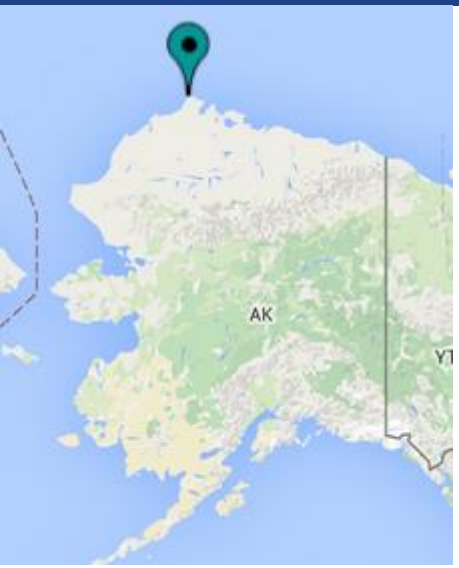
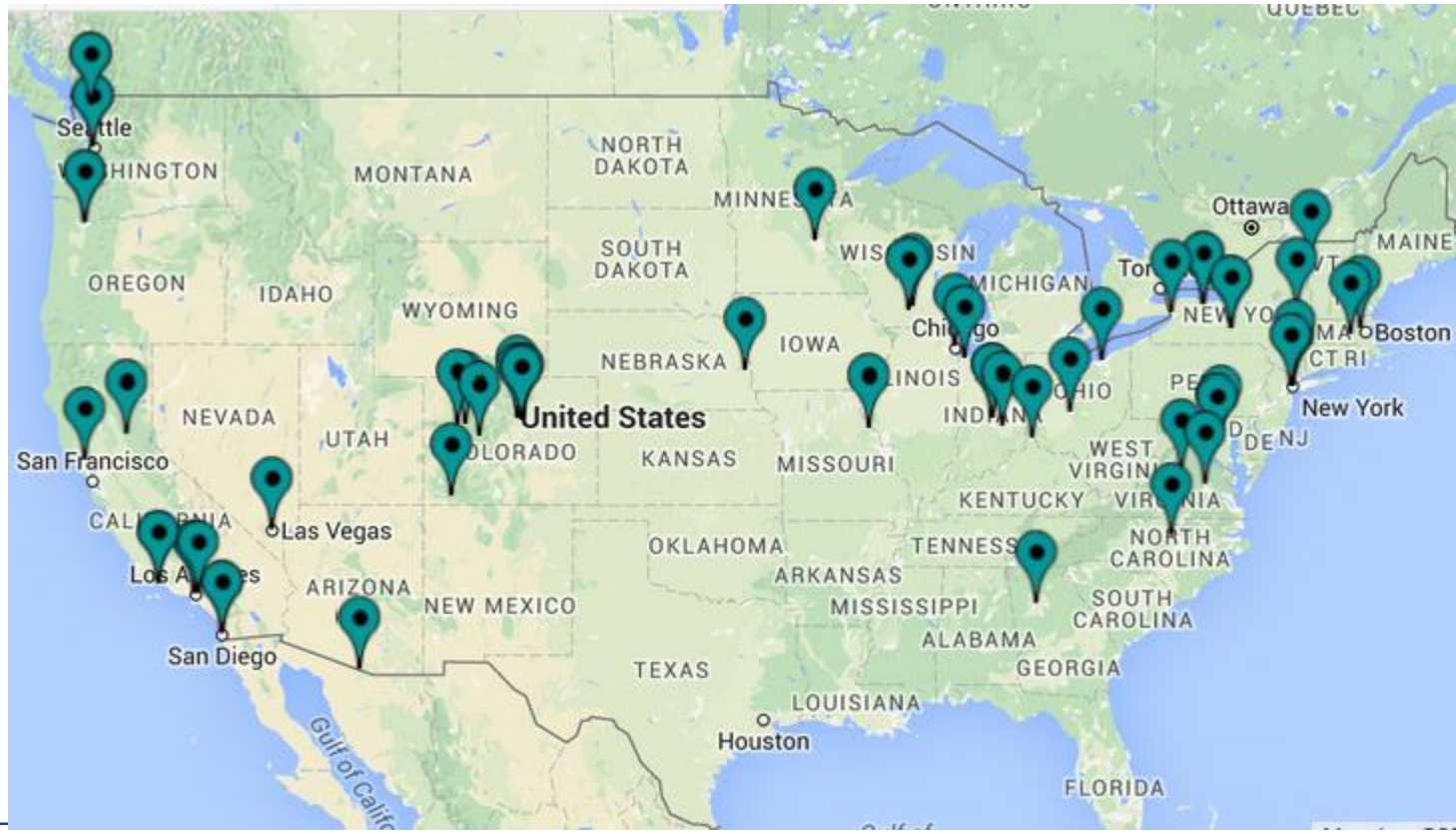
Better Buildings Residential Network Peer Exchange Call Series: *Driving Accountability for Program Performance Using Measured Energy Savings (201)*

