

University of Florida

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

November 2011 Progress Report

PI: Mark Hostetler **Co-PI:** Hal S. Knowles, III

Student: Hal S. Knowles, III (Ph.D. Student, UF School of Natural Resources & Environment)

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

Through literature reviews, direct research, industry outreach, networking, and a variety of related channels, this FESC project has helped to inform and been leveraged into multiple proposals and fostered a diversity of potential collaborations and next steps.

Specifically, key qualitative survey questions on asset and operational ratings and their interactions were developed for a series of focus group sessions conducted in February and March, 2011. These sessions explored household utility service information needs and the usability of a home energy and water reporting website (<http://gainesville-green.com/>) for customers within the Gainesville Regional Utilities service territory (University of Florida IRB-02 #2011-U-0003). Though these sessions were

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

funded under a separate grant project, the integration of asset and operational rating issues into the research design was made possible by this FESC project.

The combination of individual user testing and semi-structured group interviews was developed as a first phase investigation into how diverse users with unique needs perceive of the website, its features, and its functions. Approximately 1,500 minutes of individual usability testing audio feedback for 37 separate individuals and 440 minutes of focus group audio feedback for 7 separate stakeholder groups was collected. These stakeholder groups consisted of the following 6 group types: (1) homebuilders; (2) homeowners; (3) Realtors®; (4) local government staff/officials; (5) home energy raters; and (6) bankers/loan originators.

Preliminary findings from these qualitative data provided a foundation for the in-depth inclusion of asset and operational rating considerations into a significantly larger grant proposal as detailed in the “Funds Leveraged” section. Transcriptions are still in progress and long term qualitative data analysis will inform future directions for both the original grant under which the research took place, as well as this FESC grant. Additional collaborations are in the nascent stages of development.

Funds Leveraged/New Partnerships Created:

New collaborations		
Partner name	Title or short description of the collaboration	Funding, if applicable
DwellGreen, 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
Simonton & McKinney	Same as above.	Same as above
University of Florida Shimberg Center for Housing Studies	Same as above	Same as above
Well Home (a business of Masco Home Services, Inc.)	Same as above. <i>(Contact arose as a result of networking at the US DOE Building America National Technical Conference in Denver in August 2011 and via subsequent follow up)</i>	Same as above
Great Reward, LLC	Same as above. <i>(Contact arose as a result of networking at the US DOE Building America National Technical Conference in Denver in August 2011 and via subsequent follow up)</i>	Same as above
The Shelton Group, Inc.	Same as above. <i>(Contact arose as a result of networking at the US DOE Building America National Technical Conference in Denver in August 2011 and via subsequent follow up)</i>	Same as above
Partner name	Title or short description of the collaboration	Funding, if applicable

Navigant Consulting, Inc.	Same as above. <i>(Contact arose as a result of networking at the US DOE Building America National Technical Conference in Denver in August 2011 and via subsequent follow up)</i>	Same as above
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
Gainesville-Alachua County Association of Realtors® (GACAR)	Very preliminary discussion has begun on potential future collaboration on integrating residential asset and operational rating information into Multiple Listing Service (MLS) data and/or various local “green” real estate efforts.	N/A
Alachua County Department of Growth Management	Very preliminary discussion has begun on potential future collaboration on integrating residential asset and operational rating information into property appraiser data, building code enforcement data, and/or various local “green” building efforts.	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
Gainesville Regional Utilities: On-Bill Energy Efficiency Financing Program Proposal	Gainesville Regional Utilities (Municipally Owned Utility)	N/A (Unsolicited proposal)	PI: Pierce Jones Collaborators: Hal Knowles, Craig Miller, Kathleen Ruppert, Nick Taylor,	\$15,000 (UF Subcontract portion on a \$80,000 to \$135,00 overall proposal)	1 year (Option for annual renewal)	March 25, 2011

Hal Knowles, Co-PI and the primary supported person on this FESC project was a major University of Florida Program for Resource Efficient Communities (UF/PREC) contributor to the development of this new proposal. UF/PREC proposed to provide the following five major services as a subcontractor for this energy efficiency financing program: (1) energy pre-screening; (2) consumer education; (3) contractor training; (4) quality control; and (5) measurement and verification.

