

## Bachelor Thesis

# Development of a Machine Learning Approach to Increase the Resolution of PV Timeseries

The electricity system of the future faces a number of demanding challenges. These include the increasing integration of renewable energies, particularly from wind energy and solar radiation. Precise input data is required for a suitable simulation of electricity supply systems. High data resolution is particularly important for the evaluation of power quality characteristics in the time domain.

The underlying work deals with input data from PV systems (PV time series). Real measurement time series represent the local behaviour of these systems accurately and with a high resolution, but cannot be easily applied to other regions. Synthetic time series, which model PV system behaviour on the basis of publicly available weather data, can be used in a variety of ways, but do not have sufficient resolution to analyse voltage quality characteristics. As a solution, this thesis aims to further develop a method that realistically scales up the resolution of synthetic PV time series.

As a basis for this, a machine learning approach is to be further developed in order to increase the resolution of the time series. The aim is to model effects in the PV time series that could not previously be mapped due to insufficient resolution. One example of this is cloud cover. The further development of the approach aims to improve the quality of the model and generate realistic time series.

### Core tasks and objectives of the thesis:

- Basic research (machine learning, PV time series)
- Development of an upsampling method for PV time series in Python
- Validation of the determined method using real measurement time series

### Your Profil:

- Degree in engineering or industrial engineering (electrical engineering, mechanical engineering, energy technology) or computer science
- You are interested in current research topics relating to the energy supply of the future
- Basic knowledge and initial experience with programming tasks in Python
- You are interested in modelling technical contexts.

### We Provide:

- Intensive and reliable support during your thesis
- Flexible time management and your own air-conditioned workplace with good IT equipment
- A great atmosphere with lots of activities for students and assistants
- Lots of industry contacts and help with finding internships
- The possibility of a subsequent doctorate or employment if you perform very well

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### Focus

- Programming Python
- Machine Learning
- Renewable Energy Sources