

Germany solar energy research and development

The Fraunhofer ISE has been conducting research along the entire battery value chain for many years. Now with today's inauguration of the Center for Electrical Energy Storage, the institute has access to state-of-the-art laboratories which enable cutting-edge international research.

Fraunhofer ISE was founded in 1981 by Adolf Goetzberger in Freiburg, Germany. It was the first non-university establishment for applied solar energy research in Europe. The first areas of focus were the fluorescent collector FLUKO, transparent insulation and the initial steps towards high efficiency silicon and III-V solar cells, silicon thin film solar cells and material research.

In 2011 Fraunhofer ISE celebrated its 30th anniversary. Since its founding, the scientists have received many prestigious prizes and awards for their research results in the field.

The solar energy research at Fraunhofer ISE establishes the technical prerequisites for an efficient and environmentally friendly energy supply for industrial as well as threshold and developing countries. The institute is committed to moving away from fossil fuels and nuclear power and moving towards a 100% renewable energy supply with the aim of providing affordable solutions for the energy transformation.

To this purpose, the institute develops materials, components, systems and processes for basic research and beyond. The areas of expertise include the development of production techniques and prototypes, setting up and monitoring demonstration systems and operating indoor and outdoor testing and calibration centers.

Photovoltaic Modules and Systems Module technology converts solar cells into a robust product for reliable operation in PV power plants. Fraunhofer ISE supports the product development concentrating on increasing efficiencies, reducing costs and achieving the highest reliability. Over and above, the Institute offers its services for quality assurance of modules and power plants.

Alternative Photovoltaic Technologies In addition to silicon photovoltaics, the solar cell research at Fraunhofer ISE also extends to other photovoltaic technologies: With III-V based semiconductors like gallium indium phosphide, aluminum gallium arsenide or gallium arsenide, the highest efficiencies can be reached today. The technology of the dye solar cells has developed well beyond the laboratory stage and organic solar cells are attractive especially due to the expected low manufacturing costs.

Renewable Power Supply The construction of grid-connected systems is the largest market for the photovoltaic branch today. The Institute provides consultancy services for system planning, characterizes solar modules and carries out the technical analysis and performance testing of photovoltaic systems.

Off-grid power supplies also are a focus of the ongoing research at the institute. People living in remote rural areas, the countless number of telecommunication systems, environmental measurement technology as well as portable electronic devices require an autonomous power supply, independent of the grid. Fraunhofer ISE develops renewable energy systems for this purpose.

Fraunhofer ISE also performs research in the area of power electronics and controls. This includes inverter development and testing in a modern power electronics laboratory as well as research in the field of energy management including smart metering and smart grids.

In future, vehicles will run partly or completely on electricity and draw their energy from the grid (electric and plug-in). Fraunhofer ISE is working at the interface between the vehicles and the grid on concepts for an environmentally acceptable power supply and the optimal integration of the vehicles into the electricity grid, including metering and billing systems.

The Institute is one of the founding members and the Member-in-Charge of the Fraunhofer Energy Alliance, comprising sixteen Fraunhofer institutes with expertise in energy technology and energy research.

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