Economic value of electric vehicle reserve provision in the Nordic countries under driving requirements and charger losses

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.

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