

Dong J, Dou X, Liu D, Bao A, Wang D, Zhang Y and Jiang P (2023), Energy trading support decision model of distributed energy resources aggregator in day-ahead market considering multistakeholder risk preference behaviors, *Frontiers in Energy Research*, 11:1173981. doi: 10.3389/fenrg.2023.1173981

**Abstract** In recent years, the power market and regional distributed energy systems (RDES) in China have experienced considerable growth. However, the critical issue of how multi-stakeholder parties within the distributed energy system evaluate risk preferences in order to develop scientifically sound trading strategies remains unclear. To address this problem, this study constructs a multi-agent assisted decision-making model that incorporates the critical features of a regional distributed energy system. By simulating various calculation scenarios using this model, the study aims to provide a better understanding of the system's multi-agent interactions and decision-making processes. First, different types of stakeholders and risk preferences in RDES are delineated. Second, supply and demand fluctuations in RDRS are treated and the impact of wholesale market price volatility risk on distributed energy system aggregators (DERA) decisions is fully considered. Meanwhile, a multi-stakeholders DERA transaction decision-making model in the day-ahead market considering risk preference behaviors is constructed based on information gap decision theory (IGDT) and solved by the Opposition Learning Grey Wolf Optimizer (OLGWO). The mathematical analysis conducted in this study indicates that the approach proposed could provide an effective trading scheme and operational strategy for multi-interest entities participating in the market of RDES. Therefore, incorporating the proposed approach would be beneficial in enhancing the performance and effectiveness of such systems.

**Keywords** regional distributed energy system, multi-stakeholders, risk preference, decision support, information gap decision theory, opposition learning grey wolf optimizer.