

146. Research on the Operation Strategy of Integrated Energy System Based on the Integrated Demand Response

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Introduction

In the context of the current integrated energy system, research on integrated demand response and other aspects is of great significance to promote the transformation of the energy structure. This paper establishes a comprehensive demand response mathematical model including vertical and horizontal response approaches. In order to solve the optimization contradiction, a master-slave game model of park operators and users was constructed, and the existence and uniqueness of the game equilibrium solution was proved. Finally, combined with the example simulation, the improvement of the load curve and the operation economy are analyzed.

Methods

The integrated energy park operator, as the manager of the entire park dispatch and the setter of the park energy supply price, aims to maximize the operating profit. First, the park operator announces the energy price of each time period to the user, and the user himself makes a decision to determine his own load structure after considering the energy consumption payment and the dissatisfaction with the energy consumption. The park operator then formulates an optimal scheduling strategy for the park's energy supply equipment according to the user's participation in demand response, calculates the energy supply cost and operating profit of the park at this time, and adjusts the energy sales price to the user again. Repeat the above process until the decision of both parties reaches a stable state.

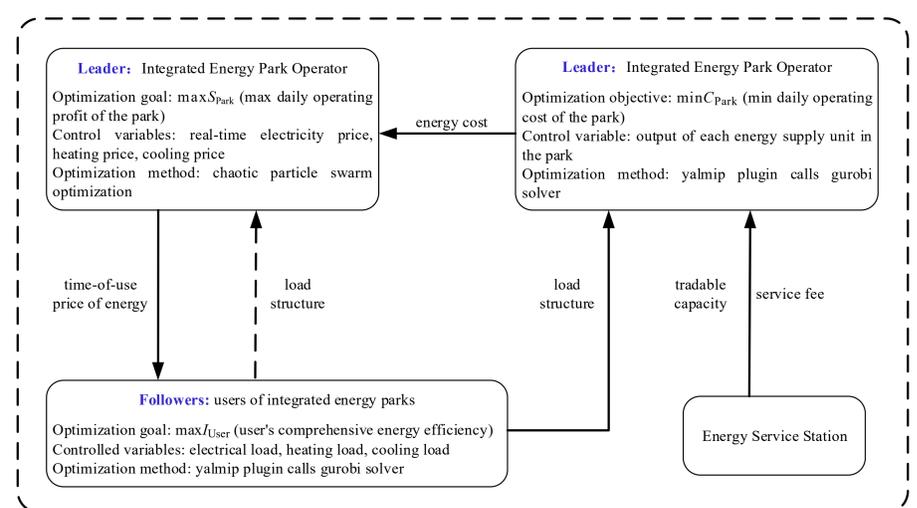


Fig.1 Solution flow

Simulation Results

Scenario	Park operating profit/yuan	Park operation cost/yuan	User pays fee/yuan	User comprehensive income index
1	13755	42772	56527	0.500
2	14831	37212	52043	0.826

Conclusion

According to the simulation results, we can draw the following conclusions:

(1) A comprehensive demand response mathematical model with vertical and horizontal response approaches is established, covering two ways of adjusting the load structure in the time dimension and converting between different energy forms, enriching the user's plans for changing the load structure Strategy.

(2) The example analysis shows that the comprehensive demand response can effectively reduce the peak-to-valley difference of the user load curve and the user's energy payment fee, improve the comprehensive income index of the user.