Whatever the weather

Weather patterns can be notoriously difficult to predict, yet doing so is an essential part of getting the most out of solar systems. Carsten M. Steenberg, Vice President of Product Management at RainWise, briefs us on the benefits of having a dedicated weather station for a forecast that can be relied on.

PES: Thanks for speaking to me Carsten. Firstly, how important is it to monitor and measure the efficiency of photovoltaic systems throughout their lifecycle?

Carsten M. Steenberg: The expected life cycle is around 25 years or more using the latest technology. After that, photovoltaic (PV) module efficiency degrades at about 0.5% per year, and of course, failure rates tend to be higher as the equipment ages.

Monitoring a PV plant from C&I to Utility grade size is essential. In the past, the Performance Ratio (PR) model was the predominant metric for measuring efficiency, i.e performance ratio = actual production/model production (%). However, more and more sites are now relying on the Plant Availability (PA) model to measure a PV plant's operational status. This generally reflects component and system reliability, looking at uptime, downtime, and condition states. It is calculated as a percentage to represent the time that the power plant is available to provide energy to the grid or be thought of as the plant's uptime.

With that in mind, an operations and maintenance (O&M) team's most significant focus is to maximize PA, essentially keeping the plant running. It's clear that weather conditions have a significant impact on PV

plant production. While cloud cover is the primary influence when it comes to solar output, all weather parameters such as air temperature, relative humidity, wind speed and direction, precipitation and air pressure greatly influence the performance of PV solar cells. Because weather can vary significantly, even across a relatively short distance, monitoring microclimate weather data at the PV plant site is crucial versus relying on nearby airport or government weather data.

PES: How big a task is it?

CS: By investing in a rugged, reliable weather monitoring system, companies and organizations can benefit from easier, accurate, real-time data of several vital parameters. This includes power production vs. the calculated maximum output based on the current solar irradiance value. Solar irradiance measurement is the most important weather parameter used for the Performance Ratio (PR) calculations.

Panel temperature is the second most important parameter; heat can reduce output efficiency by 10-25% depending on installed location. As the temperature of the solar panel increases, its output current increases exponentially, while the voltage output is reduced linearly.

Thirdly, real-time wind measurement is especially important for PV plants using tracker systems to optimize panel sun exposure. It's known that high winds are the number one common cause of damage to photovoltaic systems. Wind can also help

Carsten M. Steenberg

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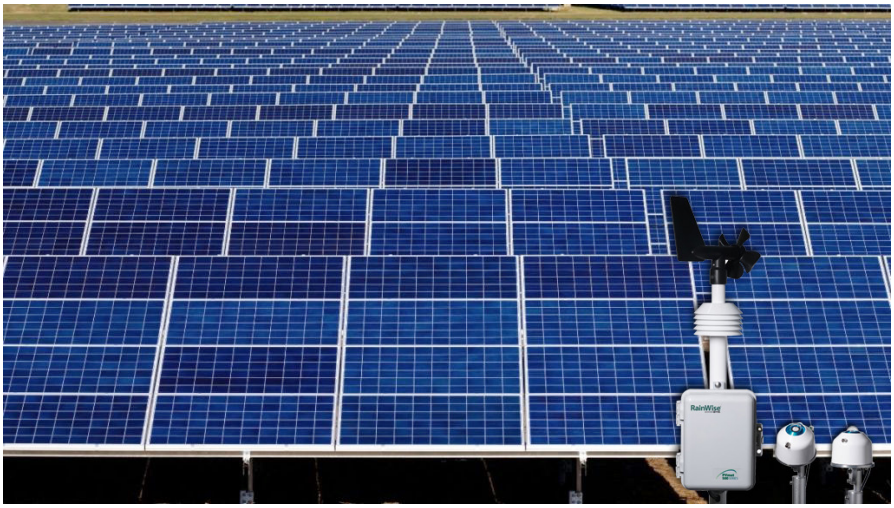


cool the PV surfaces down, knowing the wind can also affect soiling.

PES: What solutions do you offer to help?

CS: The PVMet line of weather stations provides critical monitoring of meteorological data, including the solar irradiance in GHI (Global Horizontal Irradiance), POA (Plane Of Array), and ambient & PV panel temperature. Other models also measure wind speed and direction, along with precipitation and barometric pressure.

