Better Buildings Residential Data & Evaluation Peer Exchange Call Series: 
*Cost-Effectiveness Tests & Measuring Like a Utility* 
April 10, 2014
Agenda

- Call Logistics & Opening Polls
- BBRN and Peer Exchange Call Overview
- Featured Speakers
  - **Subid Wagley**, DOE, and **Dr. Priya Sreedharan**, Energy + Environmental Economics (E3): DOE Cost Effectiveness Tool
  - **Dr. Kat Donnelly**, EMpower Devices (BBRN member) and formerly of the Connecticut Neighbor to Neighbor Energy Challenge
  - **Ludy Biddle**, NeighborWorks of Western Vermont
- Discussion
  - What approaches work well for evaluating/demonstrating the cost-effectiveness of energy upgrade programs to utilities?
  - What challenges have you had with using utility cost tests, and what strategies have you used to overcome them?
  - Have you used cost-effectiveness analysis to drive decisions about EE program implementation, and if so, how?
  - What, if any, additional guidance, tools, or resources would be helpful on cost-effectiveness testing for energy efficiency?
  - Other questions/issues?
- Future Call Topics Poll
Call Participants

- Alabama Department of Economic and Community Affairs
- Boulder County Department of Environmental Health
- California Center for Sustainable Energy
- Civic Works (Baltimore, MD)
- Clean Energy Durham
- Ecolibrium3 (Duluth, MN)
- Efficiency Maine
- Elevate Energy (Chicago, IL)
- Empower Devices (Palm Springs, CA)
- Energy and Environmental Economics (E3)
- Energy Pioneer Solutions (Omaha, NE)
- EnergyFit Nevada
- EnergySmart (Boulder, CO)
- Historic Chicago Bungalow Association
- International Sustainable Connections (Bellingham, WA)
- Midwest Energy Efficiency Alliance
- National Home Performance Council
- Natural Resources Defense Council
- NeighborWorks of Western Vermont
- National Housing Trust
- New Hampshire Office of Energy and Planning
- New York State Energy Research and Development Authority
- Portland Energy Conservation, Inc.
- Populus, LLC (Boulder, CO)
- PosiGen (New Orleans, LA)
- Southeast Energy Efficiency Alliance
- San Francisco Department of Environment
- Snohomish County PUD (Everett, WA)
- The Energy Coalition (Irvine, CA)
- Vermont Energy Investment Corporation
- Washington State Department of Commerce
- Wisconsin Energy Conservation Corporation
DOE Cost Effectiveness Tool

Subid Wagley, U.S. DOE

Dr. Priya Sreedharan, Energy + Environmental Economics (E3)
BBRP Energy Efficiency Program Cost Effectiveness Tool Beta 1.0

BBRN Peer Exchange Call
April 10, 2014
Priya Sreedharan
Motivation

+ Goal is for EE organizations to have a tool and analysis that informs program design and metrics and can be easily adjusted

+ Cost effectiveness (CE) analysis is critical
  - CE is *the* basis for approving EE programs at the state/utility level

+ For example, whole building energy efficiency programs, originally funded through federal dollars, can use CE analysis to develop the business case for sustained funding from other sources
New DOE Cost-effectiveness Tool

About the DOE CE Tool

+ Excel based tool follows standard CE protocols
+ 5 main cost tests calculated
+ User can build up a program
+ Tool supports measure level and whole-building approaches
+ Tool supports sensitivity analysis on key inputs

Using the DOE CE Tool

+ User enters general inputs (rates, discount rates)
+ Utility specific avoided costs are entered
+ Measure level & program data are defined
+ Report generates results in graphical and tabular form
## Definition of Cost Tests

<table>
<thead>
<tr>
<th>Cost Test</th>
<th>Key Question Answered</th>
<th>Summary Approach</th>
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<tbody>
<tr>
<td>Total Resource Cost</td>
<td>Will the total costs of energy in the utility service territory decrease?</td>
<td>Comparison of program administrator and customer costs to utility resource savings</td>
</tr>
<tr>
<td>Participant Cost Test</td>
<td>Will the participants benefit over the measure life?</td>
<td>Comparison of costs and benefits of the customer installing the measure</td>
</tr>
<tr>
<td>Utility/Program Administrator Cost Test</td>
<td>Will utility bills increase?</td>
<td>Comparison of program administrator costs to supply side resource costs</td>
</tr>
<tr>
<td>Ratepayer Impact Measure</td>
<td>Will utility rates increase?</td>
<td>Comparison of administrator costs and utility bill reductions to supply side resource costs</td>
</tr>
<tr>
<td>Societal Cost Test</td>
<td>Is the utility, state, or nation better off as a whole?</td>
<td>Comparison of society’s costs of energy efficiency to resource savings and non-cash costs and benefits</td>
</tr>
</tbody>
</table>
Model structure

General inputs
Utility rates, discount rate, cost tests of interest etc.

