

新能源与分布式发电

基于风险的微网分布式发电备用配置决策

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摘要:

将电力市场环境下载微电网备用分为外部与内部2类备用, 前者为大电网事故支持备用, 后者包括不可再生分布式发电备用(non-renewable distributed generation reserve, NDGR)、储能装置、低电价与高赔偿2种可中断负荷。在对大电网备用优化配置技术应用于微电网的可行性进行深入分析的基础上, 为提高微电网NDGR配置的经济性, 针对微电网各类备用的经济互补特性, 运用协调优化理念, 从风险管理角度建立优化NDGR配置的数学模型, 提出基于代价对参数的灵敏度来指导优化方向的寻优算法, 针对容量事故集对NDGR的最优配置进行风险决策, 量化分析微电网运行模式、储能以及NDGR价格对NDGR配置的影响。仿真结果表明, NDGR配置过高或过低都不合适, 而应存在最优值。

关键词: 不可再生分布式发电 备用配置 风险决策 全局优化 综合协调 微电网 电力市场

Risk Decision-Making for Configuration of Microgrid Distributed Generation Reserve

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Abstract:

The reserve of microgrid in market environment is divided into two kinds, namely the internal reserve and the external reserve, the former offer support during the faults occurred in large-scale power grid and the latter contains non-renewable distributed generation reserve (NDGR), energy storage devices and two sorts of interruptible loads, i.e., the low price load and high indemnity load. In order to improve the economy of NDGR configuration for microgrid, based on detailed analysis on the feasibility of applying optimal reserve configuration technology for large-scale power grid to microgrid and in the viewpoint of risk management as well as according to economic complementarity properties of various reserves in microgrid and utilizing the idea of coordinative optimization, a mathematical model for optimal configuration of NDGR is established. An optimization algorithm, whose optimal direction is guided by the sensitivity of cost to parameters, is proposed and in allusion to capacity faults the risk decision-making for optimal configuration of NDGR is performed while the operation modes of microgrid, energy storage and the influence of cost of NDGR on its configuration are quantitatively analyzed. Simulation results show that the exorbitant or insufficient capacity of NDGR configuration is not appropriate and it is sure that there is an optimal configuration of NDGR capacity.

Keywords: non-renewable distributed generation reserve configuration risk decision-making global optimization comprehensive coordination microgrid electricity market

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