

Dynamic Demand Management with Real Time Pricing in Smart Grid

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I. ABSTRACT:

Smart Grid is not only about the integration of more environmentally friendly and distributed energy sources, but is also about energy consumption management. Demand Response (D.R.) programs will have a significant role in future power systems through optimally scheduling and assigning consumer consumption to those periods of day when supply capacities are more available and reliable. Current demand management studies are mostly appropriate for the old power grid. In this study a quadratic mixed integer program is employed to formulate a dynamic demand management model in the Smart Grid while maximizing social welfare. Special constraints for electricity network and preference function of consumers are considered. The model is also capable of accommodating Plug in Hybrid Electric Vehicles charging demands and battery capacities. The proposed model enables consumers to tradeoff between waiting time and billing charges for using appliances. A real time nodal pricing model is defined and employed to justify tradeoffs for participants in the program. Results confirm increase of social welfare and consumers' willingness to participate in D.R. programs using the model.

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