Multiple, Non-Energy Benefits of Residential Energy Upgrades
Agenda

I. Welcome and Introductions

II. Polling Questions

III. Rachel Cluett, ACEEE

IV. Keith Canfield, CCI

V. Melanie Paskevich, NeighborWorks of Western Vermont
Why did you choose this session?
Polling Questions

What sector do you work in?

- Local government
- State government
- Federal government
- Nonprofit
- Utility
- Business
Polling Questions

How long have you been working in the field of residential energy efficiency?

- 0-1 years
- 2-5 years
- 6-10 years
- 11-20 years
- 21+ years
Polling Questions

What do you do?

- Fund energy efficiency programs
- Implement energy efficiency programs
- Work in homes to make more energy efficient
- Consult to energy efficiency programs
- Evaluate energy efficiency programs
Polling Questions

What is the biggest barrier to valuing NEBs?

- Difficulty measuring
- Defining comfort
- Utility cost effectiveness
- Customer awareness
- Clear marketing messages
Polling Questions

What offers the most potential for NEBs?

- Health
- Low fuel costs
- Real estate incorporating EE (in MLS, sales+)
- Baby Boomer retirement wave
- Resiliency rise in importance
- Smart homes & coming increase in NEB data
Visit the Residential Program Solution Center: energy.gov/rpsc

Suggestions? Email BBRPSolutionCenter@ee.doe.gov
Resources related to non-energy benefits:

- **Non-Energy Benefits Quick Link** provides easy access to resources about benefits beyond energy savings, such as health, job creation, economic development, avoided emissions, and more.

- **Tip for Success**: Leverage the many complementary benefits of energy efficiency programs to broaden your organization’s reach and partnership opportunities.

- The **Marketing and Outreach – Make Design Decisions** handbook, “Develop Messages to Motivate Action” step discusses how your audience’s top priority may not be energy efficiency.

- While you’re there, see the latest [Proven Practices](#) post on [Evaluating Residential Program Success](#).
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:
- Recognition: Media, materials
- Weekly Peer Exchange Calls
- Tools, templates, & resources
- Voluntary member initiatives
- Newsletter updates on trends
- Speaking opportunities
- Sample tweet, newsletter article announcing membership

Commitment: Provide DOE with one, annual number of residential upgrades, and information about associated benefits.
Multiple Benefits of Residential Retrofits

Rachel Cluett
Senior Research Analyst, Buildings Program
American Council for an Energy-Efficient Economy
Why quantify non-energy benefits?

- Program planning
  - Cost benefit analysis for comparison with other programs in a portfolio
- Regulatory requirements
  - Represent the value of programs to regulators
- Program marketing
  - Help program participants understand the range of benefits from upgrades
### Program planning and regulatory requirements: do the benefits outweigh the costs?

<table>
<thead>
<tr>
<th>Energy Efficiency Program Benefits:</th>
<th>Participant Cost Test</th>
<th>RIM Test</th>
<th>Utility Cost Test</th>
<th>TRC Test</th>
<th>Societal Cost Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoided Energy Costs</td>
<td>---</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Avoided Capacity Costs</td>
<td>---</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Avoided Transmission and Distribution Costs</td>
<td>---</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Wholesale Market Price Suppression Effects</td>
<td>---</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Avoided Cost of Environmental Compliance</td>
<td>---</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Non-Energy Benefits (utility)</td>
<td>---</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Non-Energy Benefits (participant)</td>
<td>Yes</td>
<td>---</td>
<td>---</td>
<td>Yes*</td>
<td>Yes*</td>
</tr>
<tr>
<td>Non-Energy Benefits (societal)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Yes</td>
</tr>
<tr>
<td>Customer Bill Savings</td>
<td>Yes</td>
<td>---</td>
<td>---</td>
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<td>---</td>
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</table>

<table>
<thead>
<tr>
<th>Energy Efficiency Program Costs:</th>
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<th>RIM Test</th>
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<th>TRC Test</th>
<th>Societal Cost Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Administrator Costs</td>
<td>---</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>EE Measure Cost: Program Financial Incentive</td>
<td>---</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>EE Measure Cost: Participant Contribution</td>
<td>Yes</td>
<td>---</td>
<td>---</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Lost Revenues to the Utility</td>
<td>---</td>
<td>Yes</td>
<td>---</td>
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</tr>
</tbody>
</table>

Source: Resource Value Framework, NESP 2014
An imbalanced cost effectiveness test doesn’t accurately assess whether programs are in the public interest

**Participant costs**
- $ contribution to energy efficiency project

**Participant benefits**
- Energy savings
- Water and sewer savings
- Reduced operations and maintenance costs
- Increased tenant comfort
- Reduced vacancy rate
## What are the benefits?