November 12, 2015

Call Slides and Discussion Summary

Call Attendee Locations





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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

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

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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)

Discussion Highlights: Indiana Community Action Association

- 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

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Nate Adams

Founder, Energy Smart Home Performance
Partner, One Knob Consulting

2012 HPwES Century Club Contractor

As Seen In

JLC THE JOURNAL OF LIGHT CONSTRUCTION

ACI

GreenBuildingAdvisor.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?

Solving client problems is incredibly satisfying.
Energy savings is a good proxy for success.
Today: Accountability builds trust and reputation.
Today: Feedback helps us get better.
Tomorrow: Makes us a market leader.

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

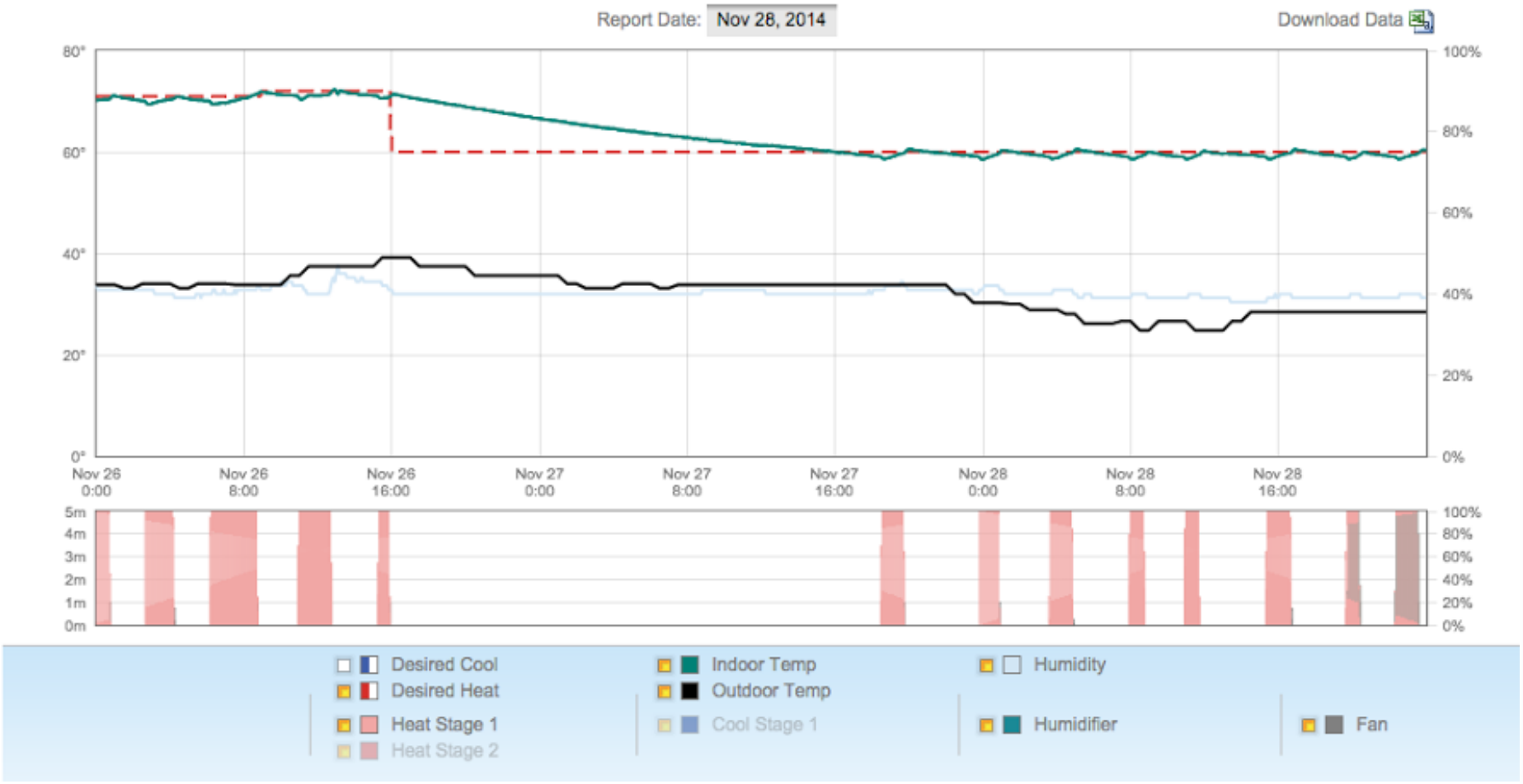
2400 square feet
Built 1957
5800 cfm 50 test
in

