



## Short Introduction of IEA PVPS of Task 13

Ulrike Jahn, IEA PVPS Task 13 Manager

System Design of Partial Shaded PV Generators, 21 September 2023



- What is IEA PVPS?
- Task activities & deliverables
- Programme outline of today

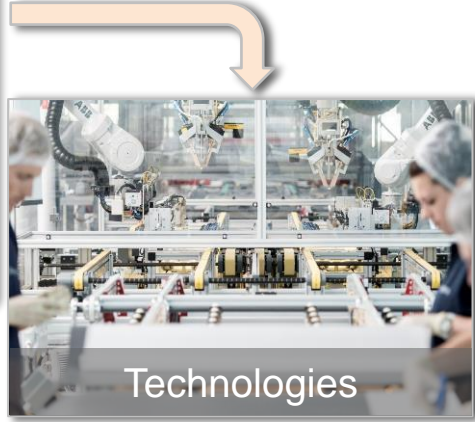
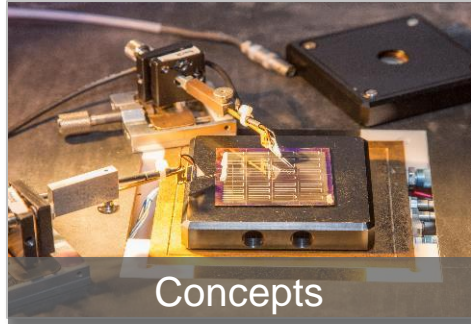
# IEA PVPS TCP in a nutshell



- 31 members - 26 countries covering 5 continents, European Commission, 4 associations
- A truly global and unbiased network of PV expertise
- Representing main stakeholders in R&D, industry, implementation and policy
- Covering a large majority of worldwide production, applications and markets
- *Mission: “To enhance the international collaborative efforts which facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems”*



# Working along the value chain



PVPS



← PVPS expertise and outreach →

## 8 Active PVPS Tasks...

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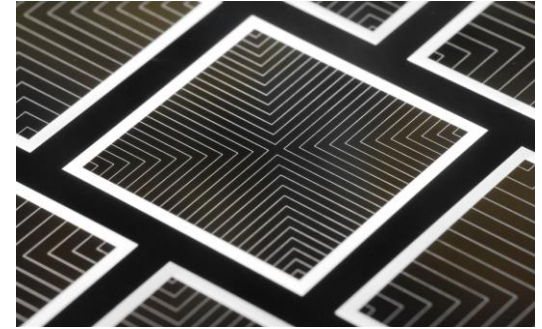


- Task 01 – Strategic PV Analysis & Outreach
- Task 12 – PV Sustainability
- **Task 13 – Reliability and Performance of PV Systems**
- Task 14 – High Penetration of PV Systems in Electricity Grids
- Task 15 – Enabling Framework for the Development of BIPV
- Task 16 – Solar Resource for High Penetration and Large-Scale Applications
- Task 17 – PV for Transport
- Task 18 – Off-Grid and Edge-of-Grid Photovoltaic Systems



## *PV Cells and Modules*

- Degradations modes of new backsheet materials
- Degradation modes in new cell and module technology
- Impact of testing strategies under specific load conditions
- Review of PV module repair strategies
- Re-qualification & standardization of 2<sup>nd</sup> life PV



## *PV + Storage Systems*

- Application-specific performance and degradation
- Estimating lifetime of PV + storage systems
- Guidelines for O&M of PV + storage systems
- Cost estimations for O&M of PV + storage systems



# Task 13: Performance and Durability of PV Applications (ST2)



## *PV Applications*

- Floating PV performance (modelling vs. real data)
- Floating PV - Degradation modes and PLR
- Agri PV: Performance of dual land use
- Bifacial PV tracking systems: Performance modelling
- Bifacial PV tracking for optimal performance and cost



## *PV Integration*

- Digital integration of PV systems from design to O&M
- Digital twinning of PV power plants
- Module Level Power Electronics (MLPE) in PV systems
- Performance comparison of MLPE vs. string inverter





