

Flexibility-based Scheduling for Smart Grids/Smart Homes Energy Management

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Energy companies are deploying SmartGrid projects as part of the effort to drive energy efficiency and save resources. Power management is a key factor for the efficiency and reliability of the SmartGrid. A smooth demand portfolio reduces the number of turbines to be turned on/off thereby improving the utilization of resources and company profitability. Minimizing energy peaks improves power quality and helps avoid power cuts including blackouts. This proposal aims to improve reliability and cost effectiveness of power delivery systems by reducing irregularities in the power-profile. We propose a method to decrease the peak-to-average power ratio via a novel conflict-resolution-based algorithm that minimizes the average deviation from the power-profile mean in a neighborhood of houses. Our algorithm considers user-defined power utilization tasks constrained with preferred time intervals. We relax the NP-hard scheduling problem with our greedy heuristic by leveraging the fact that some power tasks are less time-constrained than others.