



Fraunhofer Institute for Solar  
Energy Systems ISE

**Fraunhofer ISE**

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**A Short Overview**

[www.ise.fraunhofer.de](http://www.ise.fraunhofer.de)

# Fraunhofer Institute for Solar Energy Systems ISE

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The Fraunhofer Institute for Solar Energy Systems ISE in Freiburg, Germany is the largest solar research institute in Europe. With a staff of more than 1 400, we are committed to promoting a sustainable, economic, secure and socially just energy supply system based on renewable energy sources. We contribute to this through our main research areas of energy provision, energy distribution, energy storage and energy utilization. Through outstanding research results, successful industrial projects, spin-off companies and global collaborations, we are shaping the sustainable transformation of the energy system.

Fraunhofer ISE operates in eight market-oriented business areas, cooperating with the global scientific community and maintaining dialogue with politics and society. The Institute is certified according to the quality management standard DIN EN ISO 9001:2015 and according to the standard DIN EN ISO 50001:2018 for energy management. The Institute's (provisional) total budget, which includes investments, was 135.3 million euros in 2023.



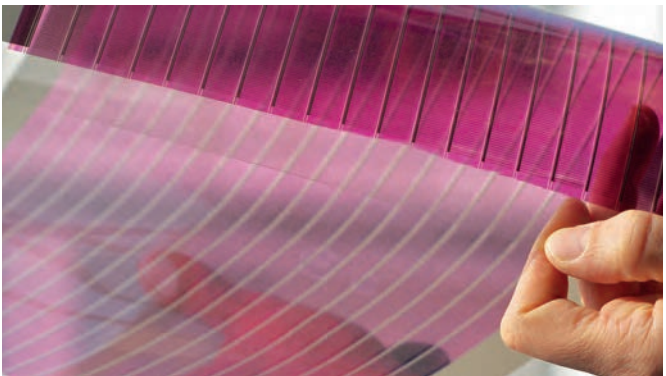
# Service Offers for Industry

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Our aim is to develop practical technical solutions for industry, either for them or with them. In doing so, we adhere to the Fraunhofer principle of applied research and make an important contribution to securing the market location and competitiveness in Europe and Germany. The Institute also offers a full range of testing and certification services. Our R&D extends from material research, through component development up to system integration.

The Institute carries out research and development projects at various phases in the life cycle of a given technology. Depending on the task and requirements of our clients and the technological readiness level, the Institute offers services in various forms:

- New material/process
- Prototype/pilot series
- Patent/licence
- Software/application
- Measurement analysis/quality control
- Consultations/planning/studies



# Business Areas



We contribute towards a successful energy transition with our industry-oriented R&D services."

**Prof. Andreas Bett, Prof. Hans-Martin Henning**  
Institute Directors, Fraunhofer ISE

## Photovoltaics: Materials, Cells and Modules

- Silicon Material and Semiconductor Substrates
- Silicon Solar Cells and Modules
- Silicon-Based Tandem Solar Cells and Modules
- Perovskite Thin-Film Photovoltaics
- Organic Photovoltaics
- III-V Solar Cells, Modules and Concentrator Photovoltaics
- Photonic and Electronic Power Devices

## Photovoltaics: Production Technology and Transfer

- Material Technologies
- Metrology and Simulation
- Coating Technologies and High-Temperature Processes
- Wet and Dry Chemical Processes
- Laser and Printing Technologies
- Connection and Encapsulation Technologies
- Artificial Intelligence and Data Management
- Technology Assessment and Transfer

## Solar Power Plants and Integrated Photovoltaics

- Module Analysis and Reliability
- Photovoltaic Solar Power Plants
- Integrated Photovoltaics
- Solar Thermal Power Plants
- Solar Energy Meteorology

## Power Electronics and Grids

- Power Converters
- High-Power Electronics and System Engineering
- Smart Grid Control
- Grid Planning and Operation
- Converter-Based Power Grids and System Stability

## Electrical Energy Storage

- Battery Management and Cells
- Battery Engineering
- Production Technology for Batteries
- Battery Integration and Operational Management
- Technology Evaluation for Batteries

