Tirada Samsri 2014: Optimizing Electric Vehicle's Charging Scheduling in Residential Area of Distribution Systems. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering. Thesis Advisor: Associate Professor Ekachai Phaisangittisagul, Ph.D. 72 pages.

This thesis presents a Plug-in Electric Vehicles (PEVs) charging scheduling method that can meet the requirements of customer and still maintain the stability of the power distribution system. The proposed method also helps to improve the energy efficiency. The proposed method is considered the waiting time to charge, deadline and also applied with the real-time system. This allows the administrator to control the charging behavior of electric vehicle for protecting instability. According to the charging behavior is uncertain, depending on the individual usage, this thesis use the data of NHTS 2009 with the commercial data to analyze the electric vehicles model in the system such as the battery size, the percentage of the energy left in a battery, the time of arrival home to start charging. The proposed method is tested on IEEE 69 bus system and applied to the 5th feeder of the Hua-Hin 3 substation which is the distribution system of the Provincial Electricity Authority (PEA). The simulations of PEVs charging scheduling and the calculation of the power flow in the system are performed by MATLAB.

The experimental results demonstrate the ability of the proposed PEVs charging scheduling to maintain the maximum power of the system, extended time to improve the distribution system to be able to connect the PEVs in the future. The proposed scheduling method is also able to allocate the PEVs charging power even though the system occurs the insufficient power problem. The results show that the proposed method is able to improve the energy efficiency of the system in terms of peak to average ratio (PAR), load factor and the sufficient average plug-out SOC.

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