



Research and innovation pay off

Ruud Ringoir, product manager at Kipp & Zonen is a regular visitor to PES. It's great to hear that the markets continue to be buoyant. There is continuous research into optimizing their solar radiation measurement tools, which will spill over to the roof top market.

PES: Welcome back to PES Solar/PV magazine, Ruud, it's great to talk with you again. I'm sure there will be some new readers, so could you begin by explaining a little about the background of Kipp & Zonen and the importance of the solar/PV industry to you?

Ruud Ringoir: Yes, my pleasure. Established in 1830 and manufacturing pyranometers since 1930, Kipp & Zonen has a long history as a leading manufacturer of accurate and reliable solar radiation sensors and systems.

We offer a wide range of radiometers from ultraviolet to far-infrared. Our market has long been meteorology and science, but over the last 20 years solar energy has become our main market. Product improvements and interfaces have optimized our monitoring solutions for this industry.

PES: Are you still finding this is a growing market?

RR: Yes, we have spent years explaining to solar energy customers the benefit of accurate solar monitoring, now we can focus on advising the most optimal

solutions for their local situation.

This shows the market has matured and is now focusing on optimizing performance. The price drop in PV panels made it an attractive source of solar energy. The ongoing research, prospecting and performance monitoring is also still a growing market for us.

PES: Bifacial seems to be the new trend in PV, can you explain what it is and whether you are expecting this trend to continue?

RR: Bifacial is simply a PV module that makes use of solar radiation coming in on both sides, therefore the back is also transparent. When sunlight hits the ground or any other object it is reflected back, when the reflected light hits the back of the bifacial module it adds to its energy production. The relation between the incoming and reflected light is the so-called albedo.



Albedometer Kit SMP

Depending on the conditions the energy gain of bifacial modules can be 10% or more. To make optimal use of bifacial modules a high albedo, high DNI, optimal row to row distance and module height are required. This technology has been around for over 10 years but the latest improvements and pricing makes it possible to stand out, given the right conditions, over conventional one-sided PV panels. Tracking mechanisms have been optimized to work with bifacial modules and these technologies are often combined.

PES: Is it possible to monitor bifacial PV with pyranometers?

RR: Yes, to monitor a bifacial PV plant a double pyranometer (albedometer) is used in the plane of array, one facing up for global tilted radiation, the other facing down for the (tilted) reflected light. The albedometer existed long before the bifacial technology, because it is used in

meteorology and climate research as well.

To measure the incoming plane of array irradiance for performance ratio purposes the positioning of the pyranometers is generally well understood. However, for measuring the reflected radiation coming into the back of a module there are few guidelines. It is important to select the right location, where the pyranometer is parallel to the module and receives light representative of the array. It might not correspond with the position of the POA pyranometer.

If the conditions affecting the amount of light reflected vary along a row, it may be necessary to average over two or more downwards-facing pyrometers. The local albedo is not a fixed number but dependent on solar angle and weather conditions, such as rain or frost on the surface.

PES: Please could you explain what albedo is and why it's important to measure it?

RR: Albedo is defined as the ratio of the diffuse reflection of solar radiation to the total incoming solar radiation, it is dimensionless and expressed as a number between 0 and 1. Where 0 is total absorption and 1 is total reflection. For example, green grass has an albedo of around 0.25, dry desert sand about 0.4, whilst fresh clean snow is more than 0.8.

All bifacial modules make use of the reflected irradiance, so proper monitoring includes the albedo monitoring as well. Because there are limited mathematical models for bifacial modules, monitoring the albedo is essential to prove the performance of the system.

PES: We are curious to know which solutions you recommend to

O&M companies?

RR: In fact, all our pyranometers can be used as albedometers. As explained above, the optimal position to measure the reflected light is not always identical to the measurement of the incoming global radiation.

Using a set of two identical pyranometers, one facing up and one facing down is enough to measure the albedo. The most commonly used type is a double SMP10 pyranometer. It can be mounted back to back and has a special mounting rod to make it an all in one albedometer.

PES: Are your systems easy to use or is specific training needed?

RR: All radiometers and solar monitoring systems are easy to install and maintain. Nowadays in our smart radiometers the integrated desiccant lasts for 10 years and the modbus interface, with free software, makes it easy to set-up while the maintenance is minimal.

All the required information for installation is given in the instruction sheet. Technical background and all details are in the manuals that can be found online. Of course, when specific application questions come up customers can always contact one of our local distributors or if required our head office.

PES: Do you have any other new products or solutions in the pipeline – if so would like to hear about them?

RR: One of our new products, which has just become available is the DustIQ. A soiling sensor that will give you the soiling ratio of the panels. Requiring absolutely no maintenance it shows you how much energy you lose and the optimal point in time when to clean. When the panels get



RT1

dirty, the DustIQ gets dirty, when the panels are cleaned, the DustIQ gets cleaned. It is mounted on the side of a panel and gives the transmission loss of the glass.

This is directly connected to the energy loss of your PV park. Correlated to the bifacial modules, the back side might not be polluted as quickly and it is also not cleaned by rain. Therefore, we also recommend the DustIQ (in reversed position) for bifacial modules.

PES: What makes Kipp & Zonen stand out from the competition and why should customers choose you?

RR: Our knowledge of the solar monitoring market, wide product range, plus worldwide network of dealers makes it very easy to stand out and help customers locally, on individual optimized monitoring solution. With our recent integration in the OTT HydroMet group we are further expanding our network. Offering not only solar monitoring but also complete weather stations.

PES: Where do you operate and where are the key markets for Kipp & Zonen and are there any areas, geographically speaking, that you would like to break in to?

RR: Providing instruments for solar monitoring for almost 100 years, we have now local distribution in almost every country in the world. We see growth in Africa and South America, where bifacial projects specifically are gaining. Cost of land (row to row space) and high DNI are the key factors here.

Another part that we are focusing on is commercial rooftops. Often considered as too small to monitor we developed the RT1 (RoofTop1) with extremely easy mounting,

low soiling and high quality back-panel temperature monitoring. Here we see opportunities as it is an upcoming market with a lot of potential.

PES: What is the single biggest challenge facing the market today?

RR: Our biggest challenge is to optimize our product portfolio to the changing market. Maintaining accuracy and reliability with improved features for local requirements. Our customers in solar energy are not the scientists that clean and check their instruments every day. We as Kipp & Zonen have to make sure that even with less maintenance, the performance of our instruments remains optimal.

PES: Looking ahead into 2018 and



DustIQ



Luft WS510

beyond, what trends and/or changes are you anticipating in the solar monitoring market and why?

RR: We see a strong cooperation between local monitoring and satellite data, where integration of the two gives best results (see our white paper). With bifacial, tracking and other concentrating techniques we see an increased interest in DNI measurement.

Global warming with the pressure on fossil fuels and CO2 reduction plans make Solar Energy a good choice we should embrace. The sun, source of our energy is free, but for our and coming generations we better make optimal use of it.

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