.85 (~\$0.052)/kWh. The APPC would be applicable during the financial year (FY) 2021-22 or until further orders for deviation settlement regarding open access and captive wind and solar generators fulfilling regional entities’ requirements.

In a recent order, the Commission observed that for wind or solar generators selling power under open access, which is not accounted for renewable purchase obligation (RPO) compliance of obligated entities, and for captive power projects where power purchase agreements (PPAs) do not exist, the settlement would be done at APPC.

The regulator said that the APPC at the national level for the FY 2021-22 was determined by computing the average APPC of all states and union territories, weighted by the conventional power purchased by the respective states and union territories. The total cost of power purchase considered for calculating the APPC excluded the cost of generation or procurement from renewable energy sources and transmission charges. The exclusion is in line with the determination of APPC to calculate the average cost of power from conventional sources.

The Commission received suggestions from various stakeholders, including Karnataka Electricity Regulatory Commission (KERC), Power Company of Karnataka Limited (PCKL), and Anushka Garg, a data analyst. In response to PCKL’s request to consider tariff obtained through competitive bidding with respect to wind and solar power projects or a rate determined under generic tariff, the Commission said that the generic tariff was not required in the calculation of APPC. It added that the procurement cost of renewable energy was obtained based on the cost of procurement approved in the tariff orders issued by the state electricity regulatory commissions.

The Commission accepted a suggestion from to consider the net power purchase volume and its cost for Chhattisgarh. Responding to another observation that the data for small hydro projects from the state and central generating stations and bagasse cogeneration sources had been overlooked while calculating the renewables component, the Commission said that it had updated the numbers in line with the APPC mentioned in the tariff order excluding the renewable energy generation for Uttar Pradesh.

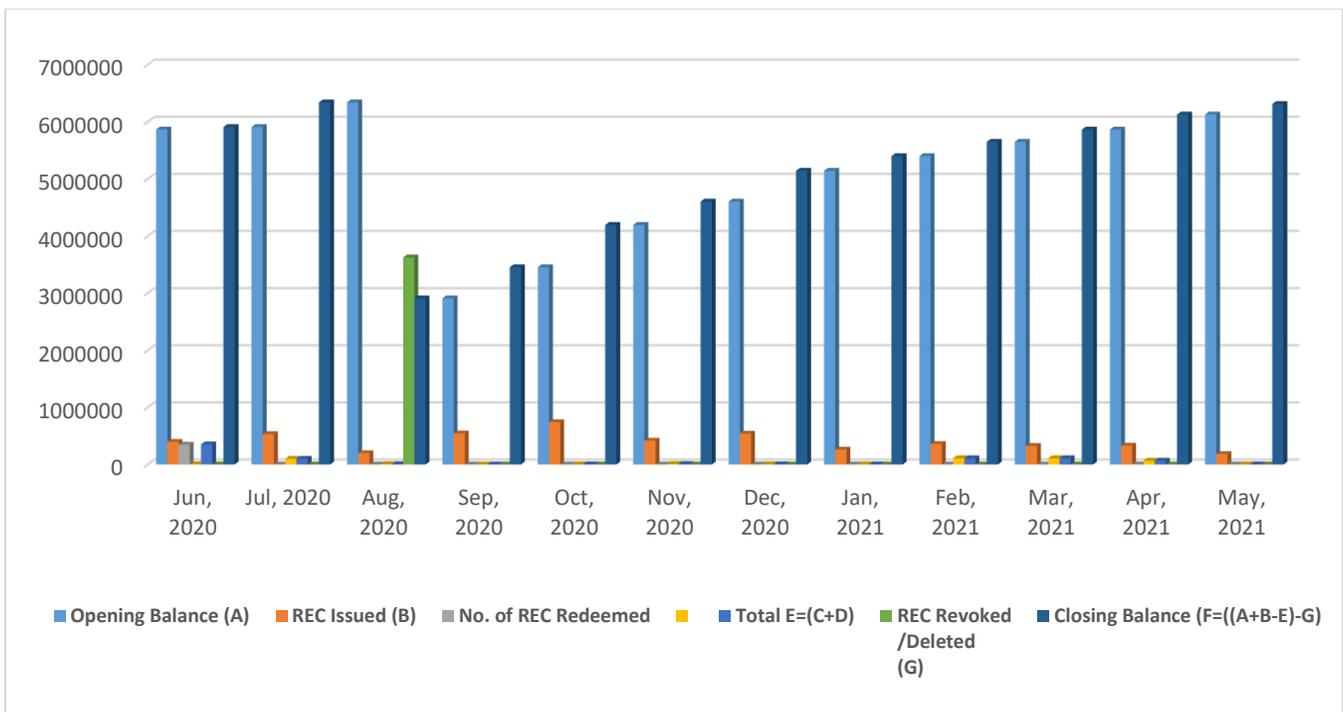
The Commission incorporated the data for small hydro projects from generating stations in Uttarakhand while calculating the renewables component. Previously, Mercom reported that CERC had approved the national APPC of ₹3.60 (~\$0.049)/kWh for open access for FY 2019-20. [Source](#)

Source wise REC break up:-

S N	Source	Accredited		Registered		RECs Issued	RECs Redeemed Through Power Exchanges	RECs Redeemed Through Self Retention	Closing Balance
		As on date		As on date		Since Inception	Since Inception	Revoke d/Delete d RECs	As on date
		Capacity	No. of Project	Capacity	No. of Project				
1	Wind	2750	536	2688	523	27575575	21953273	2424192	0
2	Urban or Municipal Waste	0	0	0	0	72892	72892	0	0
3	Solar Thermal	0	0	0	0	0	0	0	0
4	Solar PV	967	426	920	410	10415618	9561111	119543	0
5	Small Hydro	196	31	196	31	5473604	4765341	6899	0
6	Others	4	2	3	1	27157	12755	5010	0
7	Geothermal	0	0	0	0	0	0	0	0
8	DISCOM	NA	NA	NA	NA	8513006	4628199	0	3623895
9	Biomass	470	42	401	37	10845749	9896423	156549	0
10	Bio-fuel cogeneration	826	91	385	55	9227811	8610583	5001	0
	Total	5213	1128	4592	1057	72151412	59500577	2717194	3623895

REC Inventory position

Month Year	Opening Balance (A)	REC Issued (B)	No. of REC Redeemed		Total E=(C+D)	REC Revoked/ Deleted (G)	Closing Balance (F=((A+B-E)-G))
			RECs Redeemed through Power Exchanges ©	RECs retained by RE Generators (D)			
Jun, 2020	5864878	396265	349056	3415	352471	0	5908672
Jul, 2020	5908672	530935	0	100471	100471	0	6339136
Aug, 2020	6339136	198726	0	4744	4744	3623895	2909223
Sep, 2020	2909223	544955	0	207	207	0	3453971
Oct, 2020	3453971	740650	0	1086	1086	0	4193535
Nov, 2020	4193535	417810	0	7833	7833	0	4603512
Dec, 2020	4603512	540794	0	3171	3171	0	5141135
Jan, 2021	5141135	260411	0	2612	2612	0	5398934
Feb, 2021	5398934	359001	0	109394	109394	0	5648541
Mar, 2021	5648541	324035	0	109141	109141	0	5863435
Apr, 2021	5863435	330267	0	66899	66899	0	6126803
May, 2021	6126803	184149	0	1206	1206	0	6309746
Total:		72151412	59500577	2717194	62217771	3623895	



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