Technologies fit for a new era for utility-scale solar

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The deployment of solar PV across the world is on an upward trajectory, with recent reports highlighting the growing popularity of both commercial and utility-scale projects.

Despite the disruption of the past 12-18 months, in its most recent Renewable Energy Market Update, the International Energy Agency (IEA), said that in 2020, annual renewable capacity additions increased 45 percent to almost 280 GW, the highest year-on-year increase since 1999.

It is also forecasting that 'exceptionally high-capacity additions will become the 'new normal' in 2021 and 2022, with renewables accounting for 90 percent of new power capacity expansion globally'. Within this, it says that solar PV development will continue to 'break records', with annual additions reaching 162 GW by 2022, almost 50 percent higher than the pre-pandemic level of 2019.

In particular, the share of utility-scale applications is forecast to increase from over 55 percent in 2020 to almost 70 percent in 2022. This level of growth can be seen in many major markets, including the United States, where the Solar Energy Industries Association (SEIA) forecast that, after several years of uncertainty, large companies and utilities have led to massive increases in utility-scale solar procurement. As of Q1 2021, the contracted pipeline sits at 77 GW, with most of those projects slated for completion before 2024.

Similarly, in Europe, the IEA says that utility-scale growth will play an increasingly important role, with its share rising from 41 percent in 2021 to an average of 55 percent annually by 2023 25, owing to an increase in competitive auctions.

This rapid expansion over 2020 and forecasted growth for 2021-22 is fantastic news for the sector, and particularly the utility-scale market.

So, what are the key drivers supporting this robust growth outlook?

- **Increasing cost-effectiveness**

Solar PV is fast becoming the most cost-effective form of power generation and can be combined with energy storage to create a reliable source of power. This is as a direct result of the dramatic fall in solar panel prices, solar inverters and more cost-effective mounting and tracker systems, and increased efficiency of solar technology.

In addition, power purchase agreements (PPAs) are proving increasingly popular and are making utility-scale projects more economically viable. For example, while the United States remains the dominant corporate PPA market, activity in Europe almost tripled in 2020, with Spain also identified as a hotspot, with a record number of PPAs signed.

While the outlook is less certain in some markets, such as Latin America, especially due to the temporary impact of Covid-19, and changes in political support in the utility-scale sector in countries such Mexico, deployments are still expected to increase.

- **Government policies and regulations**

Many global governments have committed to ambitious carbon reduction targets, which is driving solar growth. For example, under the Paris Agreement, the U.S. and Canada

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committed to cut carbon emissions by approximately 30 percent between 2025 and 2030; Europe is aiming for a reduction of at least 40 percent below 1990 levels by 2030; and India has committed to cutting emissions intensity by 33 percent-35 percent below 2005 levels and generating 40 percent of its electricity from non-fossil fuel sources by 2030. The UK also became the first G7 country to legislate to hit net zero emissions by 2050.

- **ESG and the corporate decarbonization agenda**

The transition to renewables is now high on

the agenda for developers, investors, utilities, and policymakers, and is being driven by demand from the corporate market that sees procuring energy from a renewable source as a key part of their decarbonization plans. Where installing an on-site solar PV array isn't possible, buying from a renewable source that is generated from a utility-scale application is growing in popularity.

Innovation to meet demand

With these factors driving growth, particularly for utility-scale solar PV applications, how can technologies meet this demand?

- **Advancements in battery storage**

Storage is expected to play a key role in the future success of solar PV – not just for residential and C&I, but for utility-scale as well.

The cumulative installed capacity of energy storage projects is expected to increase from 11 GW in 2020 to 168 GW in 2030, according to BloombergNEF's New Energy Outlook. As batteries become more powerful and last longer, the switch from fossil fuels to solar PV renewable energy will be further supported, increasing overall demand.

- **Bifacial modules**

Maximizing power outcome is becoming another driver for the rapid growth in demand of utility-scale solar PV projects. One such innovation is the increasing use of bifacial modules.

In the US, a report from analysts Wood Mackenzie forecast growth of bifacial modules installed to 2 GW by the end of 2020 compared to 500 MW in 2019, and a huge increase to more than 7 GW by 2024.

- **Floating PV systems**

Floating PV is also a trend to watch. According to a report from Fitch Solutions, utility-scale floating solar installations are set to increase globally over the next few years, largely driven by increased investor interest and a growing project pipeline. It estimates that nearly 10GW of new floating solar capacity will be installed in the next 5 years, with Asian markets such as China, South Korea, India, Thailand and Vietnam expected to be key markets.

- **Higher current requirements**

Another important trend is the move towards larger size modules, with the incorporation of 210 mm larger wafers. This demand for high power density solutions and increasing the number of solar panels per string to reduce cost on BOS, will require inverter technologies to adapt to cope with higher current pics and a higher number of MPPT.

Technology solutions fit for the future: the PVS-350 and PVS-260/PVS-300

So, how do technology providers ensure that their solutions are fit for purpose in this new era for utility-scale solar?

For FIMER, a collaborative approach among solar project developers, IPP firms, EPCs, technical advisors and component manufacturers is crucial. As well as adapting and developing our technologies to meet new demands, being involved at the very beginning of the project helps to ensure that the right solution is specified that optimizes performance, increases production and keeps losses to a minimum, aiming to both increase IRR and reduce LCOE.

For example, we know that, while string inverters are becoming increasingly popular for utility projects, more traditional central architectures are still prevalent, currently accounting for almost 40 percent of the market.

With this in mind, we have developed two new market leading platforms for the utility market, a high-power MPPT inverter, the PVS-350, and the PVS-260/PVS-300 modular conversion platform, to cater for both decentralized and centralized applications, covering 100% of utility customer needs.

The main benefits of these two platforms include:

Improved flexibility for systems of any size: the PVS-260/PVS-300 has a large capacity combined with super-compact design single MPPT power block, to enable system designers to keep a 'centralized' system architecture if preferred. All power electronics are also concentrated nearby to the other critical AC power assets to simplify control and routine maintenance.

By combining the power modules in a factory pre-assembled and pretested MV station, the new platform can compete with multi-megawatt scale station designs of the latest central inverters, allowing system designers to apply the modular architecture to systems of any size.

Reduced risk of downtime: FIMER's new PVS-350 is the most powerful and power dense multi-MPPT string inverter in the solar industry, optimized for decentralized PV system architectures with a maximum efficiency of MAX > 99 percent to ensure the highest energy yield. It also has the smallest footprint when compared to other similar products, and significantly reduces

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the risk of downtime that can occur with central inverters.

Improved performance and lowering BoP costs: the PVS-260/PVS-300 modular conversion platform can easily replace central inverters in more traditional designs, optimizing the LCOE. For example, it can achieve a 2.3 percent reduction on the LCOE of a modular conversion architecture compared to a central solution. It also has higher system availability, above 99.9 percent compared to 99.5 percent maximum from central solutions.

Easy integration with future technologies: the new platforms will also be easily able to integrate with future requirements for battery storage, providing a whole-system solution for the utility market now and in the future.

A new era for utility-scale solar

In conclusion, it is an exciting time for utility-scale solar projects. Projected strong growth, favourable political and regulatory environments, and increasing corporate demand for renewable energy, mean that innovative utility-scale solar projects are being deployed to fully maximize the power of the sun.

This is pushing demand for technologies that are fit for future growth - a challenge we are more than relishing rising to.

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