

## LAUNCH OF THE “PV DOCTOR” - The Future of Solar PV Asset Performance Management

SINGAPORE, 2 April 2025.

### Launch of the “PV Doctor” – *we listen, we analyse, we cure*

The “PV Doctor”, launched today, is a **spin-off from the Solar Energy Research Institute of Singapore (SERIS)** at the National University of Singapore (NUS). **It commercialises 15 years of in-depth research on PV system performance in different climates and on maximising energy yield** – be it for well-operating (“healthy”) or under-performing (“sick”) installations.

**The “PV Doctor” offers a unique combination of cutting-edge data analytics using artificial Intelligence (AI), daily routine checks and performance benchmarks.** This ensures that PV assets under management (AUM) operate at optimum yield at any time.

Beyond the data-driven part, the “PV Doctor” also offers to rectify under-performing PV assets and bring them back to optimum energy yield levels. This will ensure higher revenues and ultimately higher returns on investment for PV system owners.

The “PV Doctor” was founded with a clear mission: to ensure that every signed-up PV system operates at its peak performance, delivering the value that owners expect. By combining cutting-edge AI-driven analytics with decade-long expertise in PV system behaviour, we provide real-time monitoring, alarm conditioning and actionable solutions that prevent energy losses and protect long-term asset value.

### Background

Solar PV systems are often sold under the assumption of “zero maintenance”. While the maintenance efforts for PV installations compared to other energy generating technologies with moving parts are much lower, they are not “zero” at all. In fact, a recent study shows that – globally – the annual amount of preventable losses of operating PV assets is USD 10 billion<sup>1</sup> !

Obviously, there are many “sick” patients out there. And that’s where the “PV Doctor” comes into the picture and helps owners of under-performing assets to find out the underlying root causes and rectifies them until the system is back to expected energy yields. Likewise, the “PV Doctor” also monitors “healthy” PV systems using its proprietary “Smart O&M” algorithm to make sure that the assets don’t move into “unhealthy” performance ranges in the first place.

### Fast ramp-up

The “Smart O&M” services were initially offered through SERIS to clients across Asia – and the sign-up rates prove the enormous demand in the region. **In less than 12 months, the assets under management (AUM) climbed to over 200 MWp, across 400 sites in 10 countries (see Fig. 1). In Singapore alone, more than 3% of all PV installations are already under “Smart O&M” monitoring by the “PV Doctor” (see Fig. 2).**

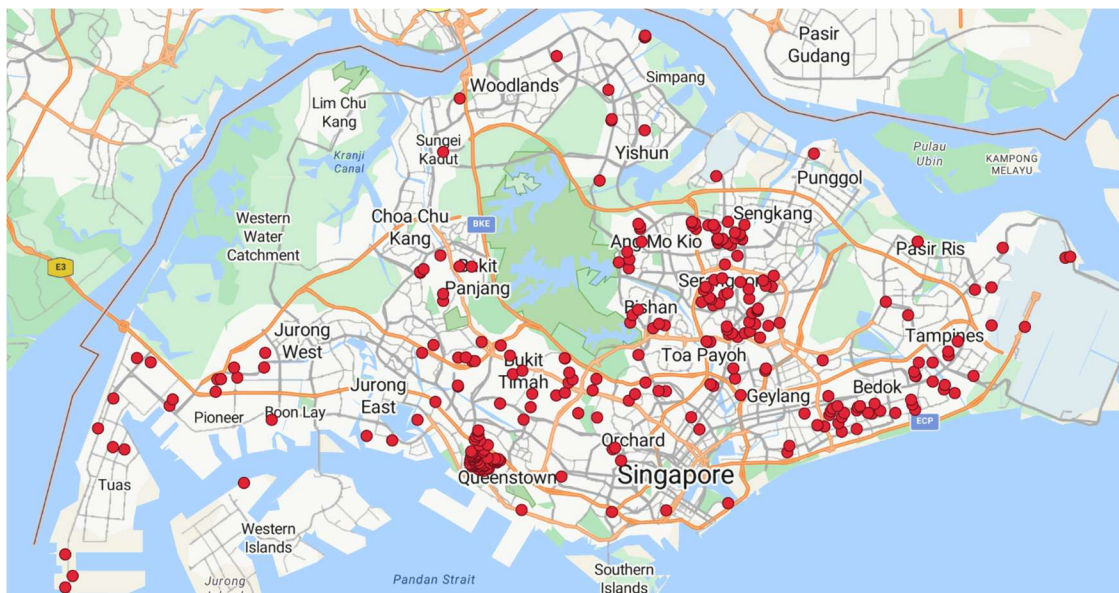
The new spin-off brings these numbers to new heights and also offers a much broader service base (see “Comprehensive List of Service Offerings” below).

