Pearl PV CKAN Data Challenge:
Comparison of PV performance across Europe

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COST Action PEARL PV aims at analyzing data of monitored photovoltaic (PV) systems installed across Europe to evaluate the long-term performance of these PV systems [1]. Datasets should allow to investigate energy performance, degradation, performance loss based on location, climate and PV technology. In the end **the goal is to have a harmonized, high-coverage, open dataset of solar photovoltaic installations across EU.**

Hence, we propose data challenge within the framework of Pearl PV, to address this issue. By contributing datasets, participants gain access to the datasets of other participants, and can join in a Europe wide intercomparison of performance and degradation of PV systems.

For this challenge, we ask you for your participation! Participants are asked to submit PV monitoring datasets to the CKAN data server of this Action [2]**, which have the following features:**

- A PV monitoring dataset, over **at least one full year** of operation.(Any datasets from 2000 till 2021)
- Recording interval of **one hour or less**
- Datasets should contain following variables:
  - global horizontal irradiance (GHI)
  - plane-of-array (POA) irradiance
  - module temperature
  - DC output power
  - AC output power
- Together with PV system metadata which is a part of the standard metadata that must be filled out in the CKAN data server when uploading a data file:
  - GPS Coordinates
  - Climate code (Koppen)
  - Fixed installation, tilt and azimuth
  - Tracking Mode
  - PV module technology
  - Total number of PV modules in the system
  - Number of modules connected in one string
  - Number of strings connected to each inverter
  - Total number of PV strings in the system
  - Soiling, Shading

The analysis of submitted data will be related to PEARL PV's main research questions which are as follows:

1- What is the relationship between weather data, PV system metadata and the power output?
2- The average annual yield of PV systems?
3- The performance ratio of PV systems across EU?

Participants are kindly asked to use the following key performance indicators (KPI's) in their analysis [3]:

- The final yield Y_f, is defined as the energy output (E_{AC}, the total AC power produced by the solar PV system over a defined period) per the system's rated capacity (P_{rated}).

$$Y_f = \frac{E_{AC}}{P_{rated}}$$

- The reference yield, is defined as the solar radiation at the plane of array (H_{POA}) divided by the irradiance at the standard test conditions ($G_{STC} = 1\ {}^{kW}/_{m^2}$).

$$Y_{ref} = \frac{H_{POA}}{G_{STC}}$$

- Average annual final yield and performance ratio (PR):

$$PR = \frac{Y_f}{Y_{ref}} = \frac{E_{AC}/P_{rated}}{H_{POA}/G_{STC}}$$

Timeline:

- Participants express their interest (deadline: 23 Dec 2021)
- Participants submit/upload their dataset (deadline: 15 Jan 2022)
- Participants submit results (deadline: 28 Feb 2022)

Please note: Participants should be registered in the CKAN data server.

References:

[1] "PEARL PV (pearlpv-cost.eu)." https://www.pearlpv-cost.eu/ (accessed Dec. 01, 2021).

[2] "Login - Pearl PV CKAN Repository (pearlpv-cost.eu)." https://ckan.pearlpv-cost.eu/user/login (accessed Dec. 01, 2021).

[3] S. Lindig, J. Ascencio-Vasquez, J. Leloux, D. Moser, and A. Reinders, "Performance Analysis and Degradation of a Large Fleet of PV Systems," *IEEE Journal of Photovoltaics*, vol. 11, no. 5, pp. 1312–1318, Sep. 2021, doi: 10.1109/JPHOTOV.2021.3093049.