



Source: First Solar

Monitor this

Monitoring | Investors are looking for steady and predictable returns from their PV plant assets. Ben Willis charts the rise of monitoring technology and how it is becoming an increasingly indispensable part of the PV equation

A non-spinning wind turbine does not necessarily mean it isn't working, but it's a pretty useful indicator that something may be amiss. A malfunctioning PV module on the other hand is altogether harder to spot. Whether they're doing their job or not, PV panels just sit there. Some degrading panels will display symptoms that are visible to the naked eye, but without these visual clues the poor performance of a PV panel or whole system is not immediately obvious.

That's why monitoring is becoming such a critical part of the PV power generation equation. The need to know how a system is performing, whether it's falling short of its projected output, or has broken down altogether, is a key capability for its operator or investor.

"PV plants are going to be out in the field exposed to the elements for 20 years – so you do need to have some idea of how that asset is performing if you want to see

the return on investment," says Adrian De Luca, vice president of marketing at sales at Locus Energy, a US-based monitoring system developer. "Usually for the first three years of a system's lifetime, it performs with no problems. Once you get past year three, there are whole load of issues that can come up."

These broadly fall into the "catastrophic" and "non-catastrophic" camps, De Luca says. Catastrophic would be an event such as an inverter blowing up, but De Luca says it's the non-catastrophic events for which monitoring is most needed.

"Non-catastrophic events are ones such as when you're starting to develop degradation in the panels that's faster than it should be as per the warranty, or the inverter becomes less efficient," he explains. "And if you're losing only 7% to one of those loss factors, that does add up to quite a lot over the life of the asset."

A burgeoning market

The need for monitoring becomes even

First Solar's operations room. The US thin-film giant's recent foray into the European monitoring market is part of a growing trend.

more pertinent when you consider the trends now shaping the market. One of these is that subsidies such as feed-in tariffs, which guaranteed steady returns to investors, are losing ground to self-consumption models, where every kilowatt of hour of power counts. Monitoring therefore has a crucial role to play in ensuring PV systems are being used optimally and giving the owners maximum bang for their buck.

According to Cedric Brehaut, author of a recent report for GTM Research on PV monitoring, the attachment of monitoring systems to PV plants at the larger end of the spectrum is now near enough universal, but falls to about 25% in smaller systems. This gives plenty of scope for the retrofitting of monitoring systems to smaller plants to ensure they're delivering projected outputs.

Indeed Brehaut's May report for GTM revealed retrofitting to be one of the fastest growing segments of the monitoring market, accounting for 6.3GW – or 15% – in 2013.

Part of this trend stems from the retrospective attachment of monitoring units to PV systems that were originally built without them, something happening particularly in the pioneer European markets such as Germany and Italy.

Another factor in the retrofitting trend, though, is the fact that investors are amassing larger fleets. The individual projects within an investor's fleet will more than likely have been built by a multitude of different contractors, meaning a very fragmented patchwork of different systems operating within a single portfolio. Investors are therefore looking to standardise the technology through which they keep tabs on their fleet.

"When plants get sold on the secondary market, it's common for the investor to say, 'I bought these new assets and my standard solution for monitoring is x, consequently I'm going to upgrade everything to x. That's one of the big factors driving retrofits,'" Brehaut says.

Growing fleets

The growing size of investors' PV fleets is also behind some of the big technological developments currently taking place in the monitoring space.

As Brehaut explains, with investors' portfolios now numbering the hundreds or thousands of plants, it is becoming impossible for operators to monitor all of them. "You don't want to see a status for all of them. You just want to know which ones have a problem and what you need to do about it," he says.

Monitoring for large fleets is about "less data, and more information," De Luca adds: "If you have 35,000 PV systems, each sending data every five minutes, that's a lot of data. But what you can do with big data techniques to draw insights from that big batch of data? By making the management of that system cheaper over time, can we extract insight from that data and help operators drive costs down?"

O&M

Such capabilities clearly make monitoring invaluable from an operations and maintenance point of view, where the chief objective is to run a plant or portfolio smoothly and profitably for as little expense as possible. With this in mind there was little surprise when, in early June, the US thin-film and project development giant First Solar announced its acquisition of Germany monitoring firm, Skytron.

With a background in very large utility-scale PV power plants, for which it has devel-

oped its own bespoke monitoring system, First Solar's self-professed aim with this deal was on one level to gain access to Skytron's knowhow and technological solutions for smaller projects. But beyond that, the deal also gives First Solar a solid basis for expanding its O&M business in Europe.

"We see there's a big opportunity in Germany to begin with and throughout Europe for more traditional O&M services that First Solar provides globally," Bob Callery, First Solar's vice president of O&M says.

"There are a number of O&M providers who are the old EPC companies that actually built these plants – those guys, many of them are going out of business, and we see an opportunity to do what we do really well in the US, which is full O&M services, and use Skytron to bolster our capabilities and go after that market."

Brehaut and De Luca both believe that deals such as the Skytron buyout by First Solar will become more common in the near

'We can build these PV plants, but they do have failure, and really the interface is your monitoring system'

future. One driver for this will be the same motivation stated by First Solar – of acquiring data and expertise to be able to offer value-added services such as an O&M in a new geographic area and market segment.

According to De Luca another will be a consequence of decisions taken by large downstream companies such as First Solar or, say, Sunpower, or even inverter manufacturers that make their own monitoring systems, to turn to an independent monitoring provider when their own bespoke systems become outmoded. This is a prospect over which Locus and other independent monitoring are licking their lips.

"One of the dirty secrets of monitoring software is that the initial development is only a fraction of what it takes to maintain that software over its lifetime," De Luca says. "So when you get a big company like First Solar or SunPower developing their own solution, we always ask at what point do they re-evaluate and start to [turn to] independent providers.

"So the First Solar deal is very interesting, because it starts to make other companies start to ask that same question – do we want to continue to do this or do we want to buy or partner with another company? For

that [section] of the market serviced by the downstream players, if we can open that up, that's huge for us."

Grid control

The final big piece in the evolving monitoring jigsaw is the extent to which monitoring can help support grid operation. This will become more of priority as the penetration of PV increases and measures to ensure grid stability are needed.

De Luca says the amount of data being collected by monitoring companies and the analytics capabilities now available offer utilities a potentially valuable insight into the functioning of the grid and how intermittent renewables can be balanced with other generation capacity. Monitoring and control systems will therefore play a vital role in the widespread adoption of PV.

"Solar is now getting large enough where companies like Locus have quite a bit of intelligence about the edges of the grid, and utility companies are starting to understand that," he says. "Things like voltage levels, power factor and frequency are being tracked by devices attached to our network; understanding what is happening here is important. But then once you understand that, you could adjust, say, the ratio of active to reactive power and potentially see massive impacts on the grid and lower costs overall."

Callery agrees such capabilities will be increasingly important as the industry matures by allowing solar operators to interact with the grid like any other generator and prevent utilities from regarding PV operators as "those solar guys". He says that one of the reasons for First Solar's acquisition of Skytron was because of the grid control functions it offered.

Long term, Callery adds, monitoring is going to be "huge" because of its status as the crucial link between PV equipment and people that allows a solar system to function.

"These plants have failure; they don't just run by themselves," he says. "So you need to determine soiling, when is it cost efficient to wash the panels, how do you manage outages, how do you find outages, how do you reporting, how do you report to banks, owners, how do you analyse failures or you can be proactive in fixing persistent problems. We can build these PV plants, but really the human interface is your monitoring system." ■

Author

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