PVMet weather stations from RainWise have been the preferred brand by many C&I plants worldwide since 2012. Weather stations are configured by solar weather experts to exact needs and arrive fully assembled. With the ease of installation, a single mast solution, reliable performance, and dependable customer service, PVMet remains a top choice. O&M and plant managers use the real-time meteorological data from PVMet weather stations to feed their selected PV monitoring software to alert if the actual production is less than the ideal calculated from the weather data parameters.

PES: Cost, is of course, a consideration and particularly so for smaller sites and domestic situations. How do you achieve accurate monitoring with reliable results in a cost effective way?

CS: One of the strengths of the broad offerings of the seven PVMet models is that we have a solution to fit every need and for every budget. The PVMet 75 using our own silicon diode irradiance sensor starts at only $945 list price.

PES: As a US-based company, do you concentrate on this market or are you able to offer a global service?

CS: Historically, the global market has had a higher demand for PVMet stations than the US market. However, in the last 18 months, we have been getting good tracking in the North American marketplace. We have always had a very responsive support team and knowledgeable sales staff, but it’s really the compact design and the ease of installation that makes this product line one of the least service demanding devices.

PES: How are you finding the market for solar and solar monitoring in the US?

CS: We are seeing explosive growth, especially in the utility grade PV plant, but also a decent growth in the C&I. We are all affected by supply chain problems, so the implementation of the PV plants does in general have some delays. As mentioned before, RainWise/NK is experiencing growth in our home market. We see this as a result of now being part of a bigger organization, with more resources on many fronts. RainWise was acquired by Neilsen-Kellerman in Jan 2020.

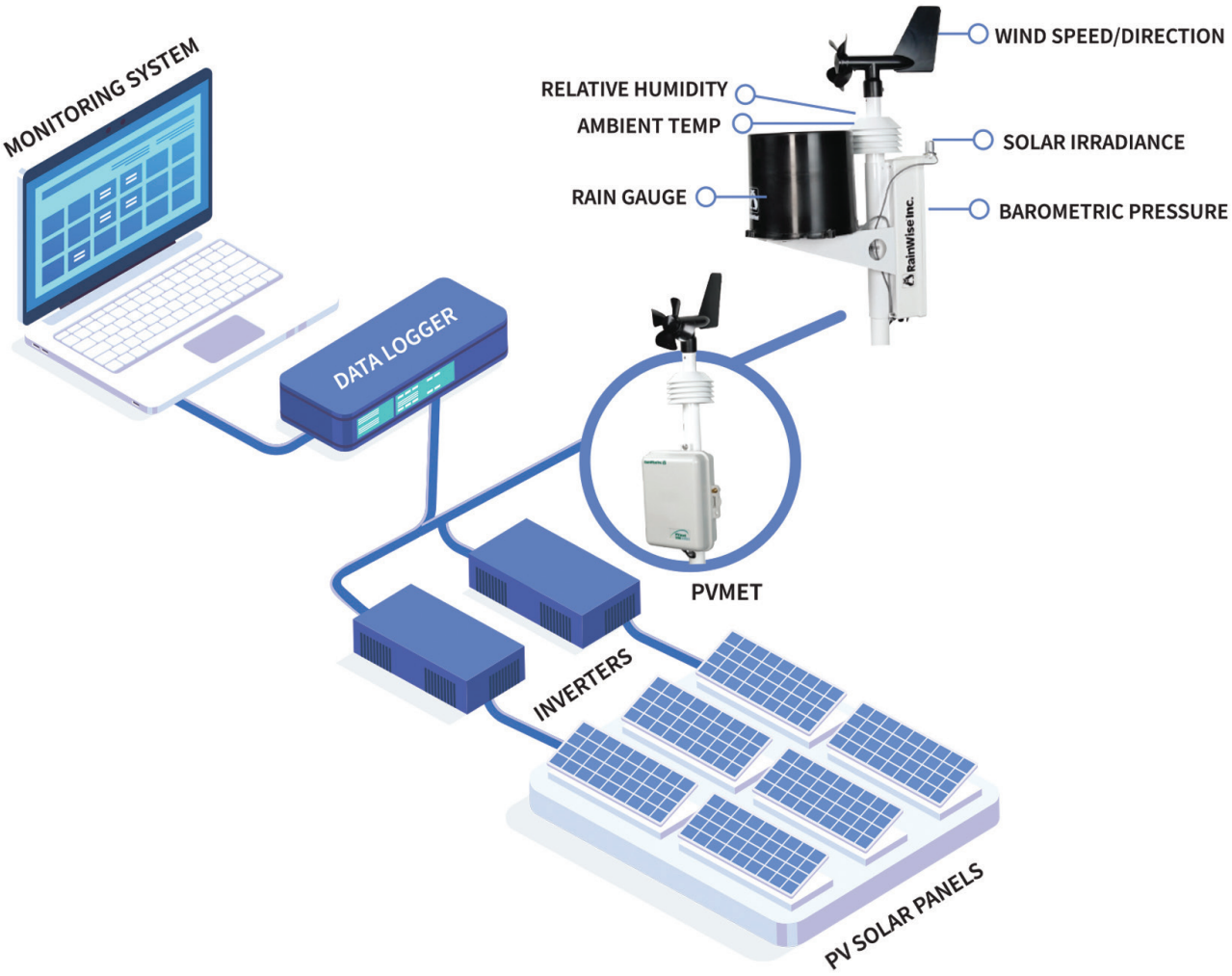
PES: You’ve been involved in the solar industry for a while now with your weather monitoring systems, how have you seen the market developing?

