



The Institute for Energy Economics and the Rational Use of Energy (IER) at the University of Stuttgart is seeking a motivated student for a Master's thesis in the field of Energy System Modeling, to be started as soon as possible.

Context and Description

Germany's energy transition necessitates a massive mobilization of decentralized flexibility from heat pumps, electric mobility, and household appliances. However, the activation of these potentials depends heavily on individual cost structures and socio-structural frameworks.

The objective of this thesis is to quantify the technical flexibility potential of these sectors and develop a methodology to construct a Flexibility Merit Order. The analysis will move beyond aggregate data to include regional and building-specific differentiations, such as level of modernization, urban vs. rural locations, and ownership status (tenant vs. owner).

Proposed Tasks

- Quantifying flexible loads (MW) for heat pumps, electric vehicles and household appliances.
- Differentiating between investment costs for smart infrastructure and variable activation costs including comfort and efficiency losses.
- Modeling the impact of building age, ownership structures, and spatial differentiation on the availability and cost of flexibility.
- Generating marginal cost curves for various flexibility quantities to illustrate the economic ranking of activation.

Requirements and Qualifications

- Enrollment in Energy Engineering, Industrial Engineering, Environmental Sciences, or a related field.
- Interest in techno-economic questions and the modeling of decentralized energy systems.
- Basic knowledge of data analysis and programming (ideally Python / R).

Contact

We look forward to receiving your application! Please send your documents (CV, current transcript of records, and relevant certificates) to Ron George (ron.george@ier.uni-stuttgart.de).

Master Thesis (m/f/d)

Technical Flexibility Potentials and Marginal Cost Curves in the Residential and GHD Sectors