Power Systems Engineering Research Center

The Effects of Demand Response Programs and Residential Energy Efficiency on Consumer Comfort

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PSERC Public Webinar
Tuesday, October 21, 2014
2:00-3:00 p.m. Eastern Time (11:00-12:00 p.m. Pacific)

Description

The energy efficiency of houses in a demand response program can affect consumer comfort and the effectiveness of the demand response program. Houses with three levels of thermal integrity were modeled with both properly-sized and oversized air conditioners. Improved thermal integrity significantly reduces both peak demand and energy consumption of all the houses modeled. A demand response program that cycled air conditioners off for varying durations during the summer cooling season was simulated for the various house designs. Without demand response cycling, houses with oversized air conditioners maintained occupant comfort, with the possible exception of humidity, which was not simulated, throughout the summer. When air conditioners were cycled, occupant comfort was degraded, with houses having improved thermal integrity providing greater comfort. If air conditioners were properly-sized for the house design and thermal integrity, occupant comfort on the hottest days was degraded regardless of demand response cycling. Occupant comfort was worse, however, with cycling. For these houses, better thermal integrity slightly improves occupant comfort without demand response, and significantly improves it with demand response cycling. These results should be considered in the design of demand response programs, and the simulations should be expanded to include other days, locations, and house designs.

Biography

Ward Jewell is a Professor of Electrical Engineering at Wichita State University, where he is the Site Director for PSERC. His current research interests include advanced energy technologies and climate change as it affects the electric energy system. Dr. Jewell is a fellow of IEEE.

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PSERC's Webinar Coordinator: Venkataramana Ajjarapu, Iowa State University, vajjarap@iastate.edu.

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