

Economic Operation of Battery Energy Storage System in Industrial Park Based on the Power Load Characteristics

Guoxin He, Renren Deng
R&D Engineer, Technology Center,
NARI Group Corporation (State Grid Elec. Power Res. Inst.)
Nanjing, China

Keywords: *industrial park, battery energy storage system, economic operation, load characteristics*

Abstract

Using the distributed energy storage system to help industrial users achieve peak clipping and valley filling has received increasing attention recently because it may save the cost of electricity significantly. Previous researches were more focused on battery energy storage system (BESS) models, estimation of life cycle cost, micro grid operation, etc. But most of them made charging and discharging strategies according to the overall electrical curve of industrial park, not considering the needs of users and the park load characteristics. Thus the full life cycle economic analysis of the whole BESS appeared to be too ideal. However, the action of BESS must take full account of the actual power of the industrial park. Different load characteristics and the user's independent demand will limit the operation strategy of BESS.

This paper firstly summarizes and classifies the load of industrial park in the city, which is divided into three types: "friendly load", "neutral load" and "unfriendly load". Unfriendly load will affect the safe and reliable operation of BESS. This kind of load asks for more requirements for the power of BESS and the charging and discharging rate. In some cases, it is not suitable to use BESS to maintain the peak power while continuous power supplies from the power grid is required. Based on the actual electrical curve of an industrial park, this work first determines the industrial load range that can be supplied, and explores the applicability and capacity configuration of BESS. In view of the time-of-use price, this work discusses several daily optimal operation strategies with income maximization as the objective function so that the whole system can achieve the maximum economic benefit. Through the establishment of risk analysis and evaluation system, the simulation running results are summarized. In the end, this paper gives some suggestions for the optimizing operation of BESS for future research.