Results

5800 to 3100 cfm50
46.5% reduction
(3500 target)
$18,000 project
$100/mo net cost

Results

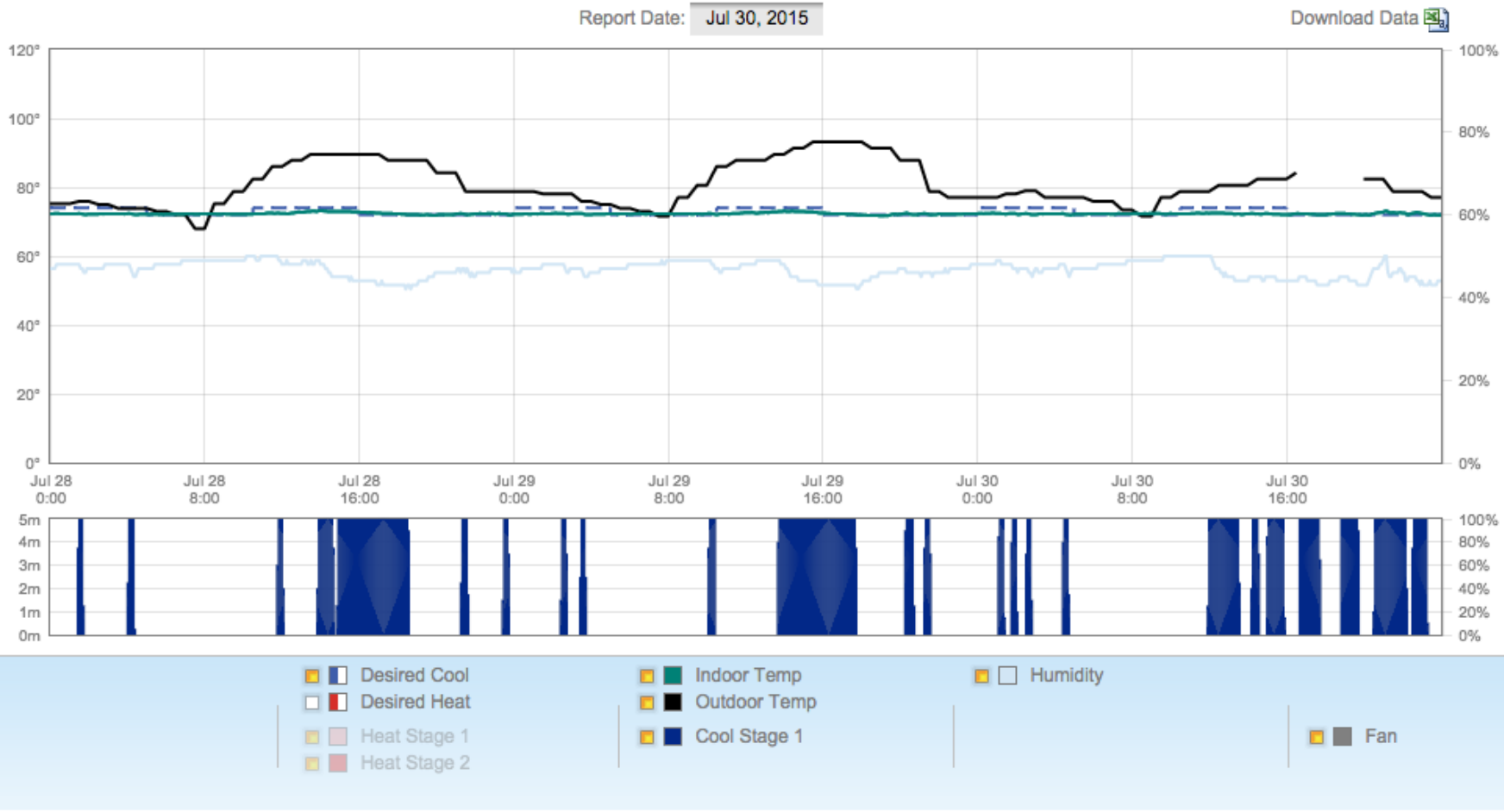
26 hours to drop 10 degrees, not 6 hours for 20 degrees



