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FEATURED May 18, 2022 Anand Gupta 0

Increasing the penetration of RE with greening the grid - EQ Mag Pro

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The webinar was held by EQ Magazine Pro on 13th May 2022, powered by **Jakson**. In this webinar, panelists talked about increasing the share of renewables through solar power and energy storage. It was moderated by Mr Kartikeya Narain Sharma, Director, Strategy, Sunsure Energy Private Limited and was



Mr Atul Tare, Vice President, New Energies, **Jakson Group** put his views in front of the panelists. He said, "Today, we have about 400 gigawatts of

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installed capacity for the power generation across the country and this is going to increase by two folds by 2030. The renewable capacity is going to continue to grow in terms of the installed capacity. The share of this particular renewable power in terms of the gross generation of the units, by 2030 this is going substantially to almost 25%. And not only just adding the capacity but also we need to ensure that it is leading to a renewable operation of the entire grid as such. During the last decade, the cost of energy storage technologies, primarily lithium-ion battery energy storage systems, has declined rapidly and is projected to decline further over the next decade. This comes at a time when electricity grid flexibility is being recognized as an essential resource for reliable operations and for integrating high amounts of renewable energy. In India, flexibility has been referred to as the 'new currency for the use of energy'. And energy storage has the technical potential to provide some of this grid flexibility. With increasing the penetration of renewable energy, along with provision of energy storage solutions, the world is well-poised to leap to the next wave of energy transition. Even today, if the ESS component is considered in computing the effective cost of renewable energy generation, the per unit is already closer to, or even lower, than the cost of electricity from conventional sources such as coal. This disruption is already evident in India with many recent successful tenders of MNRE with the provision of ESS, enabling the nation to achieve a 40 per cent renewable energy penetration target by 2030."

Further he added, "In 2020, China was leading in renewable energy installations with a capacity of around 895 GW. The U.S., in second place, had a capacity of around 292 GW. The Govt. of India is aiming to achieve 227 GW of renewable energy capacity by 2022, more than its 175 GW target as per the Paris Agreement and 523 GW (73 GW from Hydro) by 2030. And as per the Central Electricity Authority estimates, by 2029-30, the share of renewable energy generation would increase from 18% to 44%. The energy storage solution that Jackson provides is called EnerPack which can cater 100% load of rated capacity with an unmatched warranty of 5 years and is designed to IEC standards with Phase imbalance possible at 100%. It has a display of key parameters along with alarms and events on user-friendly HMI."

Mr Vikas Arya, Associate Vice President, Product Strategy, Jackson Group introduced the panelists to the new 'Helia' series of modules. He said, "Jackson is the 1st Indian module manufacturer to launch & have BIS, IEC certification up to 600Wp. The Helia series has been launched in both monofacial and bifacial variants. These modules are with high efficiency of upto 21.39% which are designed with innovative half cut cells, enabling better performance under partial shading. In these modules, M10 cells are used which are 182mm with MBB (Multi Busbar 10BB), preferred by the module manufacturers globally. These modules are certified with pollution degree II which ensure its protection against a more harsh environment. To reduce the resistive loss round wire ribbon is used. Also, PERC technology has been used to give low LID degradation. These modules are suitable for rooftop, large industries and utility power plants, manufactured using BOM & components from Tier 1 certified suppliers.

And cell cutting is done through the latest waterless NDC technology using automatic laser cutting machines. These modules are tested at 3 stages, first at 100% EL testing at stringer, then in process and final stage to ensure our customer gets a defect free module."

Mr S C Saxena, Chief General Manager, Power System Operation Corporation Ltd talked about the various implications and drivers of increasing the penetration of renewable energy within the Indian grid. He said, "The renewable energy penetration can be increased. Aggressive targets have been given by the Government of India and currently we have approximately 400 gigawatts of installed capacity out of which 108 gigawatt is variable RE but if we include hydro, it could be around 160 gigabyte. We are way ahead in terms of RE integration and while 2030 figures and targets are being cited 25% to 30% penetration. Penetration is driven not only from the supply side targets but also from the demand side and the user side simultaneously. Earlier the peak demand periods were very categorically defined, morning peak, evening peak, but now the highest demand periods



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are changing. This is pretty evident from the load curve, if we see the reports on the website we would observe that highest demand was being met up during the daytime between 10:00 to 12:00 AM in the morning. This is happening because of the shifting of agriculture load to the daytime to the solar hours and economic prosperity of the society and overall improvement in the standards of living where we see a higher penetration of weather beating load. Coming to the balancing part, which is very important to keep the system in shape. Hydro flexing is very well known and now we need flexibility from all other sources as well to be able to integrate larger amounts of renewables. The flexibility of gas, flexibility of thermal generation, coal based generation and flexibility from nuclear plants. Storage is also an aspect we are looking at. There are two approaches that can be followed. Either we go top down or we go bottoms up. Top down is talking of grid scale storage in which economics would ultimately drive the whole thing. In the bottoms up approach, we start approaching at the distribution level and possibly integrate storage, bring in more reliability, and bring in more resilience in the system."

