

PV performance during low irradiance and rainy weather conditions

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Introduction



With data made available by the Utrecht Photovoltaic Outdoor

Only timeperiods in which a plane of array irradiance of less

Test facility (UPOT) [1] the performance of **ten** commercially available PV modules during time periods of low irradiance and precipitation was analysed. Measurements were taken between **2013-03-20** and **2013-11-05** and had a granularity of a few seconds.

Results

As was expected precipitation causes module temperature to drop. Subsequently open circuit voltage (V_{OC}) increaces [Figure 1].

than 250 W/m² for at least 2 consecutive hours was measured were incorporated in the dataset. The average photon energy (APE) [2] was furthermore used to characterize the spectral irradiance and the temperature corrected **performance ratio** (PR) [3] was used to compare the different modules.

Conclusions

In terms of the PR it is shown that precipitation can increase performance by up to more than **12%** [Figure 4].





At low irradiance levels precipitation furthermore seems to shift the spectral irradiance more towards the high energy photon region of the spectrum [Figure 2].

a-Si and CdTe) [4] [Figure 3].

🔳 Rain 🔳 No Rain

The lower PR difference for the CIS module can be explained by its overall low performance and indicates that the module is faulty [Figure 5].

It should be noted that a time-lag between cell temperature measured at the back and photon excitation at the front of the module possibly attribute too much performance gain to a shift in spectral irradiance. Accounting for this still yields significantly higher PRs for a-Si and CdTe modules.

References

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