

Recharging and transportation scheduling for electric vehicle battery under the swapping mode

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ABSTRACT

Electric vehicle battery recharging on the swapping mode has grown up as an important option other than the plug-in recharging mode in China, given that several auto giants have been dedicated in constructing their battery swapping systems. However, the lack of effective operational methods on battery recharging and transportation scheduling has aroused a big challenge on the practical application of the swapping mode, which enables the necessity of our work. This study proposes a joint optimization model of recharging and scheduling of electric vehicle batteries with a dynamic electricity price system which is able to identify the optimal charging arrangement (the recharging time and the quantity of recharging batteries) as well as the optimal transportation arrangement (the transportation time and the quantity of transporting batteries). For the validation purpose, a numerical study is implemented based on dynamic electricity prices in Beijing. A sensitivity analysis of parameters is carried out to increase the robustness and provide more managerial insights of the model.

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