Chair of Renewable and Sustainable Energy Systems
TUM School of Engineering and Design
Technical University of Munich

Master's Thesis

Deriving coupled electricity, heating and cooling time series from electricity demands

Background

The energy transition is moving the focus of the energy system away from a centralized to a decentralized approach. Unlike before, distribution grids have to shoulder a lot more responsibilities as an increasing amount of generation, such as PV and wind turbines, as well as flexibility, such as battery storage, is installed. This change increases the need for highly detailed energy system simulations on a local level. This means that simplified approaches like standard load profiles or type days are not sufficient anymore to yield realistic simulation results. One idea to generate more realistic data is to use existing real data and derive other time series from it. In this thesis, we want to analyze how electricity demands can be used to derive heating and cooling time series using our own tool EnTiSe. Additionally, a paper, of which you will be part of, will be published alongside the thesis.

Research Questions

- How can energy time series be derived and coupled?
- How do coupled time series compare to other methods of time series creation?
- What impact does the method have on energy system simulations?

Requirements

- Intermediate to advanced programming experience in Python
- Basic to intermediate knowledge in Git and GitLab
- Knowledge in energy system simulations of advantage
- Fluent German or English (thesis can be written in either language)

Main goals

- Literature review of methods to derive and couple time series
- Comparison and selection of the most relevant methods
- Implementation of the methods into our chair's tool EnTiSe
- Deriving RC values from Tabula or other methods
- Comparison of the results with other methods for time series creation
- Creation of a German wide database for heating time series
- Analysis, discussion and presentation of results

Contact

Markus Doepfert
markus.doepfert@tum.de
Chair of Renewable and Sustainable Energy Systems
(Prof. Dr. rer. nat T. Hamacher)