



## A Key Task to Accomplish the IEA PVPS Mission

The industry has a continued high interest in information on performance and reliability of PV modules and systems. In addition, financial models and their underlying technical assumptions have gained increased interest in the PV industry, with reliability and performance being key parameters used as input in such models.

Most accurate energy yield predictions in different climates as well as information on operational availability of PV systems are vital for investment decisions and, thus, for further market growth. In this context, performance and yield data, reliability statistics and empirical values concerning quality of PV systems are far more relevant today than they used to be in the past. The availability of such information is, however, rather poor.

Within the framework of PVPS, Task 13 aims at supporting market actors to improve the operation, the reliability and the quality of PV components and systems. Operational data of PV systems in different climate zones compiled within the project will allow conclusions on the reliability and on yield estimations.

Task 13 engages in focusing the international collaboration in improving the reliability of photovoltaic systems and subsystems by collecting, analyzing and disseminating information on their technical performance and failures, providing a basis for their technical assessment, and developing practical recommendations for improving their electrical and economic output.

## Objectives

Address the economic aspects of PV system performance and reliability and to review the current practices for financial modelling of PV investments from the perspectives of technical assumptions used in energy yield calculations, construction (CAPEX) and operation & maintenance (O&M) during the lifetime of the PV system. Provide guidelines and recommendations on means to account and represent the various uncertainties on these parameters in order to mitigate and hedge financial risks in a PV investment.

Provide available performance data for any kind of decision maker for different PV applications and system locations (e.g. different countries, regions, climates). This data is evaluated for its applicability and quality in both a quantitative approach, using very large data sets and statistical methods, and a qualitative approach, where evaluations on individual component performances are conducted.

Perform activities on PV module characterization and failure issues in order to gain a comprehensive assessment of PV module conditions in the field. The comprehensive collection and analysis of field data of PV module defects will increasingly become important, as there are indications that a growing number of PV installations world-wide fail to fulfil quality and safety standards.

Disseminate the results of the performance and reliability analyses to target groups in industry and research, financing sector, and the general public.

## Approach

Various branches of the PV industry and the finance sector will be addressed by the national participants in their respective countries using existing business contacts. Given the broad, international project consortium, cooperation will include markets such as Asia-Pacific, Europe, and the USA.

Task 13 is subdivided into three topical Subtasks reflecting the first three objectives stated above. The fourth Subtask, dissemination of information, utilizes the output of the three subtasks and disseminates the tailored deliverables produced in the three subtasks.

## Publications and Deliverables

The following technical reports will be published in early 2017:

- Report: "Technical Assumptions in Financial PV Models: Review of Current Practices and Recommendations"
- Report: "Improving Efficiency of PV Systems Using Statistical Performance Monitoring"
- Report: "PV Performance Modelling Methods and Practices Results from the 4th PV Performance Modelling Collaborative (PVPMC) Workshop"
- Report: "Uncertainty Framework for Data Acquisition and Modeling"
- Report: "Review on IR and EL Imaging for PV Field Applications"
- Report: "Assessment of PV Module Failures in the Field"

All publications will be available for download at the workshops section on the IEA PVPS website: <http://www.iea-pvps.org/index.php?id=165>



## Task 13 Participants in 2017 and their Organizations

Country	Organization
Australia	<ul style="list-style-type: none"> <li>CAT Projects, Desert Knowledge Precinct</li> <li>Murdoch University</li> <li>The University of New South Wales (UNSW)</li> </ul>
Austria	<ul style="list-style-type: none"> <li>Austrian Institute of Technology (AIT)</li> <li>Polymer Competence Center Leoben (PCCL) GmbH</li> </ul>
Belgium	<ul style="list-style-type: none"> <li>3E nv/sa</li> <li>KU Leuven</li> </ul>
China	<ul style="list-style-type: none"> <li>Institute of Electrical Engineering, Chinese Academy of Sciences (CAS)</li> </ul>
Denmark	<ul style="list-style-type: none"> <li>Silicon &amp; PV Consulting</li> </ul>
Finland	<ul style="list-style-type: none"> <li>Fortum Power &amp; Heat Oy</li> <li>Turku University of Applied Sciences</li> </ul>
France	<ul style="list-style-type: none"> <li>Commissariat à l'Énergie Atomique et Énergies Alternatives/ Institut National de l'Énergie Solaire (CEA - INES)</li> <li>Electricité de France (EDF R&amp;D)</li> </ul>
Germany	<ul style="list-style-type: none"> <li>Fraunhofer Institute for Solar Energy Systems (ISE)</li> <li>Institute for Solar Energy Research Hamelin (ISFH)</li> <li>TÜV Rheinland Energy GmbH</li> </ul>
Israel	<ul style="list-style-type: none"> <li>M.G.Lightning Electrical Engineering</li> </ul>
Italy	<ul style="list-style-type: none"> <li>European Academy Bozen/Bolzano (EURAC)</li> <li>Gestore dei Servizi Energetici - GSE S.p.A.</li> <li>IMT Institute for Advanced Studies Lucca</li> <li>Ricerca sul Sistema Energetico - RSE S.p.A.</li> </ul>
Japan	<ul style="list-style-type: none"> <li>National Institute of Advanced Industrial Science and Technology (AIST)</li> <li>New Energy and Industrial Technology Development Organization (NEDO)</li> </ul>
Malaysia	<ul style="list-style-type: none"> <li>Universiti Teknologi MARA (UITM)</li> <li>Universiti Teknologi Malaysia (UTM)</li> </ul>
Netherlands	<ul style="list-style-type: none"> <li>Utrecht University, Copernicus Institute</li> </ul>
Norway	<ul style="list-style-type: none"> <li>Prediktor</li> <li>University of Agder</li> </ul>
SOLARPOWER EUROPE	<ul style="list-style-type: none"> <li>SOLARPOWER EUROPE</li> </ul>
Spain	<ul style="list-style-type: none"> <li>DNV GL - Energy - Renewables Advisory</li> <li>National Renewable Energy Centre (CENER)</li> </ul>
Sweden	<ul style="list-style-type: none"> <li>ABB AB, Corporate Research</li> <li>Paradisenergi AB</li> <li>Solkompagniet</li> <li>SP Technical Research Institute of Sweden</li> </ul>
Switzerland	<ul style="list-style-type: none"> <li>Scuola Universitaria Professionale della Svizzera Italiana (SUPSI)</li> <li>TNC Consulting AG</li> </ul>
Thailand	<ul style="list-style-type: none"> <li>King Mongkut University of Technology Thonburi (KMUTT)</li> </ul>
USA	<ul style="list-style-type: none"> <li>Case Western Reserve University</li> <li>National Renewable Energy Laboratory (NREL)</li> <li>Sandia National Laboratories (SNL)</li> </ul>

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**International Energy Agency Photovoltaic Power Systems Programme**

**Task 13:**

**Performance and Reliability of Photovoltaic Systems**

**PVPS**

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