
November 12, 2015

*Call Slides and Discussion Summary*
Call Attendee Locations
Call Participants: Residential Network Members

- American Council for an Energy-Efficient Economy (ACEEE)
- Boulder County, Colorado
- Building Doctors
- Building Performance Institute
- California Center for Sustainable Energy
- City & County of Denver, Colorado
- Duke Carbon Offsets Initiative
- Elevate Energy
- Energy Efficiency Specialists
- Energy Savvy
- Energy Smart Home Performance
- Greater Cincinnati Energy Alliance
- Honeywell International, Inc.
- International Center for Appropriate & Sustainable Technology
- Minnick’s, Inc.
- Mitsubishi Electric Cooling & Heating
- National Housing Trust
- New York State Energy Research & Development Authority
- Renovate America
- ResiSpeak
- Southern California Edison
Call Participants: Non-Network Members

- AJO
- Aspen CORE
- BlueGreen Alliance Foundation
- Building Performance Contractors Association
- Building Envelope Materials
- Cascade Natural Gas Corporation
- Clark County, Nevada
- CLEAResult
- County of Santa Barbara, California
- Dalhoff Associates
- empower Central Coast, California
- Energy Pioneer Solutions
- Energy Programs Consortium
- Environmental and Energy Study Institute
- Energy Response Corp.
- FS Energy Services
- Holy Cross Energy
- Hunsi Group, Inc.
- Indiana Community Action Association
- La Plata Electric Association
- MPower Oregon
- North Slope Borough
- National Renewable Energy Laboratory
- OptiMiser Energy
- Paladino & Company
- PSD Consulting
- Ryan Taylor Architects
- Sustainable Connections
- UgoEco Home Weatherization
- Volunteers of America
- Wisconsin Energy Conservation Corporation
- Wise Home Energy
Agenda

- Agenda Review and Ground Rules
- Opening Polls
- Brief Residential Network Overview
- Featured Speakers
  - Dan Phillips, Energy Analyst, Indiana Community Action Association
  - Nate Adams, Founder, Energy Smart Home Performance (Network member)
  - Daniel Kauffman, General Manager, ResiSpeak (Network member)
- Discussion
  - What experiences does your organization have with evaluation, measurement, and verification (EM&V) of the predicted or modeled savings from home energy upgrades?
  - What role should measured energy savings play in the evaluation and implementation of energy efficiency programs?
  - What actions can programs and/or contractors take to increase actual energy savings?
  - How do you avoid disappointing customers if actual energy savings do not line up with predicted savings?
  - Other questions/issues related to measuring and evaluating energy savings?
- Closing Poll and Upcoming Call Schedule
Opening Poll #1

Which of the following best describes your organization’s experience with measurement/evaluation of energy savings?

- Some experience/familiarity – 49%
- Very experienced/familiar – 23%
- Limited experience/familiarity – 21%
- No experience/familiarity – 5%
- Not applicable – 2%
Opening Poll #2

How does your organization measure energy savings from home energy upgrades?

- Review utility bills after upgrades are done (e.g., 1 year later) – 41%
- Get customer feedback on energy savings – 34%
- Use 3rd party vendors to measure, evaluate, & verify savings – 32%
- Other (please explain) – 20%
- My organization does not measure energy savings – 7%

“Other” responses:

- I’m an evaluator and I use utility bills in that capacity.
- Experience doing evaluation, measurement & verification (EM&V) including continuous, automated billing analysis (a.k.a. EM&V 2.0) for utility programs across the country.
- “Deemed energy savings" based on local utility demand-side management (DSM) plan.
**Better Buildings Residential Network:** Connects energy efficiency programs and partners to share best practices and learn from one another to increase the number of homes that are energy efficient.

