

## Assignment

### Living Lab EnTranCe

#### Title assignment:

PV system monitoring possibilities of novel method for PV performance analysis

#### Client:

Power & Energy Distribution professorship  
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#### Problem:

Measuring real life PV systems is different from measuring PV panels in controlled environments. At the EU PVSEC 2019 conference Valckenborg and Van Aken presented the use of a matrix method to compare and understand the outdoor performance of different PV technologies [1]. It seems that this method could potentially be useful for practical oriented research on larger PV systems as well.

#### Description of the assignment:

In the method described by Valckenborg and Van Aken, PV measurements during a longer period, for example a year, are collected and statistically presented in a matrix with (plane of array) irradiance and (module) temperature as variables. We think that this method might be useful for practical oriented PV-research, like we do within our professorship. Together with one of the authors of the method, Bas van Aken (TNO), we want to study the suitability of the presented matrix method for monitoring PV systems.

Thinkable possibilities to monitor a larger PV system, with the proposed method, could be:

- Does the system show systematic difference, for example caused by shading or horizon objects?
- Is it possible to observe a global change in performance, for example caused by soiling, cleaning (mechanically or by rainfall) or degradation?
- Are seasonal effects visible, other than the effects that can be explained by the position of the sun, hours of sunlight and ambient temperature?
- ....

Measurements of a few local PV systems are available for the analysis.

If required, this master thesis project can be executed fully online.

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[1] R. M. E. Valckenborg and B. van Aken, 'Outdoor Performance Quantification and Understanding of Various PV Technologies using the IEC 61853 Matrix', in *Proceedings of the EU PVSEC 2019*, Marseille, Sep. 2019, pp. 880–886, doi: 10.4229/EUPVSEC20192019-4CO.2.2.

#### **Suitable for students of the course(s):**

European Master in Renewable Energy (EMRE)

European Master in Sustainable Energy System Management (SESyM), students with a strong technical and/or mathematical interest and background

#### **Type of assignment:**

Master – graduation

#### **Period:**

#### **What are we, and where do you find us?**

The Living Lab EnTranCe is the place where students work together with teachers, researchers, the business community, governments and/or civil society organisations on complex issues. We do this at the following locations:

- Location Proeftuin, Zernikelaan 17
- Location Energy Academy Europe, Nijenborgh 6.

#### **What do we offer?**

Interesting, topical and multidisciplinary research assignments in the field of energy transition.

Space for collaboration with lecturers, researchers, lecturers and the professional field.

Guidance within the innovation workshop by theme coordinators, project leaders or experts.

#### **Are you interested?**

Then please contact us:

## **Assignment**

### **Living Lab EnTranCe**

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