University of Florida

Unifying Home Asset & Operational Ratings: Adaptive Management via Open Data & Participation

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Description: Recent environmental, social, and economic challenges are fostering a wave of interest in maximizing energy efficiency and conservation (EE+C) in existing U.S. homes. Long standing programs, ratings, and metrics are being reapplied into new stimulus initiatives such as the *Recovery through Retrofit*[1] program. Simultaneously, electric and gas utilities are expanding their demand side management (DSM) programs from weatherization and conventional technology replacement incentives to include conservation behavior campaigns with "recommendation algorithms" designed to assist in homeowner energy retrofit decision making. Furthermore, loan programs are emerging to address the financial barriers that commonly limit initiation of the necessary retrofits.

Collectively, these approaches most often project future home energy performance based on engineering models of the physical characteristics of homes (i.e., "asset ratings"). Yet to date, the marketplace is inadequately integrating historical household energy consumption patterns (i.e., "operational ratings") into the decision tree to optimize retrofit program efficacy and consumer benefits. Moving toward the unification of asset and operational ratings is crucial for successful program management, proper monitoring/measurement/verification (MMV), loan risk assessment, and for the persistence of reduced home energy use over time. However, unification will not be easy. This research project combines qualitative and quantitative research methods in social science and building science using Florida case studies to evaluate the opportunities and constraints of asset and operational rating unification and the steps necessary to get there. Relationships between our project and the collaborative, transparent, and participatory nature of "open government" initiatives are also being explored.

Budget: $24,000 over two years ($12,000 from 01/01/2011 to 12/31/2011 and $12,000 from 01/01/2012 to 12/31/2012)
Universities: UF
External Collaborators: Nick Taylor (Ph.D. Student, UF School of Natural Resources & Environment), Jennison Kipp (Assistant In, UF Program for Resource Efficient Communities)

Progress Summary

1. Annual Progress: Summary from October 1, 2011 through September 30, 2012
   As reported in the 2010/2011 annual progress report, extensive qualitative data were procured via a series of focus groups conducted in February and March, 2011. These data are being transcribed, analyzed, and integrated into a more cohesive research plan and prospective grant proposals. During the 2011/2012 project year, a complementary quantitative data approach has been delineated through literature reviews, research proposal formulation, and preliminary data analysis.

   Collectively, the qualitative and quantitative approaches related to asset and operational ratings for residential buildings have been combined into a dissertation that proposes to investigate the following questions: (1) are homes complex adaptive systems (CAS) as evidenced by nonlinear, scale invariant patterns of energy consumption over time; (2) do nonlinear energy consumption patterns correlate to weather variability; and (3) do individuals and groups differentially perceive of the privacy

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[1] See, http://www.whitehouse.gov/assets/documents/Recovery_Through_Retrofit_Final_Report.pdf

considerations and usability of conventional home energy consumption feedback displayed in a novel online tool. Research outcomes will suggest alternative methods to evaluate home energy consumption patterns and will inform new narratives to engage utility customers in verbal, written, and graphical forms.

2. Funds Leveraged/New Partnerships Created (This Period)

New collaborations		
Partner name	Title or short description of the collaboration	Funding, if applicable
Building Media, Inc.	UF/PREC is in discussion with this potential collaborator on a variety of opportunities for market segmentation, outreach, consumer behavior change campaigns, and measurement and verification of performance results for energy efficiency strategies in the residential sector including the inputs, interactions, and outputs of asset and operational rating systems.	Opportunities under consideration
Various local and community banks in Florida	UF/PREC has approached multiple financial institutions for potential collaboration on energy efficient financing programs for building retrofits in the residential and light commercial sectors.	N/A

Proposal #1						
Title	Agency	Reference Number	PI, Co-investigators and collaborators	Funding requested	Project time frame (1 year, 2 years, etc.)	Date submitted
Coming to Cultural Consensus: Residential Utility Bill Transparency, Personal Privacy, and Social Norms	Knight Foundation: Informed & Engaged Communities	News Challenge 2: Data[2]	PI: Hal Knowles Collaborators: Chris McCarty Nick Taylor, Ryan Davis	$160,000	18 months	June 20, 2012

Hal Knowles, Co-PI and the primary supported person on this FESC project was the main University of Florida Program for Resource Efficient Communities (UF/PREC) contributor to the development of this new proposal. UF/PREC proposed the following:

1. What do you propose to do? [20 words]
Study the cultural implications of complete transparency of monthly residential energy consumption data as comparative benchmarks to generate peer pressure.

2. How will your project make data more useful? [50 words]
Technological innovation in geographic information systems, the World Wide Web, computer-assisted data visualization, and utility advanced metering infrastructure are converging within a

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[2] http://newschallenge.tumblr.com/

rapidly evolving residential energy efficiency feedback industry. Our project fosters a more democratic dialogue on data sharing and social norm experimentation while finding common ground for privacy protection.

3. How is your project different from what already exists? [30 words]
The primary companies within this industry (e.g., http://opower.com/) currently control comparative feedback via "black box" algorithms. Our tool makes disaggregated usage history visible at the address-scale enabling adaptive, user-defined comparisons.

4. Why will it work? [100 words]
Cultural consensus analysis, a cognitive anthropology method, tests for consistent domains of knowledge within cultures around topics by evaluating degrees of agreement on sets of questions. Our project would apply this method to our existing online tool to improve consistency and consensus on the following questions: (1) what underlying rules govern culturally acceptable social norms on household energy consumption; (2) how can and/or should utility billing data be used to promote energy efficiency via these norms; and (3) who should have access to what data and why?

5. Who is working on it? [100 words]
Acceleration.net and the University of Florida Program for Resource Efficient Communities (UF/PREC) collaborated via a public-private partnership to build the first (and believed to be only) monthly, individual meter disaggregated, open access, online, residential energy consumption mapping and benchmarking platform. This market transformation tool lets "everybody see everybody." Ryan Davis (Acceleration.net, Director of Programming), Nick Taylor, and Hal Knowles (both UF/PREC PhD Students and Faculty), are working with multiple Florida utilities on energy efficiency and conservation benchmarking and consumer visualization with varying degrees of data access as we navigate questions of privacy, social norms, and culture change.

6. What part of the project have you already built? [100 words]
The most transparent online tool (http://gainesville-green.com/) is already built and allows access to monthly electricity, natural gas, and water billing data for all residential addresses in a single North Central Florida utility. A more filtered online tool (http://oei.compareandconserve.com/) is currently in an "alpha" stage of development and allows more constrained access to electricity billing data for two Central Florida utilities. Collectively, these tools offer an existing path to both conduct our proposed research, as well as, to apply our findings through user interface refinements including, but not limited to, data sharing rule determination, social norm self-organization, and comparison network delineation.

7. How would you use News Challenge funds? [50 words]
With these funds, Dr. Chris McCarty (UF, Director of the Bureau of Business and Economic Research), Ryan Davis, Hal Knowles, and Nick Taylor would: (1) develop add-ons to the online tools; (2) conduct cultural consensus analysis via these add-ons; and (3) democratically share findings of social norm form and function.

8. How would you sustain the project after the funding expires? [50 words]
These online tools would be sustained through a TBD mix of utility conservation program budgets, advertising revenue, premium content fees, and/or other funding sources. Additionally, our project findings would be openly shared and expected to alter the future course of technologies and industries leveraging data on household lifestyles.