

MULTIPLE ENERGY RESOURCE AGENT COORDINATION BASED ON ELECTRICITY PRICE

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ABSTRACT

This paper describes an algorithm we have developed for coordinating large numbers distributed energy resource agents - customer loads and generators - to provide a demand-response service for electricity retailers, network operators, and other businesses. Electricity customer price is used as an encouragement for customers to make use of an agent-based system. In this paper we report on a new genetic algorithm optimization of a variable supply cap on the power drawn from the grid. The cap is used to optimize responses of a large number of cool rooms which are representative of customer loads. Such responses can minimize the total cost and also be used to reduce the fluctuation of wholesale electricity prices and assist constrained networks during demand peaks. The management of large numbers distributed energy resources can be used to improve the efficiency of the electricity network. In our system, the coordination of energy resources is decentralized. Such a decentralized architecture improves grid reliability, allowing consumers to play a more active role in their energy usage. The information exchange is through indirect communications between resource agents and a broker agent. The coordination mechanism is asynchronous and adapts to change in an unsupervised manner, making it intrinsically scalable and robust.