

Zhe Yin, Ruijin Zhu, Shiting Cui, Tengshuo Li, Yifan Zhang, Zhifan Zhang, Optimisation Scheduling of Integrated Electricity-Heat-Oxygen Energy Systems Considering Demand Response and Carbon Trading Based on IGDT, *IET Generation, Transmission & Distribution*, July 2025.

**Abstract** With economic development, the residents of Tibet's high-altitude regions have an increasing demand for quality of life. This study addresses the oxygen supply needs, renewable energy instability and load uncertainty in high-altitude areas, while aligning with the goal of reducing carbon emissions. A combined electricity, heat and oxygen integrated energy system (IES) suitable for high-altitude areas is proposed. Firstly, a combined oxygen supply mode integrating power-to-gas and vacuum pressure swing adsorption is established. Secondly, due to renewable energy instability and load fluctuations, an information gap decision theory model is developed, considering both risk-averse and risk-seeking perspectives. Demand response is also incorporated to ensure a reliable energy system. Finally, a tiered carbon trading mechanism is introduced, and an optimised scheduling model for the integrated energy system is established. Using the Gurobi optimiser for typical load cases in high-altitude areas, results show that under the risk-averse strategy, IES costs increase based on the deviation factor, while under the risk-seeking strategy, IES costs decrease accordingly.