Saving Energy in Multifamily Buildings

Welcome to the Webinar! We will start at 11:00 AM Eastern Time

Be sure that you are also dialed into the telephone conference call:

**Dial-in number: 888-324-3815; Pass code: 9996091**

*(If asked for a PIN #, press *0)*


Date: July 26, 2011
Building America: Introduction
July 26, 2011

Stacey Rothgeb
Stacey.rothgeb@nrel.gov
• Reduce energy use in new and existing residential buildings
• Promote building science and systems engineering / integration approach
• “Do no harm”: Ensure safety, health and durability are maintained or improved
• Accelerate adoption of high performance technologies

www.buildingamerica.gov
15 Industry Research Teams

- Alliance for Residential Building Innovation (ARBI)
- NorthernSTAR Building America Partnership
- Building America Retrofit Alliance (BARA)
- Fraunhofer USA
- ARIES Collaborative
- Building Energy Efficient Homes for America (BeeHa)
- Habitat Cost Effective Energy Retrofit Program
- The Partnership for Advanced Residential Retrofit (PARR)
- The National Energy Leadership Corps (N.E.L.C.)
Today’s Speakers

Larry Brand is an R&D Manager at the Gas Technology Institute working in the area of building energy efficiency, product development, codes and standards, and technology deployment. He has 30 years of experience managing building systems research and product development programs for public and private companies, launching more than 20 products into the marketplace, Mr. Brand is currently the lead investigator for the Partnership for Advanced Residential Retrofit Building America team and principal investigator for the California Energy Commission Measured Home Performance project.

Peter Ludwig is the Energy Efficiency Programs Manager at CNT Energy. His primary focus is to manage the Energy Savers multifamily retrofit project. Peter has a BA in Geology and Earth Science from Wesleyan University and is a Certified Energy Manager.
Introduction to PARR

The Partnership for Advanced Residential Retrofit

Larry Brand
Gas Technology Institute
Larry.Brand@gastechnology.org
847.768.0968

Ryan Kerr
Gas Technology Institute
Ryan.Kerr@gastechnology.org
224.735.0264
PARR Overview

- Midwest region, cold climate focus
  1. Seven-state Midwest region with a Chicago “hub”
  2. Systems and whole home solutions for cold climate
  3. Targeting high potential building stock with opportunities for energy savings AND scalability
PARR Team Lead – Gas Technology Institute

> Not-for-profit research, with 65+ year history in Energy R&D

> Facilities
  – 18 acre campus near Chicago
  – 200,000 ft², 28 specialized labs

> Staff of 250

> 1000 patents; 500 products

> Research staff with 60 + years combined experience in building systems
PARR Team Members

> Community-based organization using EE to promote urban sustainability

> Runs largest residential retrofit program in Chicago

> Lead author of the Chicago Climate Action Plan

> Piloting a residential real-time electricity pricing program

> Nonprofit EE agency operating in 13 Midwest states

> Training and certification
  – HVAC performance
  – Building operators

> Residential focus areas
  – Whole home programs
  – Lighting & appliances
  – Codes & standards

> EE policy expertise
PARR Team Members

Building Research Council

> University of Illinois researchers focusing on building energy, HVAC, moisture, safety and IAQ

> Over 60 years combined experience in residential retrofit including research, evaluation, monitoring

> Illinois weatherization trainers

> Consulting company advising on EE portfolio and program design, administration, implementation and evaluation

> Manages large-scale EE stakeholder process (US and abroad) to build support for and optimize EE portfolios
PARR Partners

> Over 40 industry partners *(at time of original bid, list continues to grow)*

- Manufacturers of building materials and equipment including:
  > DuPont, Owens Corning, Carrier, Rinnai, AO Smith, Trane, Serious Materials

- Developers, contractors, and realtors including:
  > DNR Construction, Checkmate Development, DNR Const, Solar Services

- Utilities, Agencies, and Programs including:
  > ComEd, Columbia Gas of Ohio, PG&E, Vectren, CenterPoint, DTE Energy

- EE program implementers

- Government agencies including:
  > City of Chicago, City of Champaign, IL DCEO, Indiana Energy Office, Iowa Energy Center, Michigan Bureau of Energy Systems, CMAP

- Neighborhood organizations and hybrid home owner associations

- Universities and others
Research Areas

> Task 6 – Evaluation of Retrofit Delivery Practices

> Task 7 – Evaluation and Testing of Individual Retrofit Measures

> Task 8 – Evaluation of Whole House Retrofit Packages of Energy Efficiency Measures (Prototype Homes)

> Task 9 – Evaluation of Community-Scale Implementation of Retrofit Energy Efficiency Packages

> Task 11 - Other Research Activities
Energy Savers Program

Efficiency in Multifamily Buildings
Data synthesis & analysis

• “Think and do” tank for urban sustainability

• Focus on transportation, land use, energy, green infrastructure, community development and climate change