ENERGY SMART
HOME PERFORMANCE

Results

2nd floor temp difference 2-3 degrees, not 10-15



ENERGY SMART
HOME PERFORMANCE

Energy Results

Fuel	Annual Cost	Annual Savings
Natural gas	$1,695	$375
Electricity	$530	$28
Propane	$0	$0
Oil #2	$0	$0

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

ENERGY SMART
HOME PERFORMANCE

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

Discussion Highlights: Energy Smart Home Performance (Ohio)

- 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

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Driving Accountability for Program Performance Using Measured Energy Savings

Better Building Residential Network Peer Exchange

Daniel Kauffman

November 12th 2015

ResiSpeak

YOUR HOME'S UTILITY STORY

How ResiSpeak works

Utility Data
- From online accounts
- From utilities
- Manually entered

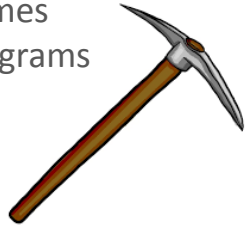
Weather Data
- National Weather Service

Retrofit Data
- Start & end data
- Work done
- Money spent

Home Data
- Zip code (for weather)
- Square footage
- Heating method

ResiSpeak

Find Saving Opportunities
- Within homes
- Within programs



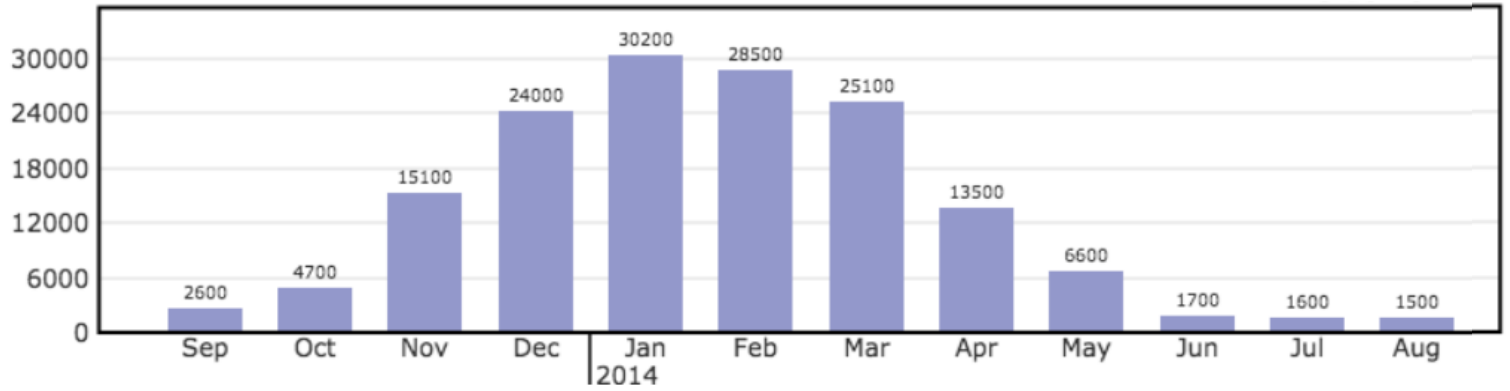
Measure Saving
- For individual home retrofits
- For programs

