Special Issue

Application of Swarm Intelligence for Multi-Energy Virtual Power Plants

Message from the Guest Editors

With the increasing number of couplings between electricity, gas, thermal, and other energy vectors, traditional independent energy systems are evolving into a comprehensive energy system. From this aspect, the traditional single-energy virtual power plant is evolving into a multi-energy synergistic virtual power plant, which is more dispersed in space and time dimensions. The complex interactions between various subjects and the autonomous behaviors of users bring significant challenges to the virtual power plant control. The scale, volume, and categories of operation data also increase significantly. Swarm intelligence originates from the observation and research of social creatures and human social behavior. Because of its advantages of flexibility and robustness, it is one of the intelligent forms that the new generation of artificial intelligence focuses on. The control concept of swarm intelligence adopts the idea of "weak centralization", which has the advantages of self-organization, efficient collaboration, and self-learning.

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