



- 1 10 MW PV power plant in Abu Dhabi, quality assurance services provided by Fraunhofer ISE.
- 2 Infrared image of overheated bypass diode in a PV module junction box.
- 3 ANDASOL 3 parabolic trough power plant in Guadix, Spain with molten salt storage (bottom left), power block and solar field (right). ©RWE Innogy

QUALITY ASSURANCE AND YIELD OPTIMIZATION FOR SOLAR POWER PLANTS

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Over the last two decades Fraunhofer ISE has made important contributions to the quality assurance of PV and solar thermal power plants. We offer quality assessments for every stage of PV or solar thermal power plant projects – from planning and design up to long-term operation.

Our services and independent reports increase the confidence of all stakeholders, international project developers, EPCs (Engineering, Procurement, Construction), banks and investors. The Institute is certified according to DIN EN ISO 9001:2008.

Planning and Design

A successful project begins with the definition of specifications, the evaluation of the project site and the analysis of regional environmental conditions. Besides irradiation, this may include soiling risks,

temperature, humidity and salinity. Environmental and climate data from various geographic information systems (GIS) provide important information. Reports on the regional occurrence and deposition rates of mineral dust allow a qualitative assessment of expected soiling risks as well as associated maintenance costs and cleaning intervals.

We assess different PV technologies, non-concentrating thermal systems as well as single and multistage optical concepts for line focus and point focus systems in low, intermediate and high concentrating applications.

Our approach is based on an integrated assessment of material and component properties, cost structure, manufacturing, tolerancing, operation, maintenance and overall performance.



Yield Assessment

As part of our yield assessment services, we analyze different sources of solar irradiation data available for the region to give indications for design specifications. This supplies our customers with site specific input parameters for their own yield and profitability calculations, enabling high performance and maximum yield to be achieved.

We obtain high-quality meteorological data of the plant location and construct a detailed performance model of the plant based on design documents. Our plant simulations use manufacturer data optionally verified and completed by our own independent and precise component characterization. Our tools range from purely optical simulations to techno-economical optimization routines for entire solar power plants. The resulting yield reports provide detailed information on all parameters that affect energy yield as well as the associated uncertainties.

Engineering and Procurement

During the project engineering and procurement phase, a technology screening helps our customers to find the components that fit best to the specific project. With our in-house developed, manufacturer quality benchmarking, performed by our accredited labs, Callab and TestLab PV Modules, we determine optimal components using testing procedures optimized with respect to time and costs.

At our Testlab Solar Thermal Systems, we test complete systems and solar thermal components and provide our clients with support in developing their products. We offer accurate shape and surface measurements of mirrors and reflector panels as well as detailed simulations of deformations. Customized performance verification, visual inspection as well as precise energy rating and reliability testing deliver accurate input parameters for our simulation models.

Commissioning

To ensure that power plants are built to the highest standards and that they can reach the expected performance, we offer a comprehensive test program for solar energy systems. The range of services includes visual plant inspections, quality assurance of components, thermography and evaluation of plant performance.

The inspections carried out by Fraunhofer ISE help to identify defects and deficiencies in the installation. Early fault detection enables operators to react quickly for necessary repairs and potential warranty claims. Our tests are performed with approved state-of-the-art procedures.

4 Independent measurement equipment is used for performance evaluation.

5 Optical and thermal quality assessment in the solar field according to international standards and guidelines.

6 Independent testing of components – research on the optical accuracy of mirrors.

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System in Operation

Independent confirmation of the quality and performance of components and complete plants is valuable to manufacturers, EPCs, banks and investors alike, irrespective of how long a plant has been operating. We offer independent performance reports that are reliable and accurate, for periods ranging from a few weeks to many years. The reports include benchmarking as well as an analysis of measured versus expected performance ratios, based on our yield assessment. Moreover, a comprehensive plant inspection and failure analysis provides information about safety, optimization potential and may serve as a basis for re-powering projects. If desired, we also offer the certification of complete PV systems in cooperation with the VDE Testing and Certification Institute.

Customers profit from our long-standing experience with multi-MW systems and our network of international partners that guarantee excellent support world-wide.