## Climate-Neutral Heat and Buildings

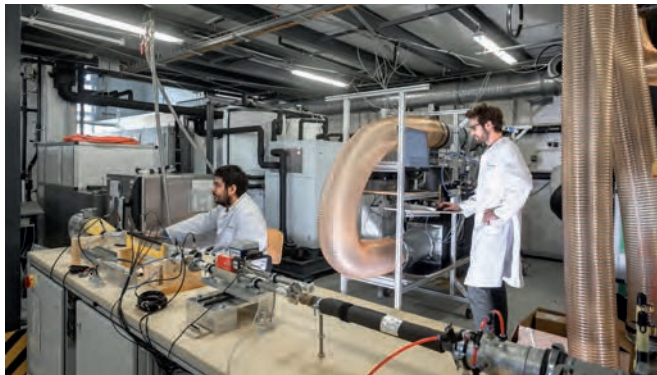
- Building System Technology
- Operational Management for Buildings, Properties and Industry
- Building Envelopes
- Heat Pumps
- Hot and Cold Storage
- Ventilation, Air-Conditioning, Refrigeration
- Water Treatment and Materials Separation
- Solar Thermal: Systems and Components

## Hydrogen Technologies

- Fuel Cell
- Electrolysis and Hydrogen Infrastructure
- Sustainable Synthesis Products

## System Integration

- Energy System Analysis
- Integrated Energy Infrastructures: Electricity, District Heat, Gas
- Energy Data Analysis
- Flexibility Management of Energy Systems
- Climate-Neutral Industry
- Climate-Neutral Cities, Urban Districts and On-Site Systems
- Electric Mobility
- Living Labs



# R&D Infrastructure

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A special feature of Fraunhofer ISE is its excellent technical infrastructure. Laboratories covering a floor area of 20 300 m<sup>2</sup>, including clean room space of over 900 m<sup>2</sup>, contain cutting-edge facilities and equipment and provide the basis for our R&D expertise. The R&D infrastructure of Fraunhofer ISE is divided into eight Laboratory Centers and four production-relevant Technological Evaluation Centers:

- Center for High Efficiency Solar Cells
- Center for Organic and Perovskite Photovoltaics
- Center for Functional Surfaces
- Center for Outdoor Performance
- Center for Power Electronics and Sustainable Grids
- Center for Electrical Energy Storage
- Center for Heating and Cooling Technologies
- Center for Electrolysis, Fuel Cells and Synthetic Fuel
- SiM-TEC – Silicon Materials Technology Evaluation Center
- PV-TEC® – Photovoltaic Technology Evaluation Center
- Module-TEC – Module Technology Evaluation Center
- Con-TEC – Concentrator Technology Evaluation Center



# Accredited Laboratories

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In addition to its R&D activities, Fraunhofer ISE offers independent testing and certification services to commercial enterprises and scientific institutions. Complementing its twelve Centers, the Institute has seven accredited laboratories for calibration and testing as follows:

**TestLab**  
PV Modules



**CaLab**  
PV Cells



**TestLab**  
Solar Thermal  
Systems



**CaLab**  
PV Modules



**TestLab**  
Solar Façades



**TestLab**  
Power Electronics



**TestLab**  
Heat Pumps  
and Chillers



# External Branches and Cooperation within the Fraunhofer-Gesellschaft

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- Fraunhofer Center for Silicon Photovoltaics CSP, Halle/Saale, Germany
- Fraunhofer Chile Research – Centro para Tecnologías en Energía Solar (FCR-CSET), Santiago, Chile

Fraunhofer ISE contributes its expertise as a member institute in associations and alliances within the Fraunhofer-Gesellschaft.

- Fraunhofer Cluster of Excellence Integrated Energy Systems CINES
- Fraunhofer Alliances: Energy, Batteries, Building Innovation, Space and Water Systems (SysWasser)
- Fraunhofer Electromobility Systems Research
- Fraunhofer Group for Energy Technology and Climate Protection
- Fraunhofer Group MATERIALS
- Fraunhofer Networks for Sustainability and Hydrogen
- Fraunhofer Initiative “Morgenstadt – City of the Future”
- Sustainability Center Freiburg, a cooperation between the University of Freiburg and Freiburg’s five Fraunhofer Institutes

## Contact

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