

Bundit Pea-da 2014: Impact Analysis of PEVs Fast Charging to Voltage Profile in Distribution System by Monte Carlo Simulation. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering. Thesis Advisor: Mr. Sanchai Dechanupaprittha, D.Eng. 91 pages.

This research presents the method to analyse impact of PEVs fast charging station to voltage profile in the distribution system. This research explains the method for preparing and conducting charging power profile at a charging station by using Monte Carlo simulation. The proposed method exploits the statistical data which are found to be key influential factors. In simulation study, there are 5 factors for generating a charging power profile, i.e. total number of vehicles in the area, charging power per pole, number of chargers in a charging station, daily distance travel for calculating the state of charge of battery and charging duration, and arrival time of vehicles at a charging station. After obtaining a charging power profile, the impact to distribution voltage will be analysed by using DIgSIENT PowerFactory. The simulation study is carried out based on Provincial Electricity Authority (PEA) distribution system. The simulation results reveal the voltage characteristics of distribution system are significantly affected by the PEVs fast charging station.

From simulation results, the key influential factors affect to the voltage characteristics in PEA distribution system, however the voltage drops and fluctuations are not violating operational criteria. In addition, this method can also be employed to find the maximum charging station and/or the impact to voltage profile in other distribution system, too.

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