

Master's Thesis, Semester Thesis or IDP

Redispatch 3.0? Smart Energy System Integration of Electric and Autonomous Trucks

Motivation

The logistics sector is undergoing one of the biggest transformations in its history. To meet ambitious climate targets while addressing a growing shortage of truck drivers, electric and autonomous trucks are becoming key technologies for the future. With automation, the decoupling from legally binding driving time regulations increases flexibility and opens new opportunities for a smart integration into the renewable energy system, especially with vehicle-to-grid (V2G) applications.

While existing research mainly considers bidirectional charging at individual sites with constraints regarding the driver working hours, a systemic view on the public charging system allows for coordinated, country-wide use of energy system integration potentials.

Thesis topic

The aim of this thesis is to assess the economic potential of a smart energy system integration of publicly charging trucks to mitigate redispatch costs. Redispatch keeps the electricity grid stable when renewable generation and electricity demand are not aligned and sum up to three billion euros per year in Germany. For this thesis, an existing simulation of load profiles and mobility patterns at the charging sites can be used. Special emphasis should be given on the effects of the logistics sector and the required adaptations of mobility patterns.

What you get

- Contribute to scientific research in a highly future-oriented field of commercial transport mobility
- Opportunity to deepen your knowledge in energy systems, mobility, and optimization
- Close supervision with weekly meetings
- In case of excellent working performance: Opportunity for a follow-up thesis work (master's thesis) and co-authorship in a scientific paper

Contact

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Work packages

- Literature research on the working principle of redispatch and the economics behind it
- Development of system model based on given load profiles and mobility patterns
- Validation of the approach
- Quantification of the economic potential of redispatch-supporting grid integration of partly automated trucks

Requirements

- High level of interest and motivation to drive the electrification and automation of the transport sector
- Initial experience in energy system modeling or energy markets
- Proficiency in Python is required
- Independent and structured way of working
- Very good German or English language skills

I am looking forward to receive your complete application with a CV, current overview of grades, a brief motivation, and any other documents. **The thesis can be conducted either in German or English.**

Start date

From now

Workplace

FTM (Garching Forschungszentrum) or remote