**Membership:** Open to organizations committed to accelerating the pace of home energy upgrades.

**Benefits:**
- Peer Exchange Calls 4x/month
- Tools, templates, & resources
- Recognition in media, materials
- Speaking opportunities
- Updates on latest trends
- Voluntary member initiatives
- Residential Program Solution Center guided tours

**Commitment:** Provide DOE with annual number of residential upgrades, and information about associated benefits.

For more information or to join, email bbresidentialnetwork@ee.doe.gov
Program Experience:
Dan Phillips
Energy Analyst
Indiana Community Action Association
Dan Phillips – Indiana Community Action Association (INCAA)

- Billing Analysis of Indiana’s Low Income Weatherization Program
  - Current process
  - Initial challenges
  - Component of continuous improvement (training)
Privately created software, originally used in Iowa, provides summaries of net energy savings by comparing pre-/post-retrofit energy use and weather normalization.

The software processes data from hundreds of thousands of houses efficiently, freeing time to focus on houses of interest.

Inputs include historical weather data, utility records pre-/post-retrofit, and a comparison group.

In Indiana, programs began competing once data was public, and the state average savings increased.

This information helps program managers work with contractors to reinforce the successes of well-performing homes and learn from the mistakes of others.

Software was created by Dalhoff Associates, LLC in Wisconsin.
Lessons Learned:
Nate Adams
Founder
Energy Smart Home Performance
Nate Adams
Founder, Energy Smart Home Performance
Partner, One Knob Consulting

2012 HPwES Century Club Contractor

As Seen In
JLC
ACI
Green Building Advisor.com
greentechmedia:

habitat
energy vanguard
Energy Smart Comprehensive Home Performance Process

1. Education - content marketing draws clients in
2. Questionnaire - primary lead source - no cost
3. Initial Consultation ($250) - 95-99% close ratio
4. Comprehensive Planning Process ($750-$1000) - 65-75% close
5. Project Execution ($2000-$4000) - 65-??% close
6. Follow Up/Feedback Loop - Delivering results is incredibly satisfying.

50-60% lead to project close ratio in a hostile market.
(No incentives. No financing. Low housing values. Low utility costs. Moderate incomes.)
Why Do We Care About Energy Accuracy?

Project Example

Problems:
● Very fast temp drop: 20 degrees in 6 hours
● Upstairs 10-15 degrees warmer than first floor

Budget:
● $100/mo
The Details

2400 square feet
Built 1957
5800 cfm 50 test in
Results

5800 to 3100 cfm
46.5% reduction
(3500 target)
$18,000 project
$100/mo net cost
Results

26 hours to drop 10 degrees, not 6 hours for 20 degrees
Results
2nd floor temp difference 2-3 degrees, not 10-15
## Energy Results

### Fuel Savings

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Annual Cost</th>
<th>Annual Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>$1,695</td>
<td>$375</td>
</tr>
<tr>
<td>Electricity</td>
<td>$530</td>
<td>$28</td>
</tr>
<tr>
<td>Propane</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Oil #2</td>
<td>$0</td>
<td>$0</td>
</tr>
</tbody>
</table>

### Package Savings Summary

Improvement Package 4 - completed for Best Value

- Total Installed Cost: $17,000
- Annual Energy Cost Savings: $403
- Monthly Cash Flow: ($88)/month
- Simple annual payback, years: 42
- Savings to Investment Ratio: 0.5
- Annual kWh Savings, kWh: 501
- Total Energy Savings, MMBtu: 42.6

### Home Improvement

- Days Since Improvement: 409
- Cubic Feet Saved: 52120
- Money Saved: $625.44
- Annual CF Saved: 46513
- Annual Savings: $558.16
- Annual Improvement: 33.6%
- Cumulative ROI: 3.5%
- Annualized ROI: 3.1%
- Carbon Savings: 6249.2 lb

Gas Savings:
- Predicted: 42.6 MMBtu
- Actual: 46.5 MMBtu
Lessons Learned From Self M&V/HP Work

Lots of Work to Track +
Unfair to Small Players +
Questions of Bias (Did you make that up?)
= Inexpensive Third Party M&V Needed

Blower Door Required
Energy Modeling Required

The Work & Follow Up Is VERY Satisfying
I LOVE my job now.

