



# PV Reliability & Assessment of Technical Risks in PV Investments

## OUTLOOK FUTURE WORK OF IEA PVPS TASK 13

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PVPS





# Task 13 Extension – 2018 - 2021

<b>Performance, Operation &amp; Reliability of PV Modules and Power Plants</b>
<b>Topic / Activity</b>
<b>Topic 1: New Module and System Concepts and Designs</b>
1.1 New Module-Concepts, -Designs and -Materials
1.2 Bifacial PV Modules
1.3 New System Concepts and Designs
1.4 Service Life Prediction
<b>Topic 2: Performance of PV Systems</b>
2.1 Methodology to prevent the occurrence of failures in PV plants through the use of predictive monitoring
2.2 Uncertainty in yield assessments and PV LCOE
2.3 Modelling of performance loss rate
2.4 Climatic rating of different technologies for different countries
2.5 Impact of soiling on performance of PV systems
<b>Topic 3: Monitoring - O&amp;M</b>
3.1 Quantification of technical risks during O&M
3.2 Characterization of PV power plants using mobile devices
3.3 Guidelines for O&M procedures in different climates/countries
3.4 Assessment of Soiling Losses during O&M
<b>Dissemination / Outreach</b>



# Topic #1: New Module and System Designs

## Motivation

- PV is utilizing new materials, manufacturing methods, module and systems designs in order to lower costs and hopefully increase or maintain reliability.
- This activity will collect data from member countries on the emerging state of the art in PV modules and systems.
- The activity will provide recommendations on characterization methods for new technologies.

## Possible Task Focus Areas

- **New Module Materials and Constructions** (e.g., encapsulants, coatings, back sheets, cover sheets, adhesives, bifacial modules, shingled cells with conductive adhesive, lightweight modules (no glass), edge seals, frameless modules, integrated mounting, module power electronics)
- **New System Concepts** (e.g., coupled PV with energy storage, high dc voltage systems, advanced power electronics, tracking technologies, vertical bifacial systems, etc.)



# 1.1 New Module Materials and Constructions

- Encapsulants
- Bifacial module designs
- Shingled cells with conductive adhesive
- Glass-glass, frameless
  - Clip design
  - Integrated support structure
  - Composite frames
- Lightweight modules (no glass)
- Coatings
  - Anti soiling, reflection
  - Aesthetic
- Megamodules
  - May increase installation efficiency?





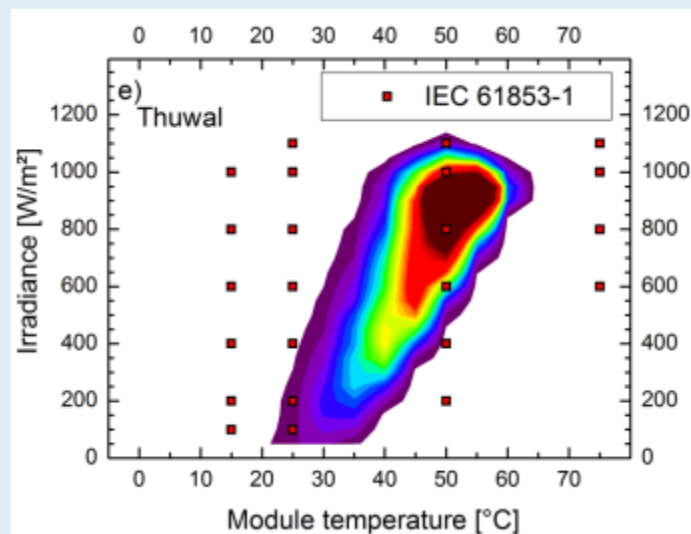
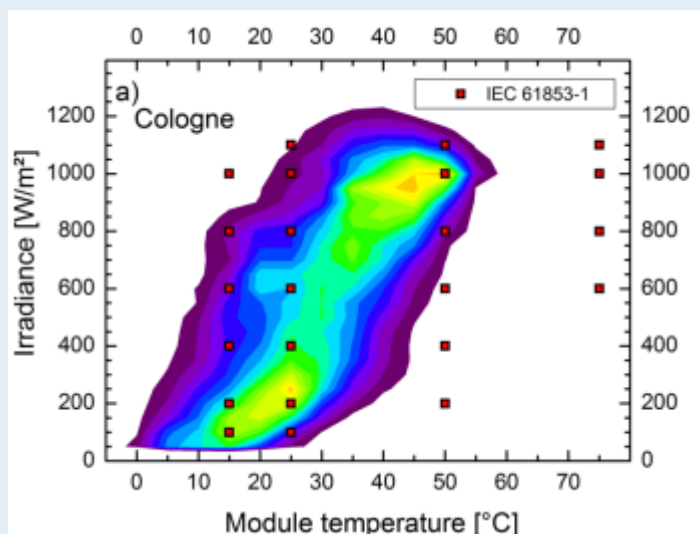
## Topic #2: Performance of PV Systems