<table>
<thead>
<tr>
<th>Category</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readily quantified and monetized benefits</td>
<td></td>
</tr>
<tr>
<td>Resource</td>
<td>Reduction in water and sewer costs</td>
</tr>
<tr>
<td>Highly important to participants, quantified by some studies</td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>Increased home durability, less maintenance</td>
</tr>
<tr>
<td></td>
<td>Reduced equipment and appliance maintenance</td>
</tr>
<tr>
<td>Comfort</td>
<td>Higher comfort levels</td>
</tr>
<tr>
<td></td>
<td>Noise: quieter indoor environment</td>
</tr>
<tr>
<td>Safety</td>
<td>Improved safety (fewer fires, reduced CO poisoning)</td>
</tr>
<tr>
<td>Home improvements</td>
<td>Increased housing property value</td>
</tr>
<tr>
<td>Potentially significant, but less readily quantified</td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>Reduced illness, fewer sick days</td>
</tr>
<tr>
<td></td>
<td>Improvements in indoor air quality</td>
</tr>
</tbody>
</table>
How are benefits quantified?

• Occupant surveys
• Algorithms from literature (resource benefits)
• Adapt values from other programs
## Value of benefits measured in existing studies

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Value range (% of utility bill savings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in water and sewer costs</td>
<td>5–60%</td>
</tr>
<tr>
<td>Increased home durability, less maintenance</td>
<td>7%</td>
</tr>
<tr>
<td>Reduced equipment and appliance maintenance</td>
<td>2–26%</td>
</tr>
<tr>
<td>Higher comfort levels</td>
<td>2–25%</td>
</tr>
<tr>
<td>Noise: quieter indoor environment</td>
<td>5–15%</td>
</tr>
<tr>
<td>Improved safety (fewer fires, reduced CO poisoning)</td>
<td>1–12%</td>
</tr>
<tr>
<td>Increased housing property value</td>
<td>2–20%, or quantified as a one-time value</td>
</tr>
<tr>
<td>Reduced illness, fewer sick days</td>
<td>0–36%</td>
</tr>
</tbody>
</table>
Resources


Rachel Cluett | rcluett@aceee.org | 202-507-4035
Clinton Climate Initiative
Reaching Scale in the Workplace

![Graph showing the growth of employees enrolled in health insurance and 401K over time]
COMPARISON OF GHG IMPACT POTENTIAL FOR AVERAGE US HOUSEHOLD (2011)

Bubbles sized by relative GHG impact with maximum expected reduction shown in dark blue.

Annual GHG Impact in Tons

Validation Confidence (1=Low, 10=high)
HEAL Employee Impact

Employee Survey Results

Did you find participation in the HEAL program to be beneficial to you or your family?

YES 89%

Do you feel you have more information about energy use in your home than you did before your participation in the HEAL program?

YES 86%

Would you have made energy efficient improvements to your home this year before participating in the HEAL program?

NO 66%

XXX Employees believe employers that offer HEAL...

- show that they care about their employees: 86%
- want to be progressive employers in the community: 82%
- are generally more sustainable or environmentally minded: 75%
- want to be an employer that you might recommend to others: 68%

Cost of providing similar disposable income increase through wages...

- Equivalent to the after-tax impact of a 1.44% salary increase for an employee making $40K
- Cost to employer: $644.33 1 year
- Cost to employer: $6,443.30 10 years

none of the above 5%
Employer 1: City

**Energy, Environment & Financial Impacts of Recommendations**
- Average Simple ROI: 10%
- Average annual utility savings: $324
- Reduced GHG emissions annually: 4,867 pounds
- Average rebate eligibility: $718

**Most Frequent Recommendations**
- Air Sealing: 38%
- Duct Sealing: 39%
- Attic Insulation: 39%
- CFL Installation: 82%
- Health & Safety: 35%

**Top Employee Concerns**
- Comfort: 95%
- High Energy Use: 87%
- Health/Air Quality: 59%

Employer 2: Health Care

**Energy, Environment & Financial Impacts of Recommendations**
- Average Simple ROI: 22%
- Average annual utility savings: $447
- Reduced GHG emissions annually: 6,708 pounds
- Average rebate eligibility: $982

**Most Frequent Recommendations**
- Air Sealing: 83%
- Duct Sealing: 88%
- Attic Insulation: 58%
- CFL Installation: 100%
- Health & Safety: 10%

