Liang Tao, Yin Xiaodong, Liu Yaxiang, 2023, Robust optimal configuration planning of integrated energy system for return on investment, 2023, *Electric Power*, 56(4): 156–166. DOI: 10.11930/j.issn.1004-9649.202205043.

Abstract Reasonable optimization of integrated energy system (IES) capacity configuration is the basis for improving returns on investment and realizing efficient energy utilization. Aiming at the uncertainty influences of wind and photovoltaic power output and energy-using load on both cost and revenue, a robust optimal configuration method for return on investment is presented. Firstly, an IES optimal configuration model is built to maximize the internal rate of return, with consideration of the constraints of investment capacity, equipment operation, energy balance and internal and external network interaction. Then, by introducing the information gap decision theory (IGDT) to deal with the uncertainties of both source and load in IES, a robust optimization model for return on investment is constructed, and the complexity of the model is reduced through equivalent transformation and dual transform. A decomposition solution strategy is proposed to obtain the maximum fluctuation range of uncertain parameters and the corresponding optimal configuration scheme in the premise of meeting the expected return on investment. Finally, an actual IES is taken for case study, and the results show that the proposed method is more effective and practical than the traditional configuration methods in increasing the return on investment and improving the robustness of optimal configuration.

Keywords integrated energy system, return on investment, uncertainty, robust optimization, system configuration.