Clarkson's Smart Housing Project: Highly-granular utility use data for Smart Buildings and Smart Residents

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ABSTRACT

Clarkson University's Smart Housing Project includes a high density sensor system to monitor electricity use at every outlet and water use at each sink, toilet and shower. These highly-granular data are critical to support a two-pronged research effort designed to integrate smart residents with smart buildings to enhance the smart housing concept. The overall objective of this project is to evaluate the effectiveness of methods to improve building controls and motivate residents to reduce utility use.

"Smart Housing" in the Woodstock Village Apartments were developed as part of recent renovations to transform poorly insulated structures with aging energy systems into appealing, well-insulated structures with low-flow water appliances and high efficiency electricity and heating appliances systems. The rich resulting dataset (over 2 GB/week) provides a detailed understanding of how college students live and use utilities. Long showers and inefficient dishwashing create high water use and cooking, lights, TVs/computers at all hours of the day are the primary activities associated with electric energy use.

Among the buildings, a two-by-two experimental plan has been implemented to assess the efficacy of two specific intervention strategies aimed at motivating behavioral change. All interventions include basic energy literacy education. We hypothesize that to enact widespread and lasting behavior to conserve resources; individuals need to internalize the value, utility, and importance of clean energy behavior in combination with informational feedback.

Con-current building energy modeling studies are evaluating the capacity to reduce building energy use for heating and ventilation through the use of metering and control systems that identify the occupancy level of the space and adjust HVAC systems accordingly.

BIOGRAPHY

Susan E. Powers is the Spence Professor of Sustainable Environmental Systems and the Associate Director of Sustainability in the Institute for a Sustainable Environment at Clarkson University. She received her Ph.D. in Environmental Engineering from the University of Michigan in 1992 and has had a variety of academic appointments at Clarkson University ever since. Her research includes technical and environmental assessment of sustainability efforts and energy and climate education initiatives at middle, high school and collegiate levels.