2012 BECC Conference: Poster Presenter Abstracts

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Protocol for Developing High Resolution Energy Disaggregation: The Reference Energy Disaggregation Data (REDD)

Appliance-specific feedback may be the most effective type of energy feedback, allowing households to identify where energy efficiency changes should be made and allowing personalized recommendations for programs or resources to be pursued as well as showing relevant barriers can be overcome. Many approaches for supplying appliance-specific feedback are costly or effortful because they depend on hardware installations. Another approach is energy disaggregation - the use of algorithms to break down an aggregate or whole-home energy signal into its component appliance/electronic contributions. Unfortunately, disaggregation algorithm development and evaluation is hindered by the lack of useful publicly available energy data and common evaluation metrics. The Reference Energy Disaggregation Data Set (REDD) project collects data and standardizes the process. We have developed and refined a multistep protocol for data collection that details recruitment, consultation, hardware specifications, equipment installation and removal, data evaluation, and a one-hour energy debrief with participants. Further, the REDD monitoring devices have been designed to record aggregate home power consumption signals at high frequency and granularity, as well as collect individual circuit-level and plug-level power consumption signals. Four weeks of data are acquired from approximately 60 homes in the Boston and San Francisco metropolitan. Lessons to date include finding that even in homogenous suburban areas, home energy systems, appliance stock and consumption patterns are extremely diverse. We anticipate that this database and protocol will allow professionals in other geographic regions and climate zones to collect and store data to facilitate the continued advancement of disaggregation algorithms.