(And I think it’s scaleable.)
Thank you!

Nate Adams

www.energysmartohio.com
www.oneknobconsulting.com
Energy savings are a good proxy for program success, and accountability builds client trust.

Ecobee thermostat logs energy use data.

Third-party data tracking is a necessity because of the quantity of data, and helps avoid issues of bias.

The program tracked a total carbon savings of 185 lbs. in just over a year in one project.

When buildings are underperforming, the initial fixes are usually duct work improvements.

Results are shared with customers over the phone anecdotally.
Experience/Lessons Learned:
Daniel Kauffman
General Manager
ResiSpeak
Driving Accountability for Program Performance
Using Measured Energy Savings

Better Building Residential Network Peer Exchange
Daniel Kauffman
November 12th 2015
ResiSpeak is a database, a calculator, and a web service for home energy efficiency programs.
How much gas was saved at this home?

Pre-retrofit: Winter peak of ~30k cubic feet/month

Post-retrofit: Winter peak of ~18k cubic feet/month

What to do with utility usage data:
Subtract the bills? Better yet, weather correct them!
How to measure savings from monthly bills

Measured energy savings:
From the post-retrofit points to the pre-retrofit line
Address the high EUI homes first

EUI – Energy Use Intensity, typically in kBtu/sqft/year
ResiSpeak uses homes in the DOE’s Building Performance Database for EUI benchmarking

Data analysis to identify home energy issues

Thermal shell problem

HVAC problem

Appliance problem

Behavioral problem

Or is there no energy use problem worth addressing?
Making energy data useful for programs

1. Target specific homes
   • Homes with addressable problems first
   • Why fix a home without a problem?

2. Identify energy problems in advance
   • Solve the right energy use problem for each home

3. Go for high ROI... most bang/buck
   • For both the homeowners and the efficiency program

4. Track the impact
   • Follow-up with homeowners as needed
   • Understand and accurately report program-wide savings

No-touch assessments:
Do it all from your desk
Determining savings: stipulate, measure or nothing

<table>
<thead>
<tr>
<th>Stipulated Savings</th>
<th>Unknown Savings</th>
<th>Measured Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Money up front</td>
<td>• Free</td>
<td>• Key metrics for program performance improvement</td>
</tr>
<tr>
<td>• Pre-approved programs from PUCs (e.g. CFL giveaways, appliance rebates)</td>
<td>• No effort</td>
<td>• Accountability &amp; reporting</td>
</tr>
<tr>
<td>• Estimates for each energy conservation measure</td>
<td>• Avoids accountability for lack of savings</td>
<td>• Low cost</td>
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**Advantages**

**Disadvantages**

**Common Use**

**Most common**

- Expensive to administrate
- Inaccurate analysis
- Over-regulates contractors

- Restrictions ability to improve program performance
- No accountability for results
- Can not claim program impacts

- Regulated utility programs

- Public/unregulated programs
- Homeowner initiated

**Least common**

- Key metrics for program performance improvement
- Accountability & reporting
- Low cost

- Waiting for results
- Potential for disappointing results
- Requires some effort

- Research programs
- Energy Savings Certificate or Carbon Credit programs

PUC – Public Utility Commission
CFL – Compact Fluorescent Light Bulb
Why programs choose to measure savings

• Cheap and easy way to accurately determine results and comply with reporting requirements
• Improve program outcomes year-on-year
• Evaluate contractors and verify work quality
• Claim Energy Savings Certificates and Carbon Credits
• Provide value-added services to participating homeowners
• Streamline calculation of EUI to determine program eligibility
• Improve Return on Investment in energy efficiency
• Intent to publish results
• Desire to do things “right”

“We want to make doing efficiency more efficient”
“Measured savings is where the rubber meets the road”
Sunlight is said to be the best of disinfectants; electric light the most efficient policeman.

