

Master's Thesis

Comparative analysis of methods to create synthetic energy time series

Background

The energy system is undergoing a significant transformation, becoming increasingly decentralized and diversified. These changes lead to many new research questions that require more and more data to be answered. A key challenge is obtaining reliable time series data on a household level as most data is only available on an aggregated level. Synthetic data can serve as valuable bridge between the need to analyze a multitude of diverse scenarios and the lack of data that is available. The issue is that these methods are scattered, and researchers do not know how they compare against each other. In this thesis we want to address this issue by consolidating the available methods to create time series with an emphasis on heating, cooling electricity, mobility and occupancy. The aim is to integrate the best methods in our chair's tool that we are currently developing and providing it to the entire research community as open-source python package. A paper, of which you will be part, will be published alongside the package.

Research Questions

- What methods exist to create synthetic time series?
- How do these time series compare against each other?

Requirements

- Intermediate programming experience in Python
- Knowledge in energy system simulations of advantage
- Fluent German or English (thesis can be written in either language)

Main goals

- Literature review of existing time series creation methods
- Comparison and selection of the most relevant methods
- Implementation of the methods into our chair's tool EnTiSe
- Comparison of the various methods using relevant KPIs
- 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)