ResiSpeak is a database, a calculator, and a web service for home energy efficiency programs

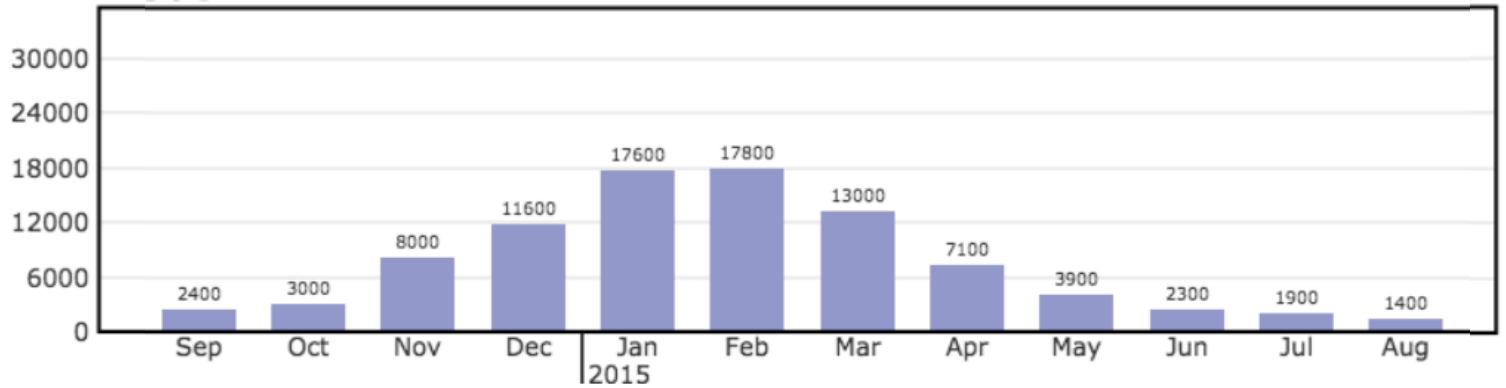
ResiSpeak
YOUR HOME'S UTILITY STORY

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

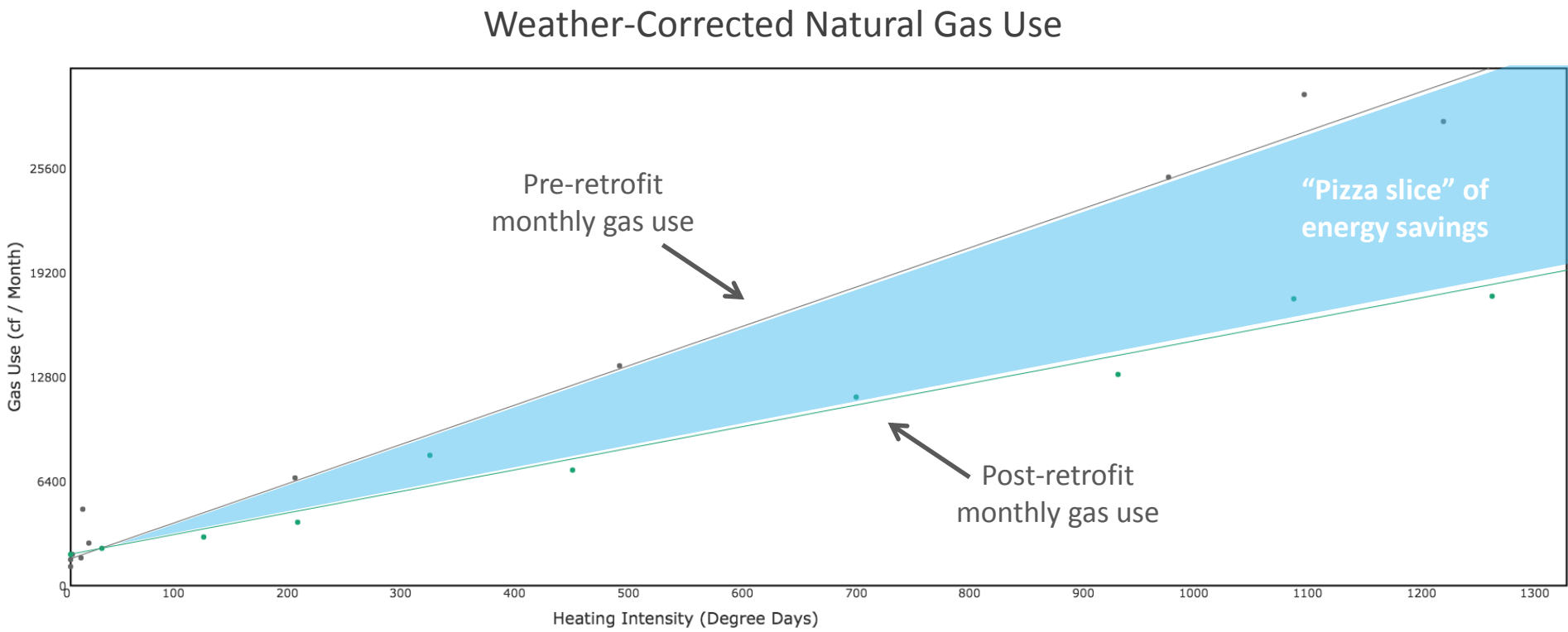


What to do with utility usage data:

Subtract the bills? Better yet, weather correct them!

ResiSpeak
YOUR HOME'S UTILITY STORY

How to measure savings from monthly bills



Measured energy savings:

