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## **Consulting**

- Technical due diligence
- Factory inspection
- Design and optimisation of non-standard PV systems
- Third party expertise on PV modules and systems
- Yield estimation and site appraisal

## **Operation and Maintenance of PV Plants and Grid Integration**

- AI-based methods for optimized operation of PV plants
- Forecasts and predictive control to minimize grid loading and energy costs
- Optimized PV solutions for built and natural environment
- Integration of PV in hybrid energy systems including storage, heat pumps, e-mobility, H2 generation

Collaboration with other ZSW units and external partners



### **Contact us**

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Certification:  
DIN EN ISO 9001:2015



Quality,  
Reliability and  
Performance of  
PV Modules and  
Systems

ZSW PHOTOVOLTAICS

# SOLAB

Module and System Testing



Our mission is to enable durable and sustainable use of PV modules for our partners and clients.



## Indoor Testing Facilities

- IV measurement and EL imaging
- Climatic stress tests for temperature, humidity and UV
- Mechanical load tests
- Electrical isolation tests
- Material analysis of polymers
- Measurement and test protocols according to IEC standards and above
- Traceable calibration of instruments



## Outdoor Testing Facilities

- High-resolution monitoring of meteorological data
- Test beds with individual IV curve monitoring
- Fixed and tracking mounting systems
- Concentration up to 3 times
- Specialized set-up for non-standard modules

Operational since 1988, the ZSW test sites reflect our long-standing experience with diverse PV technologies and systems.

## Research and Development

- Performance monitoring and long-term stability
- Accelerated ageing and test-to-failure protocols, adapted to different PV technologies
- Study of particular degradation modes and material faults with focus on new cell technologies
- New test and qualification standards
- Circular economy aspects of PV modules (reuse, repair and requalification)

Participation in national and international R&D projects



The combination of indoor and outdoor test methods with the possibility to correlate the results are unique in this form. Our team identifies degradation mechanisms due to defects or light as well as isolation faults or material problems. We adapt test protocols to problem and customer requirements. State-of-the-art modules ranging from commercial scale to laboratory size are easily handled at the ZSW Solab.

**Data from  
5000+ tested  
modules of differ-  
ent technologies  
available**

