

新能源与分布式发电

考虑电动汽车充电站布局优化的配电网规划

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摘要:

充电站的布局不仅应考虑电动汽车用户充电的方便性, 还应考虑充电站接入电网的成本。研究满足传统负荷增长和新增电动汽车充电负荷需求的配电网规划问题, 以馈线的扩容与新建、变电站的扩容、充电站的新建为手段, 以包含充电站配电网投资与运行成本最小为目标, 建立了考虑充电站布局优化的配电网规划模型。该模型不仅考虑配电网的安全运行约束, 还提出了一种新的配电网辐射状约束, 可保证规划配电网的辐射状结构。算例分析表明, 所提出的规划方法可在充电站间合理分配充电需求, 有效降低配电网的投资和运行成本。

关键词: 电动汽车 充电站布局优化 配电网规划 辐射状网络

Distribution Network Planning Considering Layout Optimization of Electric Vehicle Charging Stations

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Abstract:

In the layout of charging stations both factors, namely the convenience of charging electric vehicles for the users and the cost to connect charging stations into distribution network should be taken into account. To research the distribution network planning in which the growth of traditional load and newly increased demand of electric vehicle charging have to be met, a distribution network planning model, in which the layout optimization of charging stations is considered, is proposed. In the proposed model, the capacity extension of existing feeders and newly-built feeders, capacity extension of substations and newly-built charging stations are taken as means and the minimization of the investment and the operational cost of the distribution network containing charging stations is taken as objective function. In the proposed model, not only the constraints for secure operation of distribution network are considered and a new radiate constraint for distribution network is put forward to ensure the radial structure of the planned distribution network. Analysis of calculation example shows that the proposed planning method can rationally allocate charging demand among charging stations and effectively reduce both investment and operational cost of the planned distribution network.

Keywords: electric vehicle layout optimization of charging stations distribution network planning radial network

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