From the post-retrofit points to the pre-retrofit line

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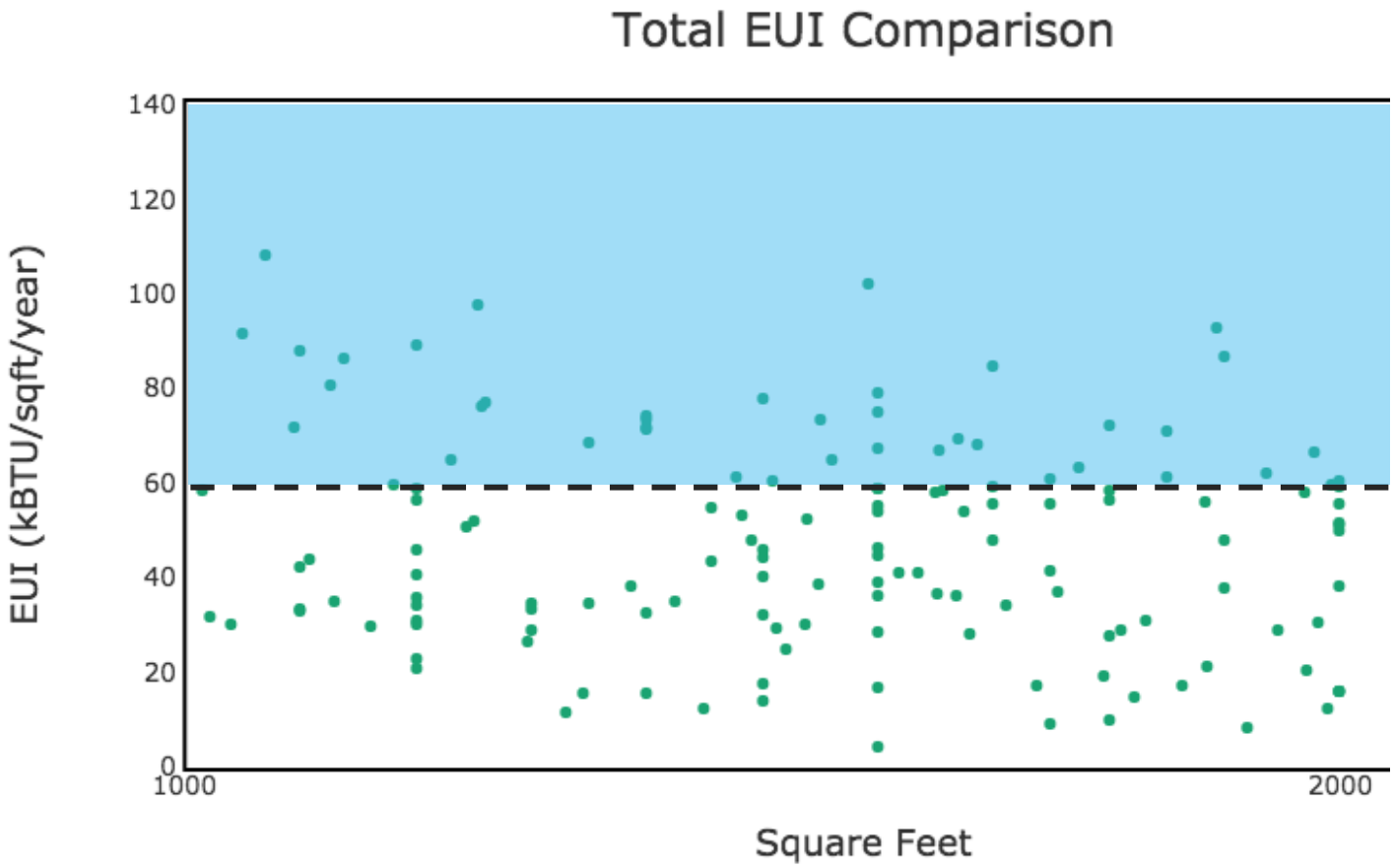
YOUR HOME'S UTILITY STORY

Address the high EUI homes first



Focus Resources on High EUI Homes

EUI – Energy Use Intensity, typically in kBtu/sqft/year

ResiSpeak uses homes in the DOE's Building Performance Database for EUI benchmarking

http://energy.gov/eere/buildings/articles/its-all-about-data-how-building-performance-database-informing-decisions

ResiSpeak
YOUR HOME'S UTILITY STORY

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?

ResiSpeak
YOUR HOME'S UTILITY STORY

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

ResiSpeak
YOUR HOME'S UTILITY STORY

Determining savings: stipulate, measure or nothing

Most common → Least common

	Stipulated Savings	Unknown Savings	Measured Savings
			
Advantages	• Money up front • Pre-approved programs from PUCs (e.g. CFL give-aways, appliance rebates) • Estimates for each energy conservation measure	• Free • No effort • Avoids accountability for lack of savings	• Key metrics for program performance improvement • Accountability & reporting • Low cost
Disadvantages	• Expensive to administrate • Inaccurate analysis • Over-regulates contractors	• Restricts ability to improve program performance • No accountability for results • Can not claim program impacts	• Waiting for results • Potential for disappointing results • Requires some effort
Common Use	• Regulated utility programs	• Public/unregulated programs • Homeowner initiated	• Research programs • Energy Savings Certificate or Carbon Credit programs

PUC – Public Utility Commission
CFL – Compact Fluorescent Light Bulb

ResiSpeak
YOUR HOME'S UTILITY STORY

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”

ResiSpeak
YOUR HOME'S UTILITY STORY

Closing Quotes

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

ResiSpeak
YOUR HOME'S UTILITY STORY

Discussion Highlights: ResiSpeak

- 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.

Related Resources in the Residential Program Solution Center

Use upgrade data to evaluate and improve services for homeowners and deliver stronger results.

