Institute of Automotive Technology
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IDP
Graphical User Interface for an EV Integration Framework in Local Energy Systems

Motivation:

The transformation towards electrified mobility and more decentralized, flexible & renewable electricity system holds various challenges for site and fleet operators such as logistics companies or municipalities. Exemplary challenges are optimum component sizing (e.g. of PV arrays, stationary storages, mains connections, converters) within the local energy system as well as the tradeoff between additional benfits through higher-level EV integration (e.g. bidirectional charging / V2G) and the ensuing cost. Technically, these result from optimization of power flows and charging schedules within the local system.

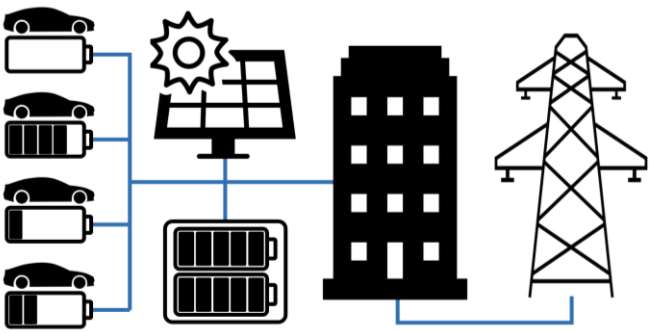
Therefore, we developed the REVOL-E-TION optimization toolbox [1] on top of the open source *oemof* energy system model framework [2] written in Python. REVOL-E-TION is used to investigate multiple scenarios of EV integration techno-economically, the comparison of which opens up insights into the mentioned tradeoffs. REVOL-E-TION can contain multiple fleets with distinct EV configurations and behaviors. Optionally, it offers optimum component sizing, semi-empirical battery aging estimation, and stochastic fleet simulation if defined in the scenario.

Project topic:

Currently, scenarios are defined using csv files containing all parameters and file names to be fetched for more complex data for all modelled components of the local energy system. A typical scenario comprises about 150 parameters, 10 of which are downstream file names. REVOL-E-TION is then executed from the command line. While easily scalable and deployable, the scenario definition process is to be made accessible to a broader user base through a graphical user interface (GUI).

This GUI should be implemented as web interface allowing to define multiple scenarios which then are computed remotely through ssh. Based on the optimization, several auto-generated results are to be shown in the web interface.

The interface should contain a graphical representation of the defined energy system (for example including a drag-and-drop option to easily add and remove blocks to and from the system). For each type of block, a tailored



panel to set the respective parameters and their variation should be developed. Furthermore, a visualization of the optimized power flows should be presented to the user.

Depending on your interests and in addition to the previous tasks, feature development in REVOL-E-TION is possible.

Your Profile:

- Interested in electric mobility
- Experience in Python GUI design and implementation
- Independent and thorough way of working
- Very good German or English skills

Working packages:

- Getting familiar with REVOL-E-TION
- Development of a concept for a GUI combined with a remote execution of the tool
- Implementation of the previously developed concept

[1] Rosner et al. REVOL-E-TION: A Flexible and Scalable Model to Optimally Integrate Bidirectional EV Fleets in Local Energy Systems. 2024. 10.13140/RG.2.2.19632.16648.

[2] Krien et al. oemof.solph—A model generator for linear and mixed-integer linear optimisation of energy systems, Software Impacts, Volume 6, 2020, 10.1016/j.simpa.2020.100028.

I look forward to receiving your application with a CV, a current overview of your grades and a **brief** motivation. The project documentation can be written in either German or English.

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Start:
Immediately / flexible

Location:
FTM, Garching Forschungszentrum.
The project can also be worked on remotely.