Cooperative Power Consumption in the Smart Grid Based on Coalition Formation Game

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Abstract—The power consumption schemes of consumers is an important issue in energy management process in smart grid. The non-cooperative methods which are always considered cannot achieve the maximized performance for consumers and networks. In this paper, we propose a cooperative power consumption scheme for consumers based on coalition formation game, which is suitable for the general electricity markets in smart grid. The advantage is that it can utilize the cooperative relationships among each other for payment savings and meanwhile take the social welfare into consideration. It is realized according to the pricing model used by power provider, the welfare function of the consumer coalitions, as well as the coalition formation algorithm based on the modified Pareto order which are proposed in this paper. Simulation results show that a stable consumers' partition can be formed in the concerned area and the higher utility for consumers and social welfare can be obtained comparing with the non-cooperative methods.

Keyword—**Smart Grid, Demand-side management, Coalition formation, Pricing model, Modified Pareto order**

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