Flexibility assessment for demand response

Data-driven approaches for unlocking building energy flexibility

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Project description

The GAIM (Long-term consumer and community empowerment in energy applications through inclusive **G**ame design, **A**rtificial **I**ntelligence, and system **M**odelling) project funded by NWO, focuses on engaging energy consumers in long-term energy applications. We employ artificial intelligence techniques and energy models to promote flexible energy use. These AI-based energy models will be integrated into a mobile/web application with gamification features, providing informed and reliable feedback to citizens on optimal energy management in households.

Your role in this project will involve developing data-driven methods to assess the flexibility potential for different users based on their demand profiles. Existing demand response programs often overlook the diverse potential of user contributions due to varying usage behaviors. Therefore, we aim to develop a data-driven method to quantify the potential of individual users with flexible loads to participate in demand response initiatives.

While existing methods in the literature rely on high-granularity data, such as non-intrusive load monitoring, we aim to explore the potential of low-granularity data. In the GAIM project, we work with quarterly-hour electricity consumption data from smart meters. This work package entails categorizing users with flexible loads within a community and developing metrics based on their potential for load-shifting or shedding scenarios. The analysis will include:

- Reviewing the literature on flexibility potential assessment methods applicable for quarterly hour demand data.
- Exploring repositories on GitHub or other platforms to assess their potential applicability.
- Implementing these methods on the data and developing a novel approach. (It may require implementing a solar disaggregation method before applying flexibility models to the dataset.)
- Publishing the model on GitHub for open-access availability and collaboration.

Job requirements

We seek an ideally a master's student who:

- Possesses basic knowledge of energy in the built environment and demand-side management.
- Has experience with Python programming and data analysis techniques.