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Charging strategy in electric vehicle chargers by utilizing demand side management scheme

Abstract

Electric vehicles (EVs) have received significant attention recently, given their potential technical, environmental, and economic benefits. However, given the fact that EV charging could happen at peak demand. This situation may deteriorate the distribution network's overall performance, particularly in terms of voltage stability. The novelty of this paper is to evaluate the impacts of the integration of EV chargers in the distribution network and to propose a charging strategy in EV chargers. The proposed charging strategy manages the power in the distribution network during the EV charger connection by utilizing demand side management. The IEEE 9-bus radial distribution system was used as the test network. Four scenarios were conducted by relevant assessments using the deterministic and probabilistic approaches. The result showed the influence of charging strategy on EV charging systems where it can reduce the impact of integration EV chargers by shifting the load of EV charging from the on-peak period to the off-peak period. As a result of using EV charging strategy, peak active power losses were reduced by 2.2 to 3.2 percent. The proposed method contributes the idea to the engineer and researcher in designing the EV charging strategy. However, the charging EV strategy could be further improved by optimizing the value of the relay setting of both the UVLS relay and the power demand relay in future research.

Keywords

Demand side management; EV charger; Load shifting