- Predictive Monitoring
- Uncertainty in yield assessments and PV LCOE
- Modelling of performance loss rate
- Climatic rating of different technologies for different countries
- Impact of Soiling on Performance of PV Systems



## 2.4 Climatic Rating of Different Technologies for Different Countries

- What are the influencing factors for best performing modules and which PV module technologies are beneficial in which climates?
- Definition, collection and harmonization of reference climate data sets.
- How can the enhancement of pre-qualification of PV modules in the laboratory combined with reference climate data sets improve the yield prediction of different technologies and reduce uncertainties?





## Topic #3: Monitoring - O&M

- Quantification of technical risks during O&M
- Characterization of PV power plants using mobile devices
- Guidelines for O&M procedures in different climates/countries
- **Assessment of Soiling Losses during O&M**



## 3.4 Assessment of Soiling Losses during O&M

- Estimate potential energy yield losses of utility-scale PV installations due to soiling losses on a global scale, based on satellite derived soiling risk maps and performance models.
- Compare existing soiling models with real world PV installation losses based on local on-site-soiling
- Assess in-plant-variations of soiling profiles from inverter readings and low-cost-sensors
- Mitigation by soiling losses by new plant concepts and plant designs, new module technologies and materials.



Fig.1: Example of extreme soiling on the 150 MWp PV power plant in Copiapo, Chile.

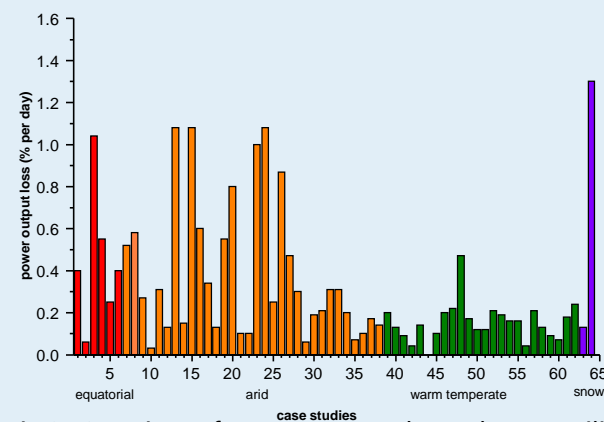


Fig.2: Overview of power output losses due to soiling based on current studies differenced according to climatic class.





## Next Task 13 Workshop

- *PV System Performance and PV Module Reliability*




IEA PVPS Task 13 Workshop at EU PVSEC 2017 in Amsterdam, The Netherlands

### PV System Performance and PV Module Reliability

**Day:** Tuesday, 26 September 2017  
**Time:** 09:00 - 13:00 h  
**Site:** RAI Convention & Exhibition Centre, Amsterdam  
**Access:** Open to all registered participants



IEA PVPS Task 13 Meeting, 27-29 March 2017   
SUPSI, CH-6952 Canobbio (Lugano), Switzerland