

Sky-cameras for PV power forecast

Watching the skies to predict future weather

Department: Sustainable Development

Research group: Energy & Resources

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Project description

The energy transition in urban areas will be based on successful development of smart grid districts, that combine local photovoltaic (PV) solar energy generation with demand from electric vehicles and heat pumps as well as with battery storage. Highly accurate forecasting of supply and demand is essential for the most economical management of such systems. Besides demand forecast, methods of forecast of solar energy, and associated PV generated electricity must be developed at high accuracy at high spatial (0.1-2 km²) and time resolution (1-60 minutes).

At the UU campus, we are setting up a small network of 4 all-sky cameras, that make pictures of moving clouds. Also, in the city of Utrecht, 4 other camera's are installed enlarging the network. Analysis of these pictures in time using artificial intelligence methods allows to reconstruct a two-dimensional shadow field over the whole campus. This affects the power generation of the more than 4000 solar panels on the roofs of the campus. Based on the correlation of the shadow field and the power generation, we can develop a solar forecasting service based on all-sky cameras which we could combine with weather forecasts from KNMI.

The assistant's activities within the project include:

1. Realization of a dashboard tool that shows the power generation of all the solar panels on the campus
2. Analyze the correlation of power fluctuations
3. Construct a shadow field, together with a PhD student
4. Cooperate with KNMI
5. Co-author a scientific paper.

Job requirements

Job requirements include specific interest in the energy transition, solar panel power and fluctuations, cloud movement, programming and data analysis skills (Python).