A Market Framework for Enabling Electric Vehicles Flexibility Procurement at the Distribution Level Considering Grid Constraints

In a context of extensive electrification of the transport sector, the use of flexibility services from electric vehicles (EVs) is becoming of paramount importance. This paper defines a market framework for enabling EVs flexibility at the distribution level, considering grid constraints. The main objective is to establish an adequate incentive system and proceed with an evaluation of EVs grid support for both users and DSOs, benchmarking it against the typical reinforcement solution. To exploit this framework, a billing process based on a two-price system is proposed for the controlled EV charging. The derived methodology is applied to a piece of semi-urban Danish distribution grid consisting of 42 customers. The service remuneration spans from 16 €/year to 51 €/year per customer, depending on the incentive scheme, and avoids a standard reinforcement of approximately 6200 €/year. It is demonstrated the benefit for DSOs and society, proving a technical and economic feasible solution.

General information
Publication status: Published
Organisations: Department of Electrical Engineering, Center for Electric Power and Energy, Distributed Energy Resources, Technical University of Denmark
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Number of pages: 7
Publication date: 2018

Host publication information
Title of host publication: Proceedings of 20th Power System Computation Conference.
Publisher: IEEE
ISBN (Print): 9781910963098
Keywords: Distribution grid, Electricity market, Electric vehicles, Flexibility procurement
Electronic versions: PID5256849.pdf
DOIs: 10.23919/PSCC.2018.8443012
Source: PublicationPreSubmission
Source ID: 144616133
Research output: Chapter in Book/Report/Conference proceeding › Article in proceedings – Annual report year: 2018 › Research › peer-review