SunSniffer meets the high requirements of new capital market regulations

Technical failures diminish yield, but often are ignored. This is dangerous – for the expected lifetime of the plant, but even more for its bankability. The Internet of Things (IoT) helps out: with module precise measurements and sophisticated analysis finding what only technical experts where able to determine. An online technical performance rating of a PV plant.

The measurements together with **high performance simulation engine** of SunSniffer contains a **simulation** which calculates with **real, measured data** of each module. New capital market regulations require a thorough due diligence and ongoing risk management procedures. Banks and insurances are requested to either implement a qualified inhouse risk rating or take advantage of external professional rating services.

As the measurements comprise next to voltage the **modules temperature** data, the site conditions are calculated as well and together with the flash data an **extremely precise and ready at hand plant performance ratio** is provided – down to **module level**. These very calculation intensive **big data math** is enabled by an own data center with huge and **high speed computing power**.

SunSniffer **opens up the calculations for technical rating agencies** and provides online rating with commercial evaluations through a special interface. SunSniffer invites to participate in its ever-expanding value network of scientific institutions, manufacturers of all kind, consultants, etc. This technology is **relevant for all actors concerned with photovoltaics** and **new business models** are possible in the context of **industry 4.0**.

But yet, why is module precise monitoring that important?

Even IEA **strongly recommends** junction box level monitoring; this is essential for a pile of reasons – and indispensable in the long run. The problem: precise and reliable information are not available. But with the **individually specifiable interface** of the SunSniffer system now it is **easy to precisely assess the quality** of a plant.

In a recent study PV Tech[1] analyzed the economic impact of technical failures. Loss of income results from **repair costs** on the one hand, and **downtime** on the other. Downtime costs in turn comprise **detection costs**, amongst others. Detection can be an **expensive undertaking, in labor and money**, and **time-consuming** as well.
Furthermore, often failures appear not at once, but evolve over time, **reducing performance successively – without being noticed**. Alarmingly: Visual inspection, the common way to detect power reducing causes, is **not even able to identify** plenty of those errors.

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Most serious weak point: modules

The study uncovered that from all PV plant components, **modules constitute the gravest share** of failures occurring during operation of a plant. Of all components affected during a year, module failures totals 12% in comparison to e.g. 8% of inverter failures.
Regarding the total failure case rate it is even more evident: module failures comprise **over 60%** in the plants examined. Actually, the number refers only to the cases detected – creeping errors or errors still under the radar or just unlocalized errors **continue to decrease the yield of the complete plant**. The detected cases of PID for example amount to 'only' 5% of the total module failures, but lacking adequate tools for identifying this error the **dark figure <u>must</u> be much higher**.

Bathtub effect – the worst is yet to come

In that study of PV Tech the average running time of the plants examined was almost 3 years. Hence, those plants range between infant-failure phase and midlife-failure phase (according to IEA[2]). Errors inherent in the system, like material defects, installation faults, etc. may **not all have exposed themselves yet** – additionally to the **external influences** like storm or hail etc. And the wear-out-failure phase, the phase when warranties expire and degradations increase massively due to natural erosion, poor material quality etc. is still to come. Those effects are the more pressing, as **undetected errors can compromise healthy components** over time as well. According to this study, undetected errors can **<u>double or triple</u> the impact on the economic risk** over the years.

So what can be done?

Monitoring a PV plant is inevitable. But monitoring at inverter level is monitoring at power collecting point and therefore the **knowledge obtained regarding the causes of a performance drop is nil**. String level monitoring at least can reveal which string is affected, but provides **no information about the exact localization or the cause**.

That too is the reason why the International Energy Agency in their study Task 13 in 2015 came to the conclusion, that monitoring "**at least on the junction box level is strongly recommended**"[3]. Only a profound monitoring on module level is able to **enhance yield <u>and</u> secure the asset**. Therefore, it has to be considered as **gross negligent to hazard the consequences** of not monitoring a plant on module level, especially as investor.

The SunSniffer technology provides not only the **precise measurements**, but the **sophisticated analyses** AND the respective **user-tailored output** via specified interfaces. With this tool banking institutions, consultants, insurances, module manufacturers or other parties can use their own interface with the individually specified data output. Warranty and other disputable issues can be **solved quickly, precisely, and reliable**.

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[1] PV Tech: Technical failures in PV projects, September 2016; http://www.pv-tech.org/technical-papers/technical-failures-in-pv-projects, 01 December 2016.
[2] IEA-PVPS, Task 13: Review of Failures of PV Modules; http://iea-pvps.org/index.php?id=275, 01 December 2016.
[3] Ibid.