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<sup>1</sup> <https://www.pv-tech.org/raptor-maps-us-solar-loses-us10-billion-asset-underperformance-2024>



*Figure 1: Locations of PV assets under management (AUM) by the “PV Doctor” (as of 2 April 2025). The spin-off currently monitors over 200 MWp, across 400 sites in 10 countries.*



*Figure 2: More than 3% of the current PV installations in Singapore are already monitored by the “PV Doctor” (as of 2 April 2025).*

## **Comprehensive List of Service Offerings by the “PV Doctor”**

The “PV Doctor” is a one-stop shop for both healthy and under-performing PV installations – irrespective of the system size. We work with all types of clients (such as system owners, developers, EPCs, O&M companies) and all system sizes from small residential to C&I installations and utility-scale solar farms.

Below is a list of the six core services that the “PV Doctor” offers to clients:

### ***1. Smart O&M – Keeping systems at best performance levels through real-time monitoring***

The core of “PV Doctor’s” services is Smart Operations & Maintenance (“Smart O&M”), a data-driven solution that automatically detects performance issues, analyses root causes, and proposes corrective actions. By directly integrating with inverter portals, PV Doctor eliminates the need for additional hardware, making it easy and cost-effective to onboard. The AI-driven system leverages high-precision local sensors (where available), with satellite data and machine learning algorithms to identify performance anomalies, including, for example:

- Performance ratio trending and behaviour;
- Soiling losses caused by industrial pollution, crops burning, or construction soiling;
- Shading impacts from nearby buildings, vegetation growth, or seasonal changes;
- Grid disturbances that affect system stability in regions with unreliable infrastructure;
- Component failures, such as inverter shutdowns, undetected string faults, or degraded modules.

### ***2. Preventive O&M – Proactive maintenance activities for highest energy yields***

For solar asset owners who prefer a hands-off approach, the “PV Doctor’s” Preventive O&M programme ensures that systems remain clean, well-maintained, and fully operational, without the need to involve system owners and facility managers. Routine inspections, scheduled cleanings, and early fault detection help prevent minor issues from escalating into costly failures.

### ***3. Rectification & Special Investigations – Diagnosing and fixing performance losses***

Many PV systems suffer from gradual component failures (e.g. potential-induced degradation, PID) or hidden inefficiencies arising, for example, from faulty wiring, loose connections, and insulation failures. System located close to the equator often see module glass staining from water/dust accumulation on solar panels installed at shallow tilt angles. The “PV Doctor” will not rest until the root causes of any under-performance have been identified, irrespective of the complexity of the failure pattern. The team will then work out rectification measures and implement the necessary steps, in close alignment with the client.

### ***4. Repowering – Upgrading aging systems for renewed & increased energy yield***

Older PV installations often fail to meet expected outputs due to outdated components (modules with low efficiencies, inverter failures due to ageing) or inefficient system layouts. Repowering revitalises these assets, incorporating the latest technologies, from state-of-the-art modules to modern inverters and real-time monitoring systems. This allows for maximising energy yield on a certain site location and extends system lifespan.

### ***5. Audits & Performance Assessments – Independent 3<sup>rd</sup>-party verifications***

Independent audits or performance assessments are required at many points in time during an asset’s lifecycle, for example during a due diligence process prior to an asset transfer or for certifying electricity generation to verify Renewable Energy Certificates (RECs). The “PV Doctor” generates independent 3<sup>rd</sup>-party audits and performance assessments using satellite-derived irradiance data, thermal imaging, and detailed electrical analysis to verify energy output, identify discrepancies, and support compliance with industry standards.

## **6. Technical Support – Expert guidance for asset owners, developers, and investors**

Managing a solar asset (or an entire PV portfolio) requires more than just operational oversight. It demands strategic planning and informed decision-making. Whether it is about evaluating tenders, quality assurance during component selection, construction and testing & commissioning, or preparing for an acquisition (or sale of assets), the “PV Doctor” provides data-backed insights and risk assessments to ensure project success.

### **About the “PV Doctor”**

The “PV Doctor” is a spin-off from the Solar Energy Research Institute of Singapore (SERIS). It has its roots at the Solar Energy Systems (SES) research cluster at SERIS, which started assessing and optimising the performance of PV systems in the Asia-Pacific region about 15 years ago. This research was initiated and driven by two key staff members: Dr André NOBRE who was with a German PV manufacturer in the early 2000s before joining SERIS and Dr Thomas REINDL who started with photovoltaics in 1992 at the SIEMENS Corporate R&D labs and held various management roles in the solar PV industry (including COO of a German EPC company) prior to SERIS. André later joined a Singapore-based solar developer where he managed a fleet of ~700 MWp of PV assets and optimised their performance across multiple geographies and climates. Both are Co-Founders of the “PV Doctor” and combining their scientific-technical knowledge with their managerial and business expertise (both also have an MBA) led to the creation of this new venture.

As André and Thomas would put it:

*“By integrating real-time monitoring, AI-powered analytics, and expert-driven solutions, we hope to help solar asset owners to:*

- ☒ *Maximise energy yield by identifying and resolving performance losses.*
- ☒ *Reduce operational risks through predictive maintenance and early fault detection.*
- ☒ *Improve financial returns with data-driven decision-making and create long-term asset value.*

*The solar industry is growing rapidly, but without the right tools, many systems fail to reach their full potential. The “PV Doctor” is here to change that.”*

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