Avoided cost inputs
Electricity, gas, water, ...

Measure level data
kWh and KW savings, costs, incentives ...

Program data
Number of homes that will be retrofitted, Admin costs ...

User enters general inputs (rates, discount rates)

Utility specific avoided costs are entered

Measure level & program data are defined

Report generates results in graphical and tabular form
Program builder

- User defines schedule of retrofits over 3 year period
- Program budget is defined by the incentives and administrative costs

Example is purely illustrative!
Results are shown in graphical form and in tables.

Tool facilitates sensitivity analysis, so impacts of different program designs, cost inputs, discount rates, etc. can be explored.

Sensitivity slider

Graphical display of results
Summary

+ **Total Resource Cost test is the primary cost-effectiveness test used by most states**
  
  • Though, there are differing views on if this is right test, how it should be used and calculated

+ **Long list of key drivers that can have a meaningful impact on the cost-effectiveness result**
  
  • Not just energy and capacity savings

+ **For States, local governments, other jurisdictions, CE questions may include:**
  
  • What is the right cost-effectiveness framework?
  • Are we applying the framework correctly?
  • Do we have the right tests?
  • We are going to discuss these questions and others next
Accessing DOE Cost Effectiveness Tool
Accessing DOE Cost Effectiveness Tool

- The Cost-Effectiveness Tool is available through the Better Buildings Residential Network Group on Home Energy Pros. If you are not a member of Home Energy Pros and the BBRN Group, you will need to sign up for Home Energy Pros and then join the BBRN Group.
- Find the Tool, along with Instructions, FAQ, etc., on the “Tools” page of the BBRN Group (bottom right section of the page, below the members).
- Once you are a member of the BBRN Group, you can access this page directly at: http://homeenergypros.lbl.gov/group/better-buildings-residential-network/page/placeholder-2
- DOE will also post the tool on its website.
Discussion: DOE Cost Effectiveness Tool

- The tool is agnostic about which cost effectiveness test is most appropriate, letting the user determine what is best given the need.
- The tool does not include recommendations for specific input values.
- Users can input energy efficiency savings from behavioral changes.
- The tool can help users quantify non-monetized benefits (e.g., environmental benefits).
- Assumptions about the life of measures and building materials are embedded in the tool.
- The tool is designed for the residential sector, but could be relevant / generalized to other sectors.
Lessons Learned:

Dr. Kat Donnelly  
EMpower Devices (BBRN member)  
Former Program Evaluator for Connecticut Neighbor to Neighbor Energy Challenge
April 10, 2014

Data & Evaluation: Cost-Effectiveness Tests and Measuring Like a Utility

Kat A. Donnelly, Ph.D.
Former Program Evaluator for CT Neighbor to Neighbor Energy Challenge (N2N)
CT Neighbor to Neighbor Energy Challenge

• 14 towns Across Connecticut
• $4.2m pilot funded by DOE to:

1. Prove that community-based strategies are a cost-effective way to drive demand for residential upgrades

2. Demonstrate that Home Energy Solutions could be marketed as a first step to deeper improvements (historical upgrade rate <10%)

3. Prove that investing in state-of-the-art data tracking systems improve community-based program results
Data and Performance Metrics

- Track & report effectiveness of customer engagement, including:
  - Communication touch points,
  - Outreach strategies,
  - Motivational messages (A/B message testing)
- Track & encourage the customer through their journey
- Compare cost-effectiveness & set thresholds for performance
- Prepare internal program reports & dashboards using real-time performance data
- Complete qualitative and quantitative analysis projects
Tracking Database

Next Two Slides:
1. Example Contractor Performance Dashboard
2. Example Cost-Effectiveness and Scenario Planning Model
Weekly Contractor Review Dashboard

Leads Assigned Last Week

Leads Completed Last Week

Leads Lost Last Week

Upgrade Conversion Rate by Contractor

Hot Leads - HES Completed in Past 60 Days

Energy Savings by Contractor

Completed HES Assessment Projects

Completed HES Improvement Projects

Project Owner   Record Count
Admin NESEG   774
Admin NESEG   77
## Cost-Effectiveness/Scenario Planning Model