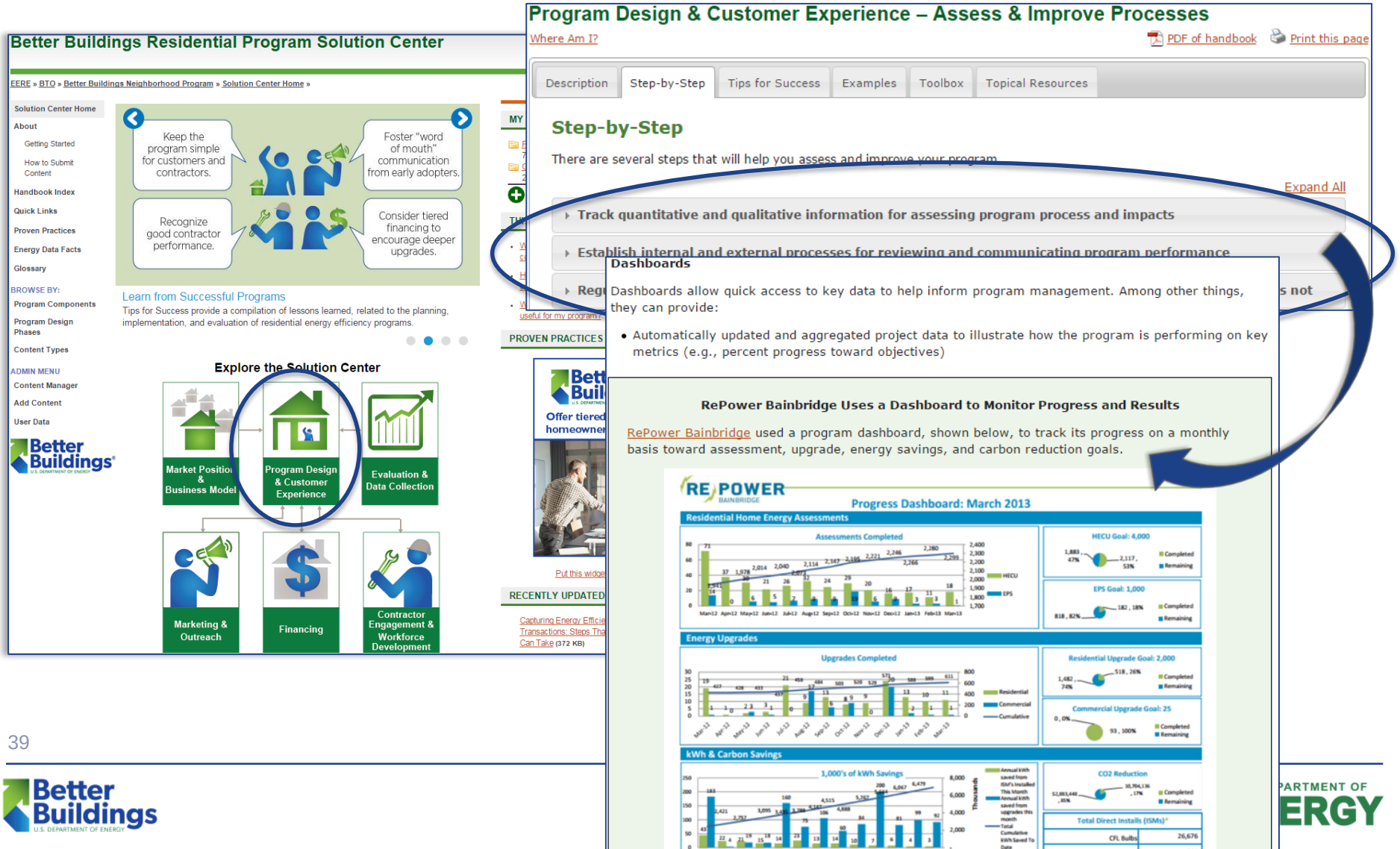
- Find step-by-step information and tips for how to improve your program's efficiency and effectiveness through information collection and continuous improvement.
- Identify and implement data collection systems and tools to enable program evaluation.
- Explore the Building Performance Database (BPD),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

www.energy.gov/rpsc

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



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?
- 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?

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.

Discussion Highlights

- 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