Justice Louis Brandeis

To measure is to know... If you can not measure it, you can not improve it.

Lord Kelvin
Measurement is a means to an end: making energy savings more cost-effective.

All programs are accountable for producing energy savings.

Data can help you avoid the mistake of improving homes that are already performing well.

Data enter ResiSpeak via utility accounts automatically. Program administrators manage the tool as a white-label service.

The tool can produce summaries of which homes are performing well and what common characteristics those homes share.

It is possible to identify savings opportunities as soon as data are collected on home performance.
Use upgrade data to evaluate and improve services for homeowners and deliver stronger results.

- Find step-by-step information and tips for how to improve your program’s efficiency and effectiveness through information collection and continuous improvement.
- Identify and implement data collection systems and tools to enable program evaluation.
- Explore the Building Performance Database (BPD), the nation's largest dataset of residential building energy-related characteristics.

While you are there, see the latest Proven Practices post on Tiered Financing.

The Solution Center is continually updated to support residential energy efficiency programs—member ideas are wanted!
Residential Program Solution Center
Navigational Example

Program Design & Customer Experience – Assess & Improve Processes

Step-by-Step
There are several steps that will help you assess and improve your program.

- Track quantitative and qualitative information for assessing program process and impacts
- Establish internal and external processes for reviewing and communicating program performance
- Reuse Dashboards allow quick access to key data to help inform program management. Among other things, they can provide:
  - Automatically updated and aggregated project data to illustrate how the program is performing on key metrics (e.g., percent progress toward objectives)

RePower Bainbridge Uses a Dashboard to Monitor Progress and Results
RePower Bainbridge used a program dashboard, shown below, to track its progress on a monthly basis toward assessment, upgrade, energy savings, and carbon reduction goals.
Discussion Questions

- What experiences does your organization have with evaluation, measurement, and verification (EM&V) of the predicted or modeled savings from home energy upgrades?
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- Other questions/issues related to measuring and evaluating energy savings?
Discussion Highlights: Other Experiences

- **Iowa’s Weatherization Assistance Program**, using the same software used in Indiana, conducted an evaluation of natural gas use, billing analysis, and electricity use annually, providing agency-level detail and helping identify trends.

- **EnergySavvy** has used continuous automated billing analysis across its utility residential program, examining results by geographic area and focusing on how specific measures are performing.

- **Denver** captures deemed energy savings for its projects, and then every 1-2 years a third party compares deemed savings to actual utility data.
Program managers can give visibility to contractors’ relative performance, allowing beneficial competition, early identification of issues, and validation/feedback on program design changes.

Use data to target quality assurance/quality control.

Typically, there is not an issue with disappointing customers if energy savings underperform projections because they are more interested in improved home comfort.

Detailed statistical analysis of energy savings is usually of greater interest to program administrators than to homeowners.
Closing Poll

- After today's call, what will you do?
  - Seek out additional information on one or more of the ideas – **59%**
  - Consider implementing one or more of the ideas discussed – **33%**
  - Make no changes to your current approach – **7%**
  - Other (please explain) – **0%**
Peer Exchange Call Series

Peer Exchange calls occur most Thursdays from 1:00-2:30 pm ET.

Calls cover a range of topics, including financing & revenue, data & evaluation, business partners, multifamily housing, and marketing & outreach for all stages of program development and implementation.

Upcoming calls:

- **January 14:** What Do You Want from Peer Exchange in 2016? Moving Your Ideas Out of Hibernation (201)
- **January 21:** The Energy-Water Nexus and What It Can Do for Your Residential Program (301)
- **January 28:** Where Do We Go From Here? The Changing Landscape of Residential Energy Efficiency (201)

***No calls December 17 through January 7 for a winter break. Enjoy the holidays!***

Send call topic ideas to peerexchange@rossstrategic.com
Thank you!

Please send any follow-up questions or future call topic ideas to: peerexchange@rossstrategic.com