Vehicle-To-Grid for Car Sharing

Conference Poster

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Publication date:
2023-06

Permanent link:
https://doi.org/10.3929/ethz-b-000615977

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Car-sharing services can effectively reduce the number of privately owned cars and thereby CO₂ emissions. Furthermore, their batteries may be relevant to providing ancillary services with so-called “vehicle-to-grid” (V2G) technology, i.e., charging and discharging the vehicle dependent on power demand. In this project, we aim to quantify the potential gains of V2G for car sharing owners and grid operators in future scenarios for 2030.

Simulation of future car sharing behaviour (agent-based)

- Scale current population
- Simulate mobility profiles
- Sample car sharing users
- Decide when they use car sharing
- Run simulation & collect car sharing trips

A mode choice model is learnt data-driven

- Equasim [2]

Fast growth with new stations: 250k U, 7500 V, 3000 S
Fast growth (x2.5): 250k U, 7500 V, 1750 S
Fast growth with more vehicles: 250k U, 10000 V, 1750 S

The highest peak shaving potential can be achieved when many vehicles are deployed at fewer stations
New stations induce more demand than additional vehicles at existing stations
Fewer vehicles lead to higher utilization rates and less opportunity for V2G

Despite the higher utilization rate of shared vehicles, there is a clear potential for V2G.
There is a sweet spot where both car sharing fleet owners and grid operators benefit from V2G.
Decision makers should consider the potential for ancillary services of EV fleets and facilitate the deployment of V2G by removing barriers.