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Master's thesis

for Ms./Mr. xx xx (123456)

Topic: Model for Analyzing the Flexibility Potential of Plug-In Electric Vehicles in the Power System

Task:

Due to the increasing replacement of internal combustion engines (ICEs) by plug-in electric vehicles (PEVs) because of growing concerns about the environment and sustainability, the paradigm of the transportation system is changing. A direct consequence of this is the growth in the grid's load demand. Thus, if there is a large demand for PEV charging at the same time, without proper coordination, the operation of the power system could be compromised.

On the other hand, if there is coordinated recharging control, PEVs can offer great flexibility to the system by injecting part of the energy stored in their batteries. Given the aforementioned circumstances, the objective of this research is to investigate the potential flexibility offered by the growth of the PEV fleet, considering the vehicle-to-grid (V2G) concept. For this, an algorithm to analyze the integration of PEVs into the distribution network will be developed. The utilization of this method enables the simulation of different scenarios and the evaluation of the implications associated with the expansion of the PEV fleet.

The study has to cover the following points:

- Literature review on flexibility, hosting capacity and PEV charging strategies
- Overview of available methods for analyzing the hosting capacity and flexibility of PEVs in the electricity system
- Definition of a method for testing the flexibility potential of PEVs in the grid
- Development of an algorithm for simulating scenarios
- Documentation of the results

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