

Drones important to identify underperforming solar power plants

The value of a PV power plant relies heavily on the solar technology performing to its promised yield. But these large-scale operations have traditionally been difficult to monitor for faults, defective or degraded PV modules; a 100% technical inspection is unfeasible. There are now a number of technology innovations that are being used to inspect PV onsite with portable test equipment. In Australia, drones play an important part in identifying underperforming power plants.

In the past, suspect solar modules in a PV power plant would need to be dismantled and shipped to offsite laboratories to assess, resulting in a lengthy downtime of the PV string, and risk of damage during transport.

Recent monitoring innovations, including rapid advances in infrared inspection with drones, makes it possible to obtain an overall picture of the status of an operational PV array, as well as identifying specific PV strings or modules for further detailed analysis using mobile PV test centres. These onsite inspection methods allow a more targeted analysis of failure as PV modules are not blindly selected. Additionally, the quality and significance of the on-site inspection results are comparable to that of traditional laboratory tests.

Onsite PV inspection methods include:

- Drone-mounted electroluminescence and thermal infrared inspection of PV arrays
- Daylight current-voltage measurement of PV strings and PV modules
- PV module characterisation with a mobile PV test centre
- Dark current-voltage measurement of PV strings and PV modules
- PV plant testing vehicle for PV strings
- Electrical impedance spectroscopy of PV strings
- Daylight electroluminescence imaging
- UV fluorescence imaging
- Advanced outdoor photoluminescence imaging
- Spectroscopic methods for polymeric materials

These PV inspection methods are comprehensively reviewed in a new report by the IEA PV Power System Programme 'Qualification of PV power plants using mobile test equipment'. Australia is represented in this program by the Australian Photovoltaics Institute (APVI). The APVI's two contributing authors are Dr David

Parlevliet, senior lecturer in the Discipline of Engineering and Energy at Murdoch University, and Dr Oliver Kunz, post-doctoral researcher in the Photoluminescence Group at the UNSW School of Photovoltaics and Renewable Energy Engineering.

Dr Parlevliet said, “Being able to perform accurate and timely on-site inspection is particularly important in Australia given the long distances and time required to ship modules to a test lab.”

Drones have now become an important piece of the portable test equipment and as Dr Parlevliet explains, “are increasingly being used in industry to rapidly assess and monitor PV plants, sometimes autonomously.”

Dr Kunz followed, “the use of drones has been revolutionary in assessing the performance of PV power plants in Australia, often in remote locations and in harsh environments. Our skilled drone pilots are incredibly effective in reducing the costs and improving the accuracy of PV plant monitoring and management.”

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[Full Report: ‘Qualification of Photovoltaic \(PV\) Power Plants using Mobile Test Equipment’](#)

The IEA’s Technology Collaboration Programme was created with a belief that the future of energy security and sustainability starts with global collaboration. The Australian PV Institute, with support from ARENA, leads Australia’s engagement in the IEA Photovoltaic Power Systems (PVPS) program and works with its members to increase the uptake of PV through quality research, data and analysis.

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About the APVI

The Australian PV Institute is a not-for-profit, member based organisation which focuses on data analysis, independent and balanced information, and collaborative research. Our objective is to *support the increased development and use of PV via research, analysis and information*. The APVI promotes solar through its live solar mapping platform [<http://pv-map.apvi.org.au>], the national solar research conference and Australia’s participation in two International Energy Agency (IEA) programs – PVPS (Photovoltaic Power Systems) for solar photovoltaics and SHC (Solar Heating and Cooling), concerned with new solar thermal products and services.

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