• Strategies that benefit the environment and economy
Data synthesis and analysis
Community focused innovation
• Smart grid and dynamic pricing
• Energy Planning
• Policy, research and analysis
Programs & projects

• Commercial and municipal buildings
  Regional Green Building Case Study Project

• Residential
  • MyHomeEQ for single family homeowners
  • Green MLS listings
  • Small 2-4 unit buildings
  • Multifamily
Green and Healthy Buildings

Collaborating on HUD research studies
MIGHHTY
WATTS to Well-Being

CNTenergy
ECMs: exciting vs reliable
A one-stop energy efficiency shop for multifamily building owners

- Both the private and subsidized markets
- Combines technical services energy audits, construction management and financing low-interest revolving loan fund
- Post retrofit performance monitoring
Energy Savers - Results

- 6,000 apartments updated for efficiency
- 30% average annual energy savings
- $10,000 in annual utility bill savings for the typical 24-unit building
- Aggregate energy savings of $3M and growing
- $2.7M loan portfolio
How Energy Savers Works
Energy Savers Process

Customer contacts CNT Energy → Application Process → Energy Audit → Confirm retrofits with owner

- Solicit bids & select contractors
- ECM Installations
- Inspection

Is financing needed?
- Yes → CNT applies to CIC

- Program evaluation (process & impact)
- Ongoing energy performance monitoring
- Intervention in low-performing buildings

CNT energy
Natural gas use

High use in the winter

Low use in the summer — but not zero.

Example: 134,000-ft² building with 96 units. All Metretek reads.
What about electricity?

Owner’s natural gas use

Owner’s electricity use
Energy Audit

- Analyze fuel bills-patterns and Energy Use Intensity (EUI, energy usage/square footage)
- Interview occupants/operators
- Visual inspection
- Instrumented Analysis: infrared thermography, thermometer, blower door
- Modeling/common sense
Infrared Thermography

Identifies surface temperature: applicable to assess existing insulation, pipes in chases, air leakage in tandem with blower door test, etc. Quantitative value limited for Multi-family buildings
Timing mainline steam vents

Boiler turns on

8 minutes later

30 minutes later
Auditor: Do you know how to operate this?  Super: Nope.
Final report with recommendations

Energy Audit
5158 S. King Boulevard, Chicago, IL

Prepared by: Chicago Metropolitan Housing Development Corporation

Performed by: CNT Energy, a division of the Center for Neighborhood Technology
## Sample Measure Package

<table>
<thead>
<tr>
<th></th>
<th>Cost</th>
<th>Annual savings</th>
<th>Simple payback</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Building envelope</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceiling cavity insulation</td>
<td>$7,049</td>
<td>$1,531</td>
<td>4.6 years</td>
</tr>
<tr>
<td>Seal air leaks</td>
<td>$400</td>
<td>$70</td>
<td>5.7 years</td>
</tr>
<tr>
<td><strong>Mechanical systems</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replacement high-efficiency boiler</td>
<td>$24,000</td>
<td>$4,542</td>
<td>5.3 years</td>
</tr>
<tr>
<td>Boiler controls</td>
<td>$4,500</td>
<td>$901</td>
<td>5.0 years</td>
</tr>
<tr>
<td>Outdoor reset control</td>
<td>$2,000</td>
<td>$1,770</td>
<td>1.1 years</td>
</tr>
<tr>
<td>Repair condensate return lines</td>
<td>$2,000</td>
<td>$460</td>
<td>4.3 years</td>
</tr>
<tr>
<td>Replace radiator and line vents</td>
<td>$1,270</td>
<td>$755</td>
<td>1.7 years</td>
</tr>
<tr>
<td><strong>Electrical/lighting</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compact fluorescent lamps</td>
<td>$152</td>
<td>$55</td>
<td>2.8 years</td>
</tr>
<tr>
<td><strong>Total for all measures</strong></td>
<td>$41,371</td>
<td>$10,084</td>
<td>4.1 years</td>
</tr>
</tbody>
</table>
Financial support

- Established a revolving loan fund
- Can combine with grant sources
- Can combine with rehab
- Can combine with acquisition
- Creates a more flexible program
Construction Management

High quality installation makes a difference.
Owners like and trust the program

“I saved over $30,000 on my operating costs with the Energy Savers Program. This is the best investment I’ve made in my buildings in 10 years”
Don Wenzel, building owner.
Energy Efficiency pays back

- Portfolio of 5 buildings, 93 units
- Total loan Amount: $117,000
- Scope of work includes: insulation, air sealing, balancing heating systems
- Monthly Loan Payment - $1,519.73
- Monthly Savings due to ECM - $2,129.5
Questions

Peter Ludwig
Energy Efficiency Programs
Manager
CNT Energy
peter@cntenergy.org
(773) 269-4048
Thank you for attending the Webinar

If you have any comments or ideas for future Webinars, please email webmasterbtp@nrel.gov

Visit www.buildings.energy.gov/webinars.html to download today’s presentation and to register for announcements of upcoming Webinars.