Proposal #2						
Title	Agency	Reference Number	PI, Co-investigators and collaborators	Funding requested	Project time frame (1 year, 2 years, etc.)	Date submitted
EnergyIT: Home Energy Use Software for Education, Comparison, and Evaluation	U.S. Department of Energy Office of Science	DE-FOA-0000508 CFDA #: 81.049 (FY 2011 SBIR/STTR Phase II Grant Applications)	PI: Pierce Jones Co-PI: Hal Knowles Collaborators: Jennison Kipp & Nick Taylor	\$243,008 (UF Subcontract portion on a \$992,020 overall proposal)	2 years (Anticipated from July 2011 – June 2013)	April 4, 2011

Hal Knowles, Co-PI and the primary supported person on this FESC project was a major University of Florida Program for Resource Efficient Communities (UF/PREC) contributor to the development of this new proposal. UF/PREC proposed to provide the following services in continued collaborative support of the Energy Tracking Software Platform:

1. Continued development, testing, and refinement of protocols and algorithms for accurately comparing energy/water performance of homes/buildings;
2. Data analysis, trend evaluation, and measurement/verification of operational energy/water performance, building asset mix, efficiency measures implemented, and their interaction effects;
3. Support for the development of an energy/water efficiency and conservation measure “recommendation engine” tailored according to building operational performance and asset mix;
4. Support for the development, deployment, and analysis of survey instrument(s) and new/improved feature sets (e.g., visualization tools, associated narrative, goal-based competitions, community-based social marketing strategies, and crowd sourced data entry pathways such as home energy auditor forms and user-specified behavioral and asset conditions)

Proposal #3						
Title	Agency	Reference Number	PI, Co-investigators and collaborators	Funding requested	Project time frame (1 year, 2 years, etc.)	Date submitted
University of Florida Integrative Science for Sustainable Resources (ISSR)	National Institute of Standards and Technology (NIST) Construction Grant Program (NCGP)	2011-NIST-NCGP-01 CFDA #: 11.618	PI: James W. Jones Collaborators / Scientific Team: Wendy D. Graham, Pierce Jones, James C. Oliverio, James Sullivan	\$7,228,352 (Federal requested portion on total estimated project cost of \$9,459,340)	5 years (Anticipated from 11/01/2011 to 10/31/2016)	April 4, 2011

Hal Knowles, Co-PI and the primary supported person on this FESC project was a major University of Florida Program for Resource Efficient Communities (UF/PREC) contributor (under the supervision of Collaborator/Scientific Team Member, Dr. Pierce Jones) to the development of this new proposal under the direction of Principal Investigator, Dr. James W. Jones, Director of the Florida Climate Institute. This proposal pursued funding through the National Institute of Standards and Technology (NIST) Construction Grant Program (NCGP) to finance and build an innovative 25,000 gross square foot joint facility housing the Florida Climate Institute, the Water Institute, and the Program for Resource Efficient Communities. Many of the considerations under evaluation and insights being gained on this FESC project were used to inform the development of some features and services envisioned for this space. The following excerpt from the Executive Summary references some of these synergies:

We propose to construct a unique facility to provide an innovative and effective platform to empower solutions for complex environmental issues increasingly facing our nation. The Integrative Science for Sustainable Resources (ISSR) research building will empower the transdisciplinary research necessary to inform complex decisions, policies, and adaptive actions related to climate change and the sustainable management of our country's water, energy, and land resources. Designed to catalyze research that crosses disciplinary and scientific boundaries while integrating knowledge and theory within science and society, the proposed ISSR facility will house three unique and effective collaborative spaces: the Indicator Incubator, the Decision Visualization and Evaluation Theater (D-VET), and the Application Development Laboratory (AppLab).

Strategically, the research conducted in the ISSR facility will mesh historical data with present conditions in ways that will rapidly enable the conceptualization and evaluation of potential alternative futures. Spatially, the ISSR will centralize computational power for large-scale integrated modeling, a state-of-the-art immersive decision theater, and collaborative multi-touch interfaces that allow for simultaneous onsite and remote access to scientifically-accurate models and simulations. Cognitively, the ISSR facility will allow researchers to link observations of natural and human resources with decision and planning support tools using 3D visualization to provide intuitive views into the consequences of resource management choices across variable scales of time and virtual space.

Physically, the facility will be located in the heart of the University of Florida (UF) campus,

easily accessible by faculty and students from all of UF's sixteen colleges. Organizationally, our facility will bring together four major interdisciplinary research programs: 1) the Florida Climate Institute; 2) the UF Water Institute; 3) the Program for Efficient Resource Communities; and 4) the Digital Worlds Institute. This intellectual infrastructure will coalesce in a shared physical venue with highly advanced technologies to allow scientists and external organizations to engage in integrated systems research related to climate, hydrology, engineering, land use, development, the built environment, policy, health, and economics. The ISSR's physical location will serve as a high profile destination for researchers from across the state and region, providing a unique opportunity for national and international leadership in research for solutions to the most pressing climate, water, energy, and land use problems faced by society now and in the future. This type of transdisciplinary research, not possible in the absence of such a facility, will lead to greater innovations in research ideas and designs. Also, the infrastructure will facilitate distance interactions with those who otherwise might not have access to integrated resources of this scale.