PVEL highlights industry trends and challenges in module manufacturing and technology

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The third PV ModuleTech (https://moduletech.solarenergyevents.com/) conference takes place in Penang, Malaysia on 22-23 October 2019. One of the key companies participating in the PV ModuleTech (https://moduletech.solarenergyevents.com/)event this year is PV Evolution Labs (PVEL).

PVEL provides extended reliability and performance tests to evaluate PV modules for the downstream market and produces the annual PV Module Reliability Scorecard.

Recently, PV-Tech took the opportunity to catch up with Tristan Erion-Lorico, Head of PV Module Business at PVEL and a key partner at the forthcoming PV ModuleTech 2019 (https://moduletech.solarenergyevents.com/) event in Penang this month.

We talked about some of the new industry trends in module manufacturing and technology, and what attendees of PV ModuleTech 2019 (https://moduletech.solarenergyevents.com/) can expect to hear from the company's presentation at the event.

What changes have you seen in the industry since PV ModuleTech last year?

Tristan Erion-Lorico: "Since last year's PV ModuleTech, bifacial modules have catapulted from a niche offering into a mainstream product. While most attendees of last year's event anticipated growth, few expected the technology to gain so much traction in such a short time. Instead, we've seen manufacturers rapidly expand bifacial capacity and bring new products to market. We're witnessing the development of several 100 MW+ bifacial solar power plants at many sites around the world.

At PV Evolution Labs (PVEL), I've observed this trend in two ways. First, more and more downstream companies are asking us for bifacial reliability and performance data. Second, more manufacturers are signing up to test bifacial products, and in some cases they're testing multiple bifacial products with us. Our bifacial testing queue demonstrates that developers and investors still lack important validation and technical diligence data that drives financing for bifacial projects.

In addition to the growth of the bifacial market, another change I've observed is the staggering number of new products in mass production from some of the biggest manufacturers. A few years ago, a module buyer could choose monocrystalline or polycrystalline, 3 bus bar, 60 or 72 cell. Now there is full cell, half cut, different cell sizes, different numbers of bus bars, n-type and p-type and different interconnection technologies, plus of course bifacial versions of many of those. The quantity of product iterations has many developers scratching their heads and looking to PVEL for data on the reliability of those various products."

What do you see as key challenges for bifacial modules?

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Modelling bifacial performance remains difficult due to a high degree of uncertainty around expected energy generation. There is very little well-validated, independent data that quantifies rear side gain. On the reliability side, we face lack of certainty around degradation rates. Do the back and front side of the module have the same degradation rates across all degradation modes? IEs need more data to address this uncertainty. In the meantime, the industry must contend with overly conservative energy yield forecasts and financial models – it is likely that developers are leaving money on the table.

There is also considerable uncertainty around bifacial site design optimization. We don't yet know the value of investing in specialized technologies to increase bifacial gain. When optimally installed, will bifacial modules drive enough additional energy yield to justify more expensive site designs? For example, does it make sense to use engineered ground covers that improve albedo, and what should the ground coverage ratio be? What tracker design is optimal – and how much of a difference does it make? As an industry, we are beginning to understand the implications of these site design changes, but more work is needed."

We are seeing the transition to larger wafers and therefore larger modules. What are the challenges associated with moving to larger module sizes?

"Compatibility with existing balance-of-system equipment and legacy systems is an important challenge that comes with moving to a larger wafers and therefore larger modules. Certain racking and tracking systems have strict specifications with regard to frame size and mounting hole location, so larger modules may require redesigned mounting systems. Likewise, most new, larger modules will not be backwards compatible with products that are operating in the field today. This will be a challenge for site owners and operators as well as manufacturers: How will manufacturers support warranties for smaller sizes if they no longer produce the products that must be replaced? The challenge of module replacement underscores the importance of selecting a high-quality, reliable product during the procurement process.

While this transition to larger wafers and modules is already underway, the industry has not settled on a standard for cell and subsequent module size. The manufacturing equipment in use by different manufacturers today have varying limitations, so different wafer and module sizes are being implemented in different factories around the world. The result is system design challenges for sites that will be installed in 2020 and beyond. There are no standard dimensions that developers can rely on for crystalline modules. With so many different available dimensions – and SKUs – it can be difficult to select the right module to design for."

You are going to be increasing the number of tests in future scorecards, why is this necessary?

"PVEL's PV Module Reliability Scorecard is based on results from our Product Qualification Program (PQP) for PV modules – it's our comprehensive suite of performance and reliability tests. The PQP is updated annually to support PV module buyers and investors conducting technical due diligence. This

year, we added new tests for backsheet durability, LeTID and microcrack sensitivity, but we also removed some tests and updated others. Our next Scorecard will address these changes.

Annual PQP updates are critical for the program to stay relevant to the global downstream PV buying community. Manufacturer's product roadmaps are more fluid and dynamic than ever before, and changes to production processes and bills of materials can have quality ramifications. We respond to feedback from our downstream partners and the broader industry at large about the reliability and performance issues they're experiencing the field, and we update our program to ensure those issues are captured.

Regular, frequent updates differentiate our PQP from industry standard certifications. Updating IEC standards can take years, and we are proud to contribute to that process. But new technologies are coming out at break-neck speed, and PV module buyers want to start using the latest products right away. Our PQP gives buyers and investors confidence in the quality of new technologies and innovations."

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