

Cities in Charge

Development of public charging infrastructure for electric vehicles in German agglomerations

The cities of Bonn, Dresden, Düsseldorf, Hamburg, Hanover, Cologne, Leipzig and Munich suffer from increased NO_x emissions. Especially in agglomerations, the most significant source of emissions is the transport sector.¹ The Cities in Charge project, funded by the Federal Ministry of Economic Affairs and Energy as part of the "Saubere Luft 2017 - 2020" program, pursues the objective of removing usage hindrances to electric mobility in order to replace combustion vehicles and thereby reduce NO_x pollution. As part of the Deutsche Telekom Group, Comfortcharge GmbH is building charging points on premises belonging to the corporate family, both in urban centers and on commuter routes. Some of these are publicly accessible charging points; others are the company's own office parking spaces for Telekom fleet vehicles.

Besides Comfortcharge GmbH, the project consortium consists of the state capital Dresden (LHD), the Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM) and three institutes of RWTH Aachen University. These are the Institute of Urban and Transport Planning (ISB), the Human-Computer Interaction Center (HCIC) and the Institute for High Voltage Technology (IFHT).

Load balancing through intelligent load control

With the increasing use of electric vehicles and the resulting charging processes, the electrical distribution grids are being subjected to additional loads. For this reason, the IFHT analyses the effects of charging infrastructure on the utilization of distribution grids. Subsequently, intelligent charging strategies are developed to avoid grid congestion in distribution grids with high penetration of charging infrastructure for electric vehicles. In addition to the restriction of the electric grid, the optimization will take the interests and mobility needs of the users into account. In different scenarios of current and future supply tasks, the effects of the charging processes of electric vehicles and the benefits of the developed charging strategies to avoid grid congestions are examined. In addition, the Fraunhofer IFAM is developing concepts for charging stations with combined battery storages to increase the available charging power at grid connections with low power ratings.

Development of a grid generator

Grid information is not available for the cities in the project and is not publicly accessible. Therefore, a grid generator is developed, which creates representative, georeferenced and synthetic grid data. These grid data will take the heterogeneity of the real grid structures into account and incorporate planning characteristics as well as statistical information about the electrical equipment in each region.

¹ <https://www.umweltbundesamt.de/daten/luft/stickstoffdioxid-belastung>

Reduction of utilization barriers and further milestones

The LHD integrates real-time status data of the charging infrastructure set up in Dresden into an "Urban City Platform" for cross-operator availability visualization. This is intended to stimulate the use of electric vehicles and increase user acceptance. In addition, the user acceptance of reservation and prioritization options is examined by IFAM and HCIC with the help of user surveys.

The task of the ISB is to identify locations with high potential for charging infrastructure based on research into the interaction of spatial and transport infrastructures with people's mobility needs. For this purpose, the site selection model for electric charging infrastructure (STELLA) will be extended, refined in its spatial level of detail and adapted to the framework conditions and requirements for this special application in the eight conurbations.

Project information



Partners

- Comfortcharge GmbH
- Fraunhofer Institute for Manufacturing Technology and Advanced Materials
- State Capital Dresden
- RWTH Aachen University



Facts

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