Need for energy rating

- € 50 billion annual market for PV, with strong future growth
- Sales currently based on "watts-peak" for conditions that are never achieved in operation, while the most important parameter for investors is energy yield
- Financial success of installations depends on energy generation rather than power values and there are cases that lower efficiency devices produce more energy
- Currently available metrology does not enable (judicial) expert assessors to clarify defects within the scope of warranty
- Focus on "watts-peak" can distort R&D efforts

Structure of the approach

- Develop an energy-based metric for photovoltaics
  - Development of energy-based metric and uncertainty assessment
  - Standard and geospatial climatic datasets
  - Measurement strategies for economical and accurate energy assessments

\[ I(T, E) = \int s(\lambda, T, E, \Omega) \cdot E(\lambda, \Omega) \, d\lambda \, d\Omega \]

- Detector characterization
  - New techniques for detector characterization
  - Linearity characterization of detector
  - Temperature dependence of detector
  - Angular dependence of detector

- Source characterization
  - Characterization of the solar spectrum
  - Spectral characterization of pulsed solar simulators
  - Characterization of LED based solar simulator
  - Simultaneous uniformimeter based on photodiode array
  - Uncertainty of spectral measurements

- Reference devices
  - Definition of required specs and selection of reference devices
  - Development and optimization of new reference devices
  - Validation of various improved calibration/characterization methods

- Calibration
- Measurement

Consortium and REGs

Summary

- Draft standards of 61853 series “Photovoltaic (PV) modules performance testing and energy rating” submitted to IEC
  - IEC 61853-2 “Spectral response, incidence angle and module operating temperature measurements”: Approved for FDIS voting
  - IEC 61853-3 “Energy Rating of PV Modules”: 1st CD
  - IEC 61853-4 “Standard reference climatic profiles”: 1st CD
  - All important players are involved to enable success

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