

QUALITY ASSURANCE FOR
PHOTOVOLTAIC POWER PLANTS



FRAUNHOFER INSTITUTE FOR SOLAR ENERGY SYSTEMS ISE

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OPTIMAL YIELD THROUGH COMPREHENSIVE QUALITY ASSURANCE



The Fraunhofer ISE Quality Circle

Since 1990 Fraunhofer ISE has made important contributions to PV plant quality assurance through its professional services. With the four elements that comprise our Quality Circle we offer quality assessments for every stage of power plant project development, from planning to long-term operation.



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Energy Yield Assessment

The way to optimal yields begins with our independent energy yield assessment. We obtain high-quality meteorological data for the power plant location and construct a detailed performance model of the plant based on design documents. Our plant simulations use manufacturers' specifications augmented by expert knowledge gained through component tests carried out in our labs. The resulting energy yield reports provide detailed statements about all parameters that affect yield, as well as the associated uncertainties. We compare our yield predictions with actual yields from our long-term monitoring portfolio on a regular basis, and collaborate on international research projects. Both of these activities help us validate our yield assessments and support the continuous improvement of our methods and tools.

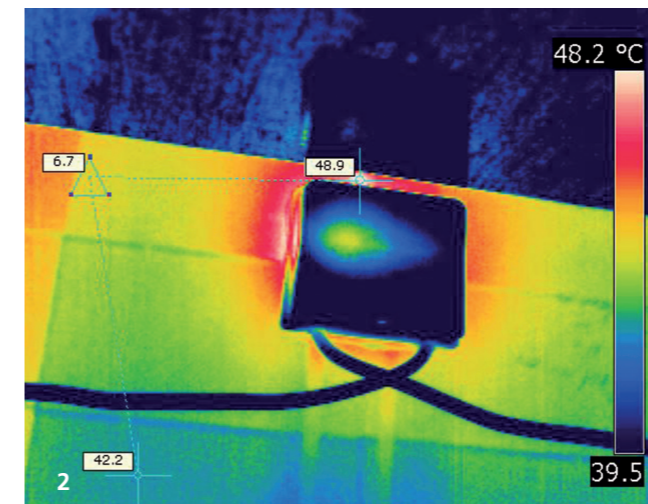
Module Measurements

Do the modules installed in a power plant conform to the manufacturer's specifications? Our clients find out for sure through performance testing in our accredited calibration laboratory "CalLab PV Modules". With a measurement uncertainty as low as 1.8 % we are leaders on an international scale. For investors and system operators we also offer statistically representative performance measurements in order to identify systematic deviations before the installation begins. A special selection procedure using the manufacturer flash lists allows us to test a small subset of modules and make a reliable appraisal of the capacity of an entire PV plant.

Power Plant Testing

To ensure that power plants are built to the highest standards and their design power rating is reached, we offer our customers a comprehensive system test program. This way corrections can be made and potential warranty claims filed in a timely manner. To determine the installed capacity we take IV-curve measurements of individual subsystems or strings, and defective modules are identified using a high-resolution infrared camera.

As part of the test program we also compare the installation with specifications in the energy yield assessment, and compile a detailed report of the deficiencies we find. If required, we can also provide certification of complete PV power plants in cooperation with the VDE Testing and Certification Institute. Our test methods and reports are recognized by investors and banks worldwide.



Monitoring

Independent confirmation of the quality and performance of PV system components and complete power plants is valuable to manufacturers, EPC's, banks and investors alike. We offer customized PV monitoring solutions that are both reliable and accurate, for periods ranging from a few weeks to many years. Our experts can provide in-depth analyses of the status and operation of all plant components. This makes early detection of suboptimal performance possible, and ensures that overall yields remain high. Long-term stability of PV modules is investigated through independent monitoring of reference systems and at our own outdoor test facilities. Through long-term collaboration with Fraunhofer ISE, large project developers have significantly increased the performance of their power plants.

Additional Services

To complement to our Quality Circle we offer customized services that we develop in close collaboration with our clients, for example comparative studies, or detailed characterization and modeling of new PV system components. We are also available as R&D partner and provide support in obtaining project funding.

1 Optimal yield is assured for this 1.5 MW roof-top power plant through the application of the full Quality Circle.

Photo: Pohlen Solar GmbH

2 Infrared images show important defects, such as poor connections inside a junction box.