

Bachelor/Master-Thesis:

Evaluation of distributed optimization for cross-sector energy management in urban neighborhoods.

An important aspect of the urgent task of reducing CO₂ emissions is the decarbonization of the energy sector. As part of this task, the EU aims to significantly increase the share of renewable energy sources in the power grid. However, the introduction of such fluctuating energy sources and the simultaneous reduction of dispatchable power plants leads to challenges in grid operation. In particular, the flexibility offered so far on the generation side will have to be provided in other ways in future energy systems.

One way to provide this flexibility is the use of batteries, electric vehicles, and flexible loads that adjust their consumption depending on external factors. Unfortunately, offering such flexibility leads to costs due to losses, wear and tear, and because the system cannot be operated optimally.

One way to offer lower-cost flexibility options is through sector coupling. In particular, the use of heating and cooling systems that currently operate independently of the power grid.

Your tasks could include:

- Literature review on distributed optimization algorithms
- Evaluating performance metrics of optimization with sector coupling
- Evaluating performance metrics of optimization algorithms and models
- Evaluation of district approximations for optimization

Your Profile:

- Student of Electrical Engineering or Information Technology at RWTH Aachen University
- Good knowledge of Python or a similar programming language
- Fundamental knowledge of power systems
- Interest in optimization theory
- Good German and English language skills

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