Words: Lili Francklyn

Tracker company embraces large-format modules with their new single-axis tracker

FTC Solar has been preparing for over a year for the arrival of their next generation solar modules. These preparations are now paying off with the release of the new Voyager+ solar tracker, a robustly engineered, single-axis, two-in-portrait configuration that optimizes energy yields and takes full advantage of the larger, more powerful modules. One array built with large-format modules is already going into the ground as our teams work to deliver what will be among the first utility-scale projects in the U.S. utilizing the new

'We are honored to be part of these incredible projects,' said Tony Etnyre, FTC Solar CEO. 'We're pleased that we can now support these exciting next generation modules with our innovative, two-in-portrait tracker systems. This, along with the industry-leading installation speeds of the Voyager tracker allows our customers to realize significant value in their solar projects.'

What is driving the adoption of large-format modules?

Solar manufacturing is entering into a new era with the introduction of high-power, high-performance modules. Likely to be integrated in the utility-scale market first, large-format modules (LFM) are a result of the drive to produce bigger silicon wafers. Large wafers expose more area to the sun and as the larger cells trap more light, that translates to a direct increase in the power of the module.

Solar manufacturers are in the process of replacing the current architecture of 72 cells per module at 156/166mm and introducing larger wafer sizes at 182mm and 210mm. In addition, they are slicing, dicing, shredding, and configuring new cell architectures to boost power output. One important result is bigger modules are evolving to house the larger wafers. While 500+ watt modules are entering the marketplace now, 600+ watt modules should be available later this year.

The advantages of large-format modules

The key attraction of super-size modules is a significant increase in power, which translates into potential improvements in return on investment (ROI) for solar developers. Next generation modules also enable greater efficiencies in construction, which can lead to reduced labor costs.

LFMs generating upwards of 500 watts per module produce more power per panel, or 14% more power per unit area of land according to FTC Solar Chief Technology Officer Nagendra Cherukupalli. In addition to

more efficient land use, they hold the promise of reduced racking, electrical infrastructure, and other balance of system (BOS) components. FTC Solar's new Voyager+ tracker, with its two-in-portrait architecture and unique installation efficiencies, greatly improves the land use equation and delivers construction advantages for solar developers.

Large-format modules lead to greater efficiencies in labor use simply because there are fewer modules to install per equivalent MW capacity. Although they are bigger and heavier, LFMs require less manpower per MW to install then standard solar panels. That too leads to additional investment gains.

According to a recent report on high-power, high-performance modules by Wood Makenzie, savings on labor and land can significantly reduce non-hardware costs in LFM installations. In the year 2020, fully 80% of utility-scale solar CAPEX in solar costs depended on the number of modules in a project and their power class, according to the report. Raising the power class, as large-format modules do, lowers the number of modules and the capital costs accordingly. Ultimately, the result is a lower levelized cost of energy (LCOE) and more profitable returns.

With the introduction of these LFM modules the solar industry is moving beyond a decade-long period of standardization. While module sizes remained relatively consistent, that allowed an entire ecosystem of racking, DC collection systems, inverters, and other components to evolve to support standardized dimensions.

The change to LFM architecture will drive a revamp of this BOS ecosystem. The large-format module architectures that are proposed currently encompass a wide range of sizes: 2.5 – 3.1 m^2, open circuit voltages: 40 – 50 Voc, and wattages: 500W – 800W, all of which may vary as module manufacturers compete fiercely to define new standards.

The result is a transitional BOS ecosystem that will be in flux until those standards can be agreed upon.

Developing tracking infrastructure to accommodate large-format modules

FTC Solar is eager to meet the challenge of large-format modules – which company crews affectionately call 'the elephants'- and has developed the new Voyager+ tracker to handle the increased wind loads and other engineering challenges.

Project stakeholders can rest assured the large-format modules will be as easy and efficient to install as standard modules, and that they will benefit from the predicted reduction in labor costs. When utilizing FTC Solar's superior and proprietary construction techniques, we have calculated Voyager+ can reduce balance of system (BOS) costs and improve return on investment overall, compared to projects built with standard module sizes. FTC Solar's CTO Cherukupalli says, 'We believe that the improved power density and labor efficiencies associated with large-format modules will bring important benefits to our customers.'

Voyager+ has multiple features that are designed to handle increased wind loads created by the additional 'sail area' of LFMs and support the extra weight of large-format modules: Slew drives with powerful torque move the sun-seeking tracker from its eastern to western positions during the day; 150mm steel tubes which provide the main support for module weight are engineered to contribute torsional strength and resist bending. Robust module rails ensure that Voyager+ supports the heavier next generation modules and contribute to resisting the wind loads.

Finally, dampers, like the shock absorbers of a car, minimize potentially damaging torsional movement– and, as its name suggests, dampens, and absorbs these forces created by the wind. FTC utilizes more dampening power than other tracker systems to stabilize and protect the PV plant from damage.

Wind tunnel testing results have verified the suitability of the Voyager+ configuration and the ability of the components to withstand the greater loads generated from the large-format modules during wind events.

The new Voyager+, while specifically engineered to support large-format modules, incorporates the most successful design innovations of the first-generation Voyager tracker. With 1.9 GW deployed worldwide through 2020, Voyager has been certified by UL/Intertek, short-term field tested, and subjected to continuous improvement programs. The engineering criteria applied to the Voyager+ to handle increased loads preserve the Voyager's unique advantages of simplicity, flexible design, ease of construction and industry-leading installation times.

Voyager+ is supported by a sophisticated communications and control platform which allows remote control of the tracker by authorized personnel. This facilitates distribution of updated software, testing, trouble shooting and monitoring of the performance of the array.

FTC Solar's Voyager+ single-axis tracker systems provide an optimized yet flexible design architecture to accommodate large-format modules of various sizes. Our company is working closely with top-tier module manufacturers to align product roadmaps and ensure that each of our customers is receiving a tracking solution that maximizes the value opportunity associated with the adoption of LFMs. FTC Solar also provides optimization software solutions and engineering services that help customers achieve the best possible efficiencies in land use, labor, and time by developing optimal project configurations for every situation.

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