Validating a centralized approach to primary frequency control with series-produced electric vehicles - DTU Orbit (29/12/2018)

Validating a centralized approach to primary frequency control with series-produced electric vehicles

The aim of this work is twofold: on one hand it proposes a centralized approach to primary frequency control by using electric vehicles as controllable units; on the other hand, it experimentally validates whether series-produced EVs, adhering to contemporary standards, can be an effective resource for providing primary frequency control. The validation process is realized in an islanded system with renewable sources and it relies on verifying that the frequency values are within the desired limits following severe load steps or wind power fluctuations. In order to reflect today’s situation, the used EVs, three Nissan Leaf, are not taking advantage of any V2G capability, but rely solely on the possibility of limiting the charge between 6 A and 16 A. The centralized approach implies that the frequency is not measured locally as it is a common practice today, but is routed via the Internet in order to include potential communication delays that would take into account the presence of different entities for controlling the vehicles, such as aggregators and utilities. The centralised approach is pursued to support aggregators in participating in current ancillary service markets. Ultimately, this paper aims to strengthen the applied research within EV integration through the practical validation of smart grid concepts on original manufactured equipment.

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