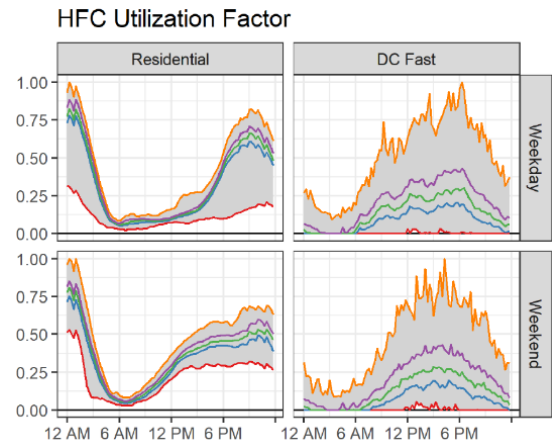


Bachelor-/Master thesis

Impact of different distribution strategies of highway fast-charging stations on the power demand at grid nodes.

To fulfill the EU's and German reduction targets of CO₂ emissions, substituting gasoline and diesel driven vehicles with electric vehicles (EVs) is one of the key elements. Highway fast-charging (HFC) stations for electric vehicles are needed to address range anxiety concerns and further drive this substitution. However, highway fast-charging stations' characteristics - their relative inflexibility, high power demand, and spatial concentration - can adversely affect grid operations when HFC infrastructure is expanded. While the impacts on distribution networks have been extensively analyzed in the past, the implications of highway fast-charging station placement on transmission grids have remained mostly unexplored.

Therefore, this thesis will evaluate various options regarding the geographic distribution of fast-charging stations. To derive distribution scenarios, mobility data, e.g., the German highways' traffic volume, should be analyzed. Depending on the distribution scenario, this thesis's results should explore the load's impact at the transmission grid nodes.



Source: Mowry, A., Mallapragada D.: *Grid Impacts of Highway Electric Vehicle Charging and the Role for Mitigation via Energy Storage*. MIT Center for Energy and Environmental Policy Research. 2021.

Key tasks and objectives of the thesis

- Familiarization with the topics of traffic and power networks and charging station planning
- Evaluation of traffic data from the Federal Highway Research Institute ([Link](#))
- Generation of spatially and temporally resolved charging profiles
- Geographical allocation of fast-charging stations to transmission grid nodes
- Sensitivity analysis regarding different distribution strategies

Your profile

- Study of mathematics, computer science or economics with a quantitative focus
- Experiences in programming (e.g., with Python) is an advantage

We offer

- Intensive and reliable supervision during your thesis
- Possibility of starting a Ph.D. in case of very good performance

Contact



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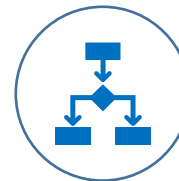
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Topics



- Energy Systems
- E-Mobility
- Infrastructure Planning

Methods



- Data Analysis
- Scenario Generation
- Sensitivity Analysis