

# A global approach to solar O&M

**Operations and maintenance** | The distribution and growing size of PV fleets mean new approaches to plant operation and maintenance are needed. Florian Danner, Jens Kahnert and Bjarn Röse of Conergy Services outline the key ingredients for cost-effective O&M in a globalised industry



Credit: Conergy

In the past, the solar industry thought about operation and maintenance (O&M) providers the way most of us think about doctors: we only see them once a year for a check-up or when something is wrong.

Now with nearly 178GW of solar installed globally, O&M is much less of a reactive service and more of a preventive one. To continue the metaphor, O&M providers are more like your personal trainers, your nutritionists, or even your hairdressers. Today, O&M providers don't just fix solar power systems when something goes wrong; they make sure solar power systems are always performing optimally — and looking good.

This is particularly important in the context of the global geographic expansion of solar. Fleets are becoming too large and dispersed now for O&M providers to run them effectively on a purely reactive basis. To keep costs down for O&M providers and keep profits high for solar asset owners, a preventative approach is needed.

Conergy's O&M team has identified some of the key building blocks of an effective process. Here we distil the key capabilities of the modern, global O&M team:

- 1 – Monitoring software expertise;
- 2 – Re-engineering expertise;
- 3 – Cost-effective cleaning and snow removal methods; and
- 4 – Efficient scheduling practices

## Monitoring technology expertise

In the past decade, the solar industry has gone from serving largely individual inves-

tors to largely institutional investors, who have a greater demand for detailed, reliable, real-time data on their PV systems for the purposes of financial modelling. Conveniently, the key to reliable data is the same everywhere: a great monitoring technology and expertise reading its data.

To start, you need a stable, reliable, and profound monitoring system — an in-plant SCADA — that collects and delivers all necessary data from all devices of the plant. Second, you need an automated data acquisition tool, normally embedded in a sorting data warehouse, to put them into a framework and make them ready for analysis. This is the crucial part of all O&M software, as nearly all the bigger O&M providers have a fleet, which consists of completely heterogeneous structures.

Third, you need your team to master the usage of the software. Service technicians cannot only be electricians anymore, but also need to be software engineers, network analysts and experts in electronics. You can only control your PV plant if you have a robust, flexible datalogger and SCADA system. This optimises full integration of the complete scope of O&M.

Conergy Services sees firsthand how modern technology reduces our costs significantly. We still maintain PV plants which were installed back in 2002 and are still working analogue. When we switch these older systems to modern technology, however, our manual labour and manual failure analysis needs reduce and our costs

decline by roughly 20-30%. Today, while the old devices are still working, Conergy Services is making a big push to integrate these older PV assets into a modern IT landscape.

## Ability to reengineer old plants

There are a lot of old PV plants that are not producing at their optimal capacity. At the same time, these older plants are at the end of their loan agreements, and customers have some freed up cash to invest in their solar PV system in new ways.

A modern O&M provider should be able to provide full re-engineering capabilities, to dive deep into the electrical setup and find possibilities for modification and optimisation of the plant's output.

There are a lot of possibilities to gain more yield. One is to exchange the equipment (modules or inverters). Conergy Services has developed complete new spare parts for existing old-fashioned central inverters. These small additions create a higher yield without the need to replace the whole inverter. Additionally, with new hardware, the service intervals will become longer, which will allow not only for better cost efficiency but also a higher yield of the entire service plan. Another possibility is to install a proper monitoring system, as mentioned above. There is no one solution to re-engineering an older power plant; each plant is unique and each solution must make sense for a given customer from the cost perspective.

It is critical, given the need for customisation and good judgement in the re-engineering process, to have an in-house field force of top service engineers. These engineers will know your systems inside out and are both backup and quality managers for your service partners.

## Cost-effective cleaning and snow removal

Data-driven, system-specific cleaning can make or break the profitability of your O&M business. To start, you should always test your system by experimenting with two reference cells. One of them should be

**Solar O&M practices are adapting as the industry expands its global footprint.**



Credit: Clean Clear Solutions

cleaned monthly and the other one should be left uncleaned. As soon as the (constant normal) deviation between both increases to more than 5%, due to the soiling effect, panel cleaning should begin (the soiled reference cell should be cleaned as well).

Moving forward, all production and irradiation data should be evaluated before and after cleaning to gain knowledge regarding the individual site concerned. This allows the frequency of cleaning to vary, which will benefit your time and costs spent. If you start to see that panels are getting soiled very frequently, you must identify the source and take all necessary steps to block this soiling.

For example, PV plants close to railway tracks and railway stations, industrial sites or on agricultural lands can suffer from excess emissions or dirt and need special attention. Regular controls on the soiling sources and steps to prevent this are mandatory for running any solar PV system profitably. New pressurised air technologies can also reduce costs, especially in dry parts of the world, where water is expensive or just not available. Snow removal is only needed in regions with long-term low temperatures below 2°C, where snow does not melt during the day. In these regions, it makes sense to remove the snow coverage with the same data-driven process you would use to clean your panels.

**Efficient scheduling**

As mentioned at the start, O&M is now a

preventative maintenance practice as much as it is a reactive one. This is the industry standard now and most EPC and O&M contracts include the complete scope of work for maintenance services and the frequency they ought to be performed, similar to manufacturer warranty conditions.

To avoid unnecessary production losses, many tasks should be done during low-irradiation times. These are transformer and HV-switchgear maintenance during the winter season, preferably in the early morning or late afternoon. For health and safety reasons, these works (mandatorily including HV-switching) must not be executed during the night. Another task is inverter maintenance. This should be scheduled for March/October and executed in the early morning, late afternoon, or on days where the weather forecast predicts cloudy conditions. These are the times when disruption to production is lower, but irradiance is still sufficient for monitoring purposes.

For I-V-curve measurements, on the other hand, high irradiation is needed in order to obtain reliable results. These tasks simply can't be done early or late in the daytime. Production losses are inevitable. In order to keep those as low as possible, a spot check of 10% of the strings should be sufficient, unless the permanently monitored performance ratio of the site implies serious problems initiated by the strings/panels.

**System-specific cleaning can make or break the profitability of O&M activity.**

From the whole range of different maintenance tasks, only a few, like transformer thermal imaging or maintenance work on the energy meters, require a partial or complete shutdown of the site. Those have to be identified and all necessary preparations need to be completed prior to execution.

Modern solar O&M is becoming an increasingly competitive business and cannot continue to be regarded as something done only when a plant malfunctions. An approach to O&M built around these four key areas will help providers optimise their practices and solar project owners ensure they will be maximising the value of their asset over its full lifetime.

**Authors**

Florian Danner is managing director of Conergy Services, the O&M business unit of Conergy. He has been with Conergy since 2006 and has a decade of experience in "after-sales" operations and customer care.



Jens Kahnert is also managing director of Conergy Services. He has been with Conergy since 2007 and has worked on "after-sales" operations, logistics, and process and order management.



Bjarn Rose is senior manager of business development for Conergy Services. He has been with Conergy since 2009, previously working in sales, product management and purchasing.

