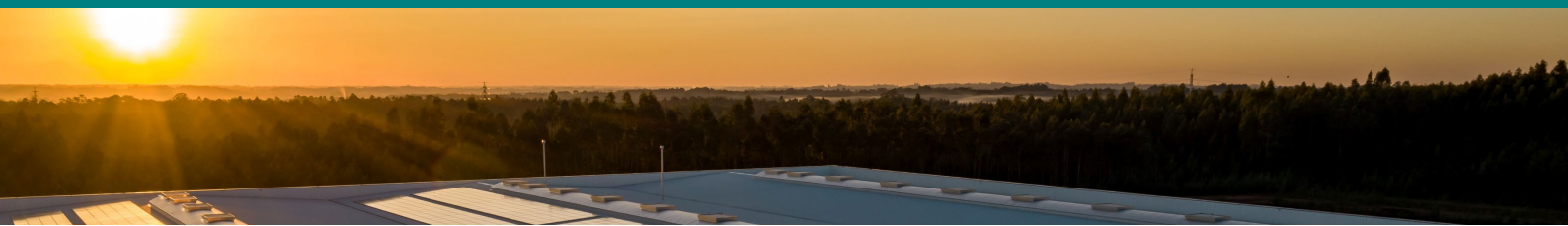


Master's Thesis

Impact of Demand Side Management on Grid Expansion in Distribution Networks



Motivation

The ongoing transformation of the energy system towards decarbonization and decentralization presents significant challenges for electricity distribution networks. In Austria, the increasing integration of renewable energy sources, particularly photovoltaic systems and wind power have led to rising volatility and bidirectional power flows in distribution grids. These developments demand innovative strategies to ensure system stability, economic efficiency, and reliable operation without excessive grid reinforcement. One promising approach to addressing these challenges is demand-side management (DSM). By actively managing and shifting electricity consumption in response to grid conditions or price signals, DSM can help balance local supply and demand, alleviate network congestion, and enhance the utilization of renewable generation.

The goal of this thesis is therefore to **analyze and formulate the DSM potential in Austrian distribution networks**.

RESEARCH QUESTIONS

- How much demand-side management potential can network participants provide to the DSO?
- To what extent can the inclusion of private households positively influence grid operation?
- Which formulations for modeling demand-side management in power systems are available, and which is best suited for implementation in a mixed-integer linear programming (MILP) framework?

TASKS & METHODOLOGY

- Literature research on the possible impact of DSM
- Literature research on existing methods/models
- Mathematical formulation of DSM
- Implementing to the existing LEGO-Pyomo Model
- Optimization of the simulation model
- Analysis of the results
- Presentation of the results

ORGANIZATIONAL INFORMATION

-  Start: Immediately
-  Support from the motivated IEE team
-  Close cooperation with supervisor

-  Modern workstations available at the institute
-  (Partial) creation in home-office possible
-  Writing in German or English

Contact

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