

# Optimal Dispatch of Electric Vehicles Performing V2G Regulation



## The Invention

This invention is related to real-time dispatch algorithms for EV aggregators. An optimal dispatch algorithm for EVs performing discrete frequency regulation is developed that switches EVs on and off in order to meet the system regulation signal while minimizing required communication bandwidth and ensuring charging fairness.

## Market Need

- A major issue with incremental dispatch is that the charging stations required for incremental power changes are more expensive than the simpler charging stations that accept on/off commands only. This is because additional hardware is needed to modulate charge rates continuously.
- Standard charging stations commercially available today do not support the communication requirements needed for continuous modulation of charge rates.

## Competitive Advantage

- This invention supports the utilization of EVs for frequency regulation. It can act as a catalyst for higher renewable penetration.
- It also helps operate the power grid more efficiently and in a manner that required least data processing/storage and least communication infrastructure.
- This invention will facilitate higher penetrations of electric vehicles, which helps minimize environmental impact of transportation.

## Project Status

This technology is at TRL 3-4. Simulations performed on a group of 1000 EVs in the ERCOT system using high resolution regulation signals over a 24-hour period to verify the effectiveness of the proposed dispatch algorithm.

## Looking for a Development Partner

Industrial partner collaboration is step forward for technology development and next step is to focus on the effects of using different maximum charger ratings and on extending the algorithm's advantages to EVs performing bidirectional V2G.



Fig. 1. Steps aggregator takes to participate in regulation markets.

## Patent Protection

A patent application covering this technology and design is being filed in the United States.

## About KFUPM

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