CS: Yes, we started selling the PVMet 100 & 200 in late 2011. There is no doubt that RainWise is a pioneer in this segment. Since then, there has been solid global growth in the market and a degree of competition.

In addition, the price of PV panels has continued to drop, while the efficiency has increased. Due to these two factors, we have seen many installations in countries that are not known to have a significant amount of sunlight, like the UK and Denmark, for example.

PES: How do you see technology in terms of monitoring and measuring PV system efficiency developing, now and in the future?

CS: Undoubtedly, understanding the need for extensive monitoring has matured tremendously in the last ten years. Of course, the demand from the entities financing the majority of the plants has focused on the



importance of monitoring.

A new awareness has grown around the monitoring of soiling of the PV panels. With the increased efficiency of the PV panel, the production reduction effect of soiling resulting from dust, soot, salt, and bird droppings can be dramatic. Soiling can result in losses in energy production of more than 10% per week.

Regarding weather station technology, certain standards like the IEC-61724-1 have outlined specs for irradiance sensors in the various classes A, B & C. We have also seen a preference in moving to Modbus TCP using the Ethernet communication vs. Modbus RTU using the serial RS485 technology.

In general, it's more the recognition of the need for proper O&M services that has been increasing vs major changes to the monitoring systems technology.

PES: Do you think it can develop at a fast enough rate to meet demand?

CS: With reference to the previous question, I don't see any problems keeping up with the demand for new monitoring technology. Currently, a lot of technology development is focused on how to clean and maintain solar panels more cost-effectively while limiting the manual labor involved.

PES: Are there new ideas and innovations from NK in the pipeline that you can tell us about?

CS: The parent company for Rainwise and PVMet continues to invest in product improvements, advancements, and new technologies. PVMet will introduce Modbus TCP connectivity, starting with the new PVMet 200 TCP, which will be available in summer 2022. Based on our most successful PVMet model, the compact PVMet 200 TCP station provides increased reliability with a built-in TCP/RJ45 Ethernet connection, eliminating the need for costly converter technology when connecting to the TCP/Ethernet environment. Discoverable via Wi-Fi, the PVMet 200 TCP can be remotely managed and configured via an internal webpage for easy setup and hassle-free firmware upgrades.

PES: And finally, what do you think is next for the PV industry and solar? What does the future look like?

CS: There is a global trend towards solar energy to reduce net greenhouse gas emissions, that is often accelerated by tax policies and mandates to accelerate specific goals. At the same time, there is momentum to continue to move away from fossil fuels to meet climate-related targets.

We are also witnessing the expansion in the electric vehicle landscape, research indicates that by 2035 the largest automotive market will be fully electric. Heat pumps are replacing standard heating and cooling systems for both homes and businesses. Renewable energy offers a more efficient and cost-effective option for both residential and business entities.

The future is quite bright for the solar industry; research companies estimate that the global market will almost double by 2030.

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