Mr Ravindran Sundersingh, Chief Technical Officer, Renewables, ACME Group put his views in front of the panelists. He said, "I would like to start with the fact that every kWh of electricity which is produced in India, gives rise to 800 grams of carbon, as per the published data on CA website. It means, we have a long way to go and the target is very clear, greening the grid. We have a target of 100% renewable where there is no carbon emitted from any of the generation. There are a few technical constraints. One of them is thermal machines, they do provide a lot of stability to the grid, give a lot of inertia and supply a lot of reactive power, which is also a responsibility. As more and more RE is on the grid, the responsibility is not just to produce energy but to contribute to grid stability. We have to contribute to frequency and voltage regulation. In renewables, we don't get much ability to feed into faults. As a power system designer for me it's very important that whenever a fault takes place the system should be able to feed a lot of fault current into it so that the voltage doesn't dip too much and also the protective devices act correctly. So, designers will have to put in a lot of thought to elements which will provide all these important features. When we talk of storage, the first thought that comes to mind is battery storage. One of the most important storage today is pump storage which is already getting developed on a large scale in India. Also, compressed air energy storage is a proven technology. It's an operation for hundreds of megawatts but it needs certain underground caverns where you can store the pressurized air or liquid. Apart from chemicals we have mechanical, pressure, inertia of a flywheel and so many other technologies. Hydrogen is very important, today we can generate huge volumes of hydrogen with an electrolyzer and then produce electricity either using fuel cells or using a gas turbine which is modified to fire hydrogen. The main challenges for this are the cost and the roundtrip efficiency. People are also using ammonia as a storage medium, hydrogen is converted to ammonia, its transportation is easy and people are working on turbines which can fire ammonia. We have stored renewable energy, transported it to another place and used it in a thermal boiler. So, we are time shifting and geographically shifting the energy."

Ms Ritu Lal, Senior VP & Head, Institutional Relations, Amplus Solar said, "Storage is actually a necessity. We will end up having a huge installed capacity and poor capacity utilization, if we focus on the cost effectiveness. Conversely, the less storage we adopt, the more expensive it's going to be. And, the more we push adoption of solar storage, the faster the production costs will come down. For example, we have a high penetration of EVs in Delhi, air may become cleaner but if the EV is being recharged with coal, then the actual emission profile of the country and the planet has become worse. The time has come for us to forget about cost and efficient utilization but start thinking of storage differently. The next decade in terms of the largest amount of use commercially, will belong to lithium. There will be other technologies as well but the amount of investment and deployment of lithium for the next 7-8 years are going to be lithium storage years. Just because we don't have access to lithium, we cannot ignore lithium storage as a technology. We need to have the utility scale storage, cni level storage and storage at the residential level. At current cost, it will need to be incentivized for it to find greater adoption and the quicker we start working with it."



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Mr Kapil Kasotia, COO-Wind, Hybrid and Storage, Amp Energy India said increasing the share of renewables cannot be just about solar. If, we look at the overall renewal mix anywhere, solar is everywhere. But it is always going to happen between 9:00 AM to 6:00 PM only. The way, curve is changing and the peaks are in the morning and in the evening, it is continued to be like that. It basically requires a very very sharp ramp down as the solar kicks in and when it goes out in the evening a very sharp ramp up again. It puts a lot of strain on the grid. So, it is not going to be just solar in the grid, it has to be more than solar such as complementary technologies. We must work on projects which are hybrid in nature. Storage always need to be just the balance in figure, it cannot be a source and a large scale shifting of power especially not the lithium. We have to green the grid and start thinking more about hybrids. Also, we have to start utilising a lot of our wind potential along with solar. The development has to go hand in hand. It has to be a philosophy of balancing, what we are producing from the very beginning and then think about storage as just a balancing figure.”

Mr Praveen Vaishnav, AGM, Renew Power said, “As we are about to achieve goals we have set for solar. We have a bell curve of the power generation but our requirement is an inverted bell curve. So, we do have peak requirements on the edges and we do have peak generation in the middle of the day. This excess power, which actually gets clipped off. We are not using it at all, it is just getting wasted. So, if we merge these extra power by saving it in storage then we may use the discharging on these peak hours while charging all of these non peak hours. Increasing solar is a global requirement but there are a few drawbacks as well, one is the successful power clipping which we are generating but not using. We must use the power we are generating. Second, there are also issues of DSM penalties when we are getting 10% or 15% generation, we do get penalties. It can be minimized by using the supplies from storage. Third one is the transmission and congestion, the power stability that we can think of by using storage as a distribution itself. Fourth is the renewable forming applications, there are dips in the solar generation suddenly. We can compensate for it by using storage. For increasing the share of renewable energy, these are the aspects which we must take care of. We must use wind, we must use wind and storage along with solar to compensate for whatever instability is getting developed in the grid. For this, better storage facilities should be available.”

Mr P K Agrawal, Independent Advisor, Innovative Wind Energy Inc, USA put his views in front of the panelists and said, “Increasing the share of renewables is a well accepted fact. Worldwide, big countries are moving to increase the share of renewal or replacing the amount of fossil fuel generation by the non-fossil fuel generation. Accordingly, India has also committed to about 50% of non-fossil fuel generation by 2030. There are many challenges like availability, reducing inertia and requirement of reference of voltage, which will not be available if we go for 100%. It presently is based on the physical properties of generators but if it is simulated then still it is not safe. However this fact is that renewal capacity has to be increased and solar with storage is a viable or good option for increasing it because solar is available everywhere unlike the wind which is available only in some of the states. There are many facts which we should consider before going very big for the storage. First, the storage life is about 10 to 15 years and the life of solar itself is 25 or 30 years, so we need to replace solar also, before the expiry. So, again we have to think about how the environmentally unfriendly salvage of batteries will be managed. There has to be innovative technologies for storage. When we increase the penetration of renewals up to 30%, there will be no problem in integrating the 30% of RE because the flexibility available with commercial power point is sufficient for integration of 30%. But when we will go beyond 30% integration, then we need different types of flexibility.”

For more information please see below link:

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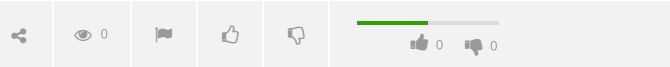
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