# Task 13: Techno-Economic Key Performance Indicators (ST3)

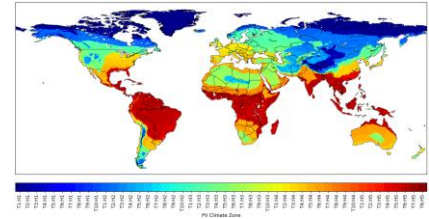


## *Overview and Assessment of*

- Extreme weather events and impact on KPIs
- Diagnostics, repair and mitigation strategies
- Best performing technologies for climatic conditions
- Guidelines for module selection and system design

## *Mapping of PV economic KPIs*

- Decision matrix of KPIs along the value chain
- Develop best practice flowcharts for PV projects
- Analysis of large-scale impact on reliability KPIs
- Visualization of techno-economic KPIs and global mapping





# Technical Reports [\(https://iea-pvps.org/research-tasks/performance-operation-and-reliability-of-photovoltaic\)](https://iea-pvps.org/research-tasks/performance-operation-and-reliability-of-photovoltaic)



Technology Collaboration Programme  
Task 10

Figure 10: Performance, Operation and Reliability of Photovoltaic Systems

**PVPS** **Uncertainties in Yield Assessments and PV LCOE 2020**

Report IEA-PVPS-T10-02-2020

Technology Collaboration Programme  
Task 10

Figure 10: Performance, Operation and Reliability of Photovoltaic Systems

**PVPS** **Climatic Rating of Photovoltaic Modules: Different Technologies for Various Operating Conditions 2020**

Report IEA-PVPS-T10-03-2020

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Task 10

Figure 10: Performance, Operation and Reliability of Photovoltaic Systems

**PVPS** **Assessment of Performance Loss Rate of PV Power Systems 2020**

Report IEA-PVPS-T10-05-2020

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Figure 11: Performance, Operation and Reliability of Photovoltaic Systems

**PVPS** **Bifacial Photovoltaic Modules and Systems: Experience and Results from International Research and Pilot Applications 2021**

Report IEA-PVPS-T10-06-2021

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Figure 12: Performance, Operation and Reliability of Photovoltaic Systems

**PVPS** **Performance of New Photovoltaic System Designs 2021**

Report IEA-PVPS-T10-07-2021

Technology Collaboration Programme  
Task 10

Figure 11: Performance, Operation and Reliability of Photovoltaic Systems

**PVPS** **Designing New Materials for Photovoltaics: Opportunities for Lowering Cost and Increasing Performance through Advanced Material Innovations 2021**

Report IEA-PVPS-T10-08-2021

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Figure 13: Performance, Operation and Reliability of Photovoltaic Systems

**PVPS** **Qualification of Photovoltaic (PV) Power Plants using Mobile Test Equipment 2021**

Report IEA-PVPS-T10-09-2021

Technology Collaboration Programme  
Task 10

Figure 10: Performance, Operation and Reliability of Photovoltaic Systems

**PVPS** **Service Life Estimation for Photovoltaic Modules 2021**

Report IEA-PVPS-T10-10-2021

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Figure 13: Performance, Operation and Reliability of Photovoltaic Systems

**PVPS** **Quantification of Technical Risks in PV Power Systems 2021**

Report IEA-PVPS-T10-11-2021

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Figure 13: Performance, Operation and Reliability of Photovoltaic Systems

**PVPS** **Guidelines for Operation and Maintenance of Photovoltaic Power Plants in Different Climates 2021**

Report IEA-PVPS-T10-12-2021

# System Design of Partial Shaded PV Generators



## Your speakers of today

### Ulrike Jahn

Introduction of IEA PVPS Task 13



### Mauro Cattivio

Definition of PV shading classes and criticalities in PV applications



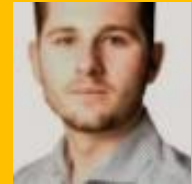
### Sara Golroodbari

Shading tolerant PV module measurements and simulation



### Cyril Allenspach

PV system performance of different power conditioner and shading index



### Bernhard Kubicek

Precise irradiance modeling as source of partial shading analysis



### Franz Baumgartner

Design recommendations of PV system affected by shading – Webtool



*Final Discussion & Wrap-Up*

iea-pvps.org

<https://iea-pvps.org/research-tasks/performance-operation-and-reliability-of-photovoltaic>

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