**Top Employee Concerns**
- Comfort: 87%
- High Energy Use: 70%
- Health/Air Quality: 68%
<table>
<thead>
<tr>
<th>Employer 1: City</th>
<th>Employer 2: Health Care</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Number of Recommendations</strong></td>
<td>3.1</td>
</tr>
<tr>
<td><strong>Average Cost</strong></td>
<td>$5,816</td>
</tr>
<tr>
<td><strong>Average Rebate</strong></td>
<td>$718</td>
</tr>
<tr>
<td><strong>Average Net Cost</strong></td>
<td>$5,099</td>
</tr>
<tr>
<td><strong>Annual Savings</strong></td>
<td>$324</td>
</tr>
<tr>
<td><strong>Percentage Financed through CU</strong></td>
<td>69%</td>
</tr>
<tr>
<td><strong>Average Loan</strong></td>
<td>$2,081</td>
</tr>
<tr>
<td><strong>Those receiving assessments</strong></td>
<td>2.4</td>
</tr>
<tr>
<td><strong>Those progressing to retrofit</strong></td>
<td>$3,948</td>
</tr>
<tr>
<td></td>
<td>$742</td>
</tr>
<tr>
<td></td>
<td>$3,206</td>
</tr>
<tr>
<td></td>
<td>$344</td>
</tr>
<tr>
<td><strong>Average Number of Recommendations</strong></td>
<td>3.6</td>
</tr>
<tr>
<td><strong>Average Cost</strong></td>
<td>$3,001</td>
</tr>
<tr>
<td><strong>Average Rebate</strong></td>
<td>$984</td>
</tr>
<tr>
<td><strong>Average Net Cost</strong></td>
<td>$2,017</td>
</tr>
<tr>
<td><strong>Annual Savings</strong></td>
<td>$447</td>
</tr>
<tr>
<td><strong>Average Payback (in years)</strong></td>
<td>4.51</td>
</tr>
<tr>
<td><strong>Those progressing to retrofit</strong></td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>$3,180</td>
</tr>
<tr>
<td></td>
<td>$1,065</td>
</tr>
<tr>
<td></td>
<td>$2,081</td>
</tr>
<tr>
<td></td>
<td>$427</td>
</tr>
<tr>
<td></td>
<td>4.87</td>
</tr>
</tbody>
</table>
## Potential Impact of Offering Home Energy Efficiency: Firm with 25,000 Employees

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in Utility Expenses (over 10 Years)</td>
<td>$26 Million</td>
</tr>
<tr>
<td>Stimulation of Home Performance and Construction Sectors</td>
<td>$23 Million</td>
</tr>
<tr>
<td>Improved Health Outcomes for Participants</td>
<td>$5 Million</td>
</tr>
<tr>
<td>Estimated Increase in Home Value</td>
<td>$20 Million</td>
</tr>
</tbody>
</table>
Key Findings from HEAL

• Delivering information, financing/Incentives and infrastructure needs, backed by a strong quality assurance plan, creates an action vector

• Program uptake and participation rates can be 3-10 times higher than those found in the general utility program population

• Employees appreciate the employer’s facilitation role and tend to view the employer more favorably and as being more sustainably oriented

• Co-benefits appear to be substantial, and accrue to multiple stakeholder groups
Thank You

kcanfield@clintonfoundation.org
Non-Energy Benefits of Residential Energy Upgrades

Melanie Paskevich, Program Manager
 NeighborWorks of Western VT

- **Nonprofit** housing organization
- One-stop-shop
- Provide all the answers and support homebuyers and owners need
- Keep customer’s best interest front and center
- **Realty, Lending, Financial Counseling and Education, Home Repair, HEAT Squad**
- Part of a national nonprofit network, *NeighborWorks America*
Meet the HEAT Squad

- Providing **support** to improve energy efficiency of homes/businesses, regardless of income since 2010
- **Reduced cost audits**, same day audit reports, objective advice, help with contractors, in-house financing
- Available in five counties, half of Vermont
- Completed almost **4,000 audits and 1,500 projects**
- **Partners**: Efficiency VT, Green Mountain Power, Local Contractors, Energy Committees and Champions
Residential Non-Energy Benefits

1. Your Health and Safety
2. Protect Your Investment
3. Support Your Community
Your Health and Safety

- Reduce incidence of rodents and pests

*Our house and cellar are toasty warm and the amazing thing is- we have not seen a single mouse. Thank you.*

- Lower outside noise
- Eliminate moisture/mildew/mold (asthma)
- Address dangerous gas leaks and carbon monoxide issues
- Verify building tightness limit, not too tight

*Have a safer home for you and your family*

-Lee & Jane
Protect Your Investment

- Reduce occurrence of damaging ice dams
- Eliminate moisture from entering building
- Protect the structure and increase the longevity of the building
- Lower maintenance expenses (painting, roofing, siding, etc.)
- Increase value of the home
Support Your Community

“Make a Difference in Your Community. Your improvements support your local economy with local jobs for local folks.”

- Job creation
- Personal empowerment
- Energy independence
- Support the local economy
Head Scratcher:

How do we effectively market to homeowners about this....

INCREASED COMFORT

With warm weather and low fuel prices, how can we quantify increased comfort?
Thank You

Melanie Paskevich
802.797.8610
mpaskevich@nwwvt.org