### Cost Effectiveness by Strategy ($/HES visit)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
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<tr>
<td>Festival</td>
<td>$257.21</td>
<td>$116.92</td>
<td>$110.23</td>
<td>$128.61</td>
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<td>$12.09</td>
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<td>Coalition partner meetings</td>
<td>$466.38</td>
<td>$151.14</td>
<td>$187.96</td>
<td>$151.14</td>
<td>$197.49</td>
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<td>$0.25</td>
<td>$0.20</td>
<td>$0.11</td>
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<td>Workshops</td>
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<td>$72.55</td>
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<td>$101.57</td>
<td>$31.09</td>
<td>$79.64</td>
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<tr>
<td>Other</td>
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<td>$59.36</td>
<td>$-</td>
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<tr>
<td>Election</td>
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<td>$161.11</td>
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<td>Call nights</td>
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<tr>
<td>Tableing</td>
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<td>Presentation to Other Non-Coalition Partner</td>
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<td>$0.91</td>
<td>$0.40</td>
<td>$0.34</td>
<td>$0.38</td>
<td>$1.15</td>
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### Hours per Upgrade Complete Sign Up— by Strategy (Pull through)

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Problem, Diagnosis, Solution: Contractor Close Rates

**Problem:** Poor Close Rate (26% of leads completed assessment)

**Quantitative Diagnosis:**
- Lost leads
- Poor contractor follow up
- Low bid rates
- Low customer upgrade awareness

**Solution—Course Correction:**
- N2N Assign Leads
- Contractor Scorecards
- N2N Contractor RFQ
- Energy Advisors
- Customer Sales Training
- Lead “swim lanes”
N2N Course Correction Results

- HES Visit Close Rate
  - June 2011: 26%, 546 visits
  - October 2012: 62%, 2,485 visits

- Follow On Upgrade Rate
  - June 2011: 5.1%, 22 upgrades
  - October 2012: 7.8%, 188 upgrades
Lessons Learned: Where to Invest

1. Community-based organizing
   - Use multi-touch approaches tailored to communities
   - Need significant staffing to succeed
   - Hire experienced community organizers
     - Community groups and volunteers are critical and require support and training

2. Contractor coordination and support

3. Marketing
   - Understand the target audience & energy efficiency marketing
   - Rely on Earned media
   - Coordinate marketing & brand awareness with outreach and social media
Lessons Learned: EMpower Devices

- Data and performance evaluation helped the program continuously improve through a Test, Learn, and Adapt approach.
- Data tracking and effectiveness evaluation showed that community-based organizing through trusted messengers/community connectors is key.
- Using cost effectiveness tests to evaluate outreach strategies helped the program improve performance.
- Data analysis also helped the program identify the drivers behind low conversion rates (poor contractor follow-up, low customer awareness of upgrades, etc.) and tactics to address those drivers (energy advisors, sales training, etc.).
Lessons Learned:

Ludy Biddle
NeighborWorks of Western Vermont
NeighborWorks H.E.A.T. Squad
One-Stop-Shop for Home Energy Efficiency

Ludy Biddle
Executive Director
NeighborWorks of Western VT
www.heatsquad.org
Lessons Learned: NeighborWorks of Western Vermont H.E.A.T. Squad

- NeighborWorks partnered with a consultant to perform a cost effectiveness analysis of the H.E.A.T. Squad

- Through standard utility cost tests, the consultant found:
  - Customers were 40% more likely to install energy efficiency measures if they had heard about the HEAT squad
  - Low-income households who heard HEAT squad messaging were 64% more likely to install upgrades
  - For every dollar spent on the HEAT squad, $1.72 in benefits is returned to the community

- The analysis results has helped communicate the program’s value to the utility and energy efficiency community
Discussion Questions: Cost-Effectiveness Tests and Measuring Like a Utility

- What approaches work well for evaluating/demonstrating the cost-effectiveness of energy upgrade programs to utilities?
- What challenges have you had with using utility cost tests, and what strategies have you used to overcome them?
- Have you used cost-effectiveness analysis to drive decisions about EE program implementation, and if so, how?
- What, if any, additional guidance, tools, or resources would be helpful on cost-effectiveness testing for energy efficiency?
- Other questions/issues related to cost-effectiveness tests and measuring like a utility?
Poll: Other Guidance, Tools or Assistance

What other guidance, tools, or assistance on EE cost effectiveness testing would be useful from DOE?

- Examples of how EE programs have managed cost-effectiveness tests: 69%
- Training/online demo of DOE cost-effectiveness tool: 69%
- Guidance/resources on utility "triple bottom line" analysis: 38%
- Other tool or resource: 19%
- Other webinar or peer exchange call: 6%

Suggestions: More training in the use of one test versus another; more guidance on the assumptions used in the test
Future Call Topics

Which of the following topics, if any, are of interest for future Data/Evaluation Peer Exchange calls?

- Using Data to Support Behavior Modification Efforts: 67%
- Developing a Benchmarking Plan: Templates, Tools, and Data: 67%
- Customer Relationship Management Systems and Energy Efficiency Results: 67%
- Making Evaluations Work for Your Program: Tips for Success: 56%
- Other: 6% (Different methods for calculating the weather-normalized energy savings specifically for residential homes)

If you would like to share your experiences on a call or have other ideas for a call topic, contact peerexchange@rossstrategic.com