Economic value of electric vehicle reserve provision in the Nordic countries under driving requirements and charger losses - DTU Orbit (17/02/2019)

Electric vehicles can be used for delivering primary frequency control (PFC) and the revenue can compensate for the costs of driving. However, the average system frequency can be biased over the hour, which can lead storage units performing PFC to become either fully charged or depleted. This is also called the energy content of the frequency. Another important role is played by the V2G charger efficiency, which negatively affects the service energy flow. In this paper, the characterisation of the charger and the influence of the losses are detailed. Real frequency and market data are used for calculating the revenue under the Nordic regulatory framework. Earnings are calculated for the best case where the future energy content is known in advance. The results show that, in order to fulfill the service delivery specifications, a crucial role is played by the bid power compared to the size of the energy storage. Recommendations are given in order not to fail regulatory requirements along with considerations on the influence of service provision on the degradation.

General information
State: Published
Organisations: Center for Electric Power and Energy, Department of Electrical Engineering, Distributed Energy Resources, Energy System Management
Contributors: Thingvad, A., Ziras, C., Marinelli, M.
Pages: 826-834
Publication date: 1 Feb 2019
Peer-reviewed: Yes

Publication information
Journal: Journal of Energy Storage
Volume: 21
ISSN (Print): 2352-152X
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.74 SJR 0.84 SNIP 1.365
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.74 SJR 0.532 SNIP 1.077
Web of Science (2016): Indexed yes
Original language: English
Keywords: Ancillary services, Battery degradation, Electric vehicles, Frequency control, Vehicle-to-Grid
Electronic versions:
EST_2018_682_manuscript_in_black.pdf
DOIs:
10.1016/j.est.2018.12.018
Source: Scopus
Source-ID: 85060687393
Research output: Research - peer-review → Journal article – Annual report year: 2019