



## Master Thesis

### Flexibility potential of Multi Family Houses

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Transforming the heating sector also means transforming multifamily houses (MFH), since they account for more than 50% of German households (Schuhmacher et al., 2023). Moreover, they constitute a particular case of the building sector as they are often located in rather densely populated areas, unite different dwellings in the same building, and tenants are typically not the owners of the building. Therefore, it might be interesting to look at their energy supply situation within energy transition scenarios. Residential buildings show the potential to provide flexibility to the electricity market (Marijanovic et al., 2022). Given heterogeneous heat and electricity demands combined with shared storages, PV systems, and grid connection MFHs incorporate certain degrees of freedom to optimize their participation in electricity markets (Braeuer et al., 2022). At the same time MFHs are subject to several regulatory interventions, e.g. *Mieterstrom*, or the CO<sub>2</sub>-cost sharing obligation.

The aim of this thesis is to identify the flexibility potential of MFHs. This includes analyzing potential remuneration options (e.g. participation in electricity markets, gains in operational efficiency, reducing the peak demand relevant for network sizing), modelling the energy demands in an MFH, and developing an optimization model to simulate the energy supply and operation of the MFH.

#### Key tasks and objectives of the thesis

- Modelling energy demand, flexibilities, and technologies in MFHs.
- Identification of relevant system and building scenarios considering current regulation.
- Analysis and evaluation of potential participation in energy markets.

#### Your profile

- Economics major, best with a focus on energy.
- Analytical thinking and the ability to carry out independent scientific work.

#### Literature

- Marijanovic, Zorica et al. "Value of short-term heating system flexibility—A case study for residential heat pumps on the German intraday market." *Energy* 249 (2022): 123664.
- Schumacher, Katja, et al. "Mehrfamilienhäuser: Der blinde Fleck der sozialen Wärmewende." (2023).
- Braeuer, Fritz, et al. "Optimal system design for energy communities in multi-family buildings: the case of the German Tenant Electricity Law." *Applied Energy* 305 (2022): 117884.
- Ein hundred Energie GmbH: „Effiziente Stromversorgung von Wärmepumpen im Mehrfamilienhaus“. White Paper. (2024).

#### Contact



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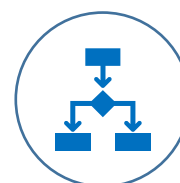
[External link to call](#)

#### Topics



- Multi Family Houses
- Residential dispatch

#### Methods



- Optimization
- Data preparation