

基于场景法和电池寿命折损的用户光储变协同规划 【上架时间： 2023-03-30】



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分类	:	论文		
价格	:	¥ 0.00		

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详细信息

【标题】 基于场景法和电池寿命折损的用户光储变协同规划

【Title】 Cooperative planning of the photovoltaic-energy storage and transformer in industrial users based on scenario method and energy storage life loss

【摘要】为提高用户侧“光伏+储能”项目的投资与运行经济性，本文提出了多类“源荷”曲线组合场景下计及储能电池寿命折损的大工业用户光伏、储能和变压器协同规划方法。首先，采用k-means聚类算法对8760h尺度的负荷需求曲线和光伏理论出力曲线进行聚类，两两组合后形成有限个“源荷”曲线；然后，考虑用户综合用电节约效益、项目补贴和变压器建设成本节约效益，以及光伏电站和储能综合投资成本，建立以年综合效益最大为目标的光储变协同规划模型，建立了以年综合效益最大为目标的协同规划模型，其包含基于等效全循环寿命次数的储能成本线性化模型，使储能规划与运行优化问题能够一体化求解。最后，采用YALMIP/CPLEX工具对某典型大工业用户进行规划方案求解，结果验证了所提协同规划模型的有效性，能够为用户侧“光伏+储能”项目的规划工作提供借鉴。

【Abstract】In order to improve the investment and operation economy of the user-side photovoltaic and energy storage project, a collaborative planning method for the photovoltaic, energy storage and transformer of industrial users was proposed in this paper, based on "source-load" curves scenario and energy storage life loss. First, 8760h scale load demand curves and PV theoretical output curves are clustered by the k-means clustering algorithm, and a finite number of "source-charge" curves are formed by pairwise combination. Secondly, comprehensively considering the cost saving benefits of electricity consumption, project subsidy, transformer investment, and the comprehensive investment cost of the photovoltaic power station and energy storage, a collaborative planning model with the goal of maximizing annual comprehensive benefits was established, including the linearized peak shaving delay investment benefit and the energy storage cost model based on the equivalent full cycle life number, which enables the integrated solution of energy storage planning and operation optimization problems. Finally, the planning schemes of the typical large industrial consumer were solved by the YALMIP/CPLEX tool. The proposed collaborative planning model was proven to be effective, and can provide valuable reference for the planning project of the user-side photovoltaic and energy storage.

【关键词】 储能；变压器；场景削减；协同规划；储能寿命折损

【Keywords】 storage system; transformer; scene cut ;collaborative planning; energy storage life loss

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