V2G enabled EVs providing frequency containment reserves: field results - DTU Orbit

(10/03/2019)

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Frequency regulation is procured by transmission system operators (TSOs) to ensure stable and reliable operation of power systems. In the Nordic energy region, frequency-controlled normal operation reserve (FNR) is one of the services that require fast-response. Electric vehicles (EVs) with vehicle to grid (V2G) capability may be considered an FNR provider in a future renewable-based power system. This paper presents results from the first commercial V2G hub in the Nordic area using the EV fleet of Frederiksberg Forsyning. The results are achieved by participating in the Danish frequency regulation market, and provide an analysis of the EV fleet operational data. Additionally, an analysis on practical issues that may result from realistic implementation of frequency regulation, such as delays, measurement errors and physical equipment constraints is given. These issues must be taken into account when developing new strategies for providing frequency services with EVs in a future scenario. Results show that a set of EVs operating in aggregated mode is able to support the grid while satisfying the primary goal of the EV fleet, i.e. transportation of fleet customers.

General information
State: Published
Organisations: Department of Electrical Engineering, Center for Electric Power and Energy, Distributed Energy Resources, Sao Paulo State University
Contributors: Banol Arias, N., Hashemi, S., Andersen, P. B., Traholt, C., Romero, R.
Pages: 1814-19
Publication date: 2018

Host publication information
Title of host publication: Proceedings of 2018 IEEE International Conference on Industrial Technology
Publisher: IEEE
Keywords: Electric vehicles, EV fleet, Frequency regulation, Services, Practical issues
Electronic versions:
EVfleet_Operation_preprint.pdf
DOIs:
10.1109/ICIT.2018.8352459
Source: FindIt
Source-ID: 2434425583
Research output: Research - peer-review › Article in proceedings – Annual report year: 2018