

INTELLIGENT PHOTOVOLTAIC MODULE TECHNOLOGIES

Project title: **IPOT –
Intelligent Photovoltaic mOdule Technologies**
Project start: **May 1st, 2010**
Project duration: **4 years**
Total cost: **€ 4,960,000.–**
Website: **www.ipot-project.at**

The project is co-financed by the federal Austrian (BMVIT, BMWFJ) and the Carinthian government, managed by the FFG under the COMET programme – K Projects.



Competence Centers for
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FFG

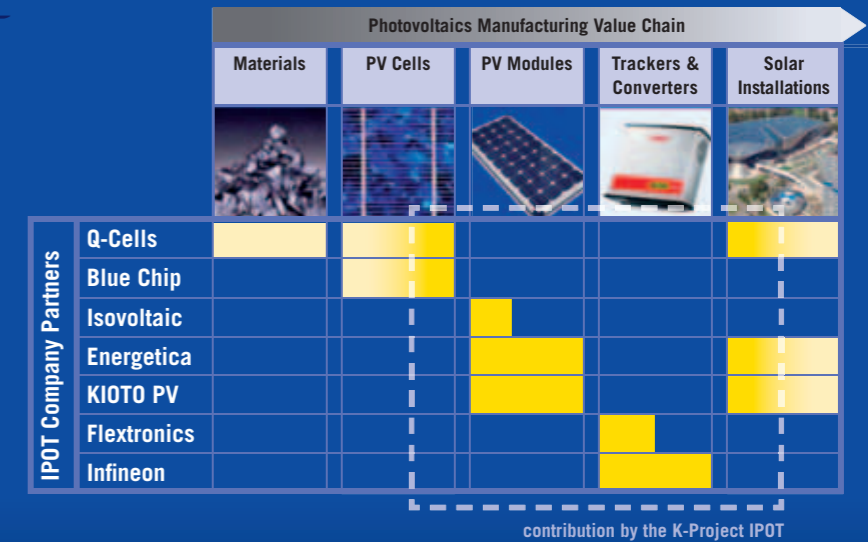


IPOT

www.ipot-project.at



IPOT unites partners along the entire photovoltaics value chain



Mission of IPOT

The IPOT consortium aims to achieve a significant improvement of the overall system efficiency of photovoltaic modules. Research goals are focussing on measures for increased effectiveness, cost reduction and the overall goal to reach grid parity for photovoltaic systems.

Motivation

Photovoltaics (PV) are currently amongst the most promising key components of renewable energy supply systems. The statistics on energy politics and photovoltaics leave no doubts about the importance of PV systems for building the global energy system of the future. Consequently, developing low-cost, highly efficient and intelligent photovoltaic modules, cells and components is now more important than ever before.

Current research deals mainly with PV cells and PV installations. IPOT will focus on a vital centre of all PV systems: the PV module. PV modules are an important building block for both grid parity and reliability. Their growth towards maturity can be seen from the increase of module efficiencies and from the narrowing of the gap between laboratory results and manufacturing practice.

The targeted innovations like integrated energy converters and advanced high quality PV modules offering higher energy yield, lifetime and stability will ensure unique selling propositions for the consortium partners and the whole domestic photovoltaic branch. This will help secure their market success, raise the international visibility and provide solid basis for long-term sustainable growth.

Objectives

The research focuses foremost on implementing inherent system intelligence. This integrated intelligence will present a unique feature in future products, generating technological leadership and effective added value for the producing company partners. IPOT's central science and technology objectives have all been aligned to these overall goals:

- Research, development and integration of **innovative PV module technologies** that enhance the applicability of modules and strengthen the competitive position of photovoltaics by tailoring to customer needs
- Improvement of the functionality of solar modules by **integration of MPP trackers** for higher overall module efficiency and improved operability
- Optimisation of **PV system efficiency**, in particular in combination with visionary smart cell concepts

Overall Strategy

IPOT collaborative research will overcome current technical challenges by developing key techniques to reach a significant improvement of the overall system effectiveness of photovoltaic modules. The consortium identified three core research approaches having potential for a lasting impact on in house grid parity and reliability of PV installations:

- **Module Technologies**
- **Integrated System Intelligence**
- **Improved Process Control**

Technical Approach

In line with the research programme focussing on PV module technologies, IPOT is divided into four interacting and complementary research projects:

■ Project 1: Advanced Module Technologies [AMT]

- Smart Front Cover Technologies
- New Encapsulation Technologies
- Alternative Frame Materials and Designs
- Total Quality Assurance

■ Project 2: Module Integrated MPP Tracker [MPP]

- Power Electronics Topologies for the Implementation of the MPPT on the Module Level
- MPPT Control Electronics and Communication
- Electrical, Thermal and Mechanical Integration into the PV Module

■ Project 3: Smart PV Cell & System Efficiency [SPVC]

- PV Monitoring System
- Smart PV Cell Concepts

■ Project 4: PV Sensor Lab [PVSL]

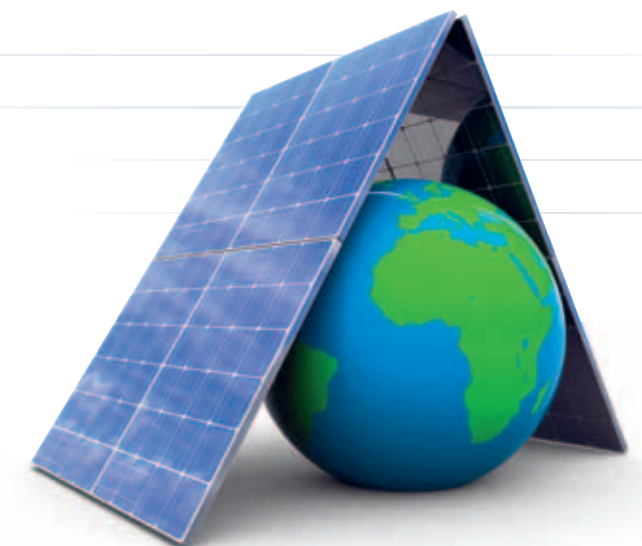
- Selection and Evaluation of Measurement Systems
- Conception and Testing
- Implementation

These research projects are further divided into individual work packages with clearly defined goals and interfaces to other activities. Milestones have been introduced at crucial points to ensure a critical review of project results and assist in liaising between individual research activities. The individual research topics interact considerably and thus aid each other, creating a substantial amount of topical research synergies. These synergetic cross-links will be further strengthened by the complementary research competences of the IPOT associates.

Expected Impact

IPOT collaborative research will overcome current technical challenges by developing key techniques to reach a significant improvement of the overall system efficiency of PV modules. In addition to expected technological advances, which will generate innovation in products, the joint research will also create socio-economic benefit:

- the results of IPOT will bring PV module technology closer to maturity and will facilitate strong penetration into the markets of renewable electricity production;
- a joint, cooperative build-up of knowledge, accompanied by a general increase in problem-tackling and problem-solving capabilities of all partners;
- supported by leading research entities AIT and CTR, a build-up of in-house R&D capacities will lastingly increase the R&D activities of the company partners;
- the formation and expansion of durable, national and international networks on both institutional and personal levels.



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Consortium

Bringing together leading companies and research institutions in the field, the vertically integrated IPOT consortium spans the bridge from basic research to industrial application development and implementation. The IPOT project brings together the individual strengths of the partners to take a significant step forward in the photovoltaics market. To guarantee the broad competence and the representation of key players of the photovoltaics value chain, the IPOT project is pursued and the results exploited on the European level.

