WHOLE HOUSE RETROFITS: WHAT IT TAKES TO MOVE THE MARKET

Regulatory Assistance Project Webinar

December 15, 2010

Chris Neme, Energy Futures Group
Webinar Overview

- Chris Neme:  Framework for good program design
- Mark Dyen:  Keys to good program implementation
- Tim Kisner:  Building labeling/disclosure requirements
Presentation Overview

1. Introduction
2. Opportunity and market barriers
3. Designing good programs
   a. Program design myths
   b. Mapping strategies to barriers
   c. Key design questions/trade-offs
4. Importance of a good policy framework
5. Results from leading programs
Introduction
Energy Futures Group Consulting

Areas of Expertise
- Program Design
- Policy Development
- Building Codes
- Evaluation
- Cost-Effectiveness

Range of Clients
- Government Agencies
- Advocates
- Regulators
- Utilities

Clients in more than 10 states/provinces plus regional, national and international organizations.
Opportunity and Market Barriers
Opportunity

~50% of national residential energy use is heating/cooling (~60% in Northeast and Midwest)
Opportunity (2)

- Very little effort to date to address residential heating
  - In existing buildings (lots of new construction programs)
  - Other than furnace & heat pump rebates
Market Barriers

Consumers
- Lack info on efficiency benefits
- Difficultly identifying quality contractors
- Inadequate access to capital
- Split incentives (renters)
- Risk – uncertainty re: benefits
- High transaction/hassle costs
- Improvements not visible/sexy

Contractors
- Lack technical tools/skills
- Difficulty differentiating in marketing to consumers
- Risk – need new business model
- Weak sales skills
- Inadequate capacity

Others
- Lenders don’t value efficiency in appraisals
Designing Good Programs
Program Design Myths

- Free audits are all that is needed
  “we just need to educate consumers”

- Financing is all that is needed
  “we just need to enable consumers to pay for retrofits”
Program Design Reality

- We have a basic supply and demand problem
  - Far too little of both
- There is no single “magic bullet” solution to either
- Multiple market barriers require multiple strategies
  - Market is complex
  - Importance of barrier differs by consumer
  - Need comprehensive approach
  - But it needs to be tightly coordinated
  - And it needs to be
    - Creative – adapted to local conditions
    - Nimble – quick to respond to market feedback
## Inadequate Supply

<table>
<thead>
<tr>
<th>State</th>
<th>Estimated Individuals w/Certifications</th>
<th>Households</th>
<th>Estimated Individuals w/Certifications per Million Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vermont</td>
<td>103</td>
<td>248,825</td>
<td>415</td>
</tr>
<tr>
<td>New York</td>
<td>908</td>
<td>7,114,431</td>
<td>128</td>
</tr>
<tr>
<td>New Jersey</td>
<td>310</td>
<td>3,141,956</td>
<td>99</td>
</tr>
<tr>
<td>Oregon</td>
<td>120</td>
<td>1,425,340</td>
<td>84</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>41</td>
<td>497,054</td>
<td>82</td>
</tr>
<tr>
<td>Maine</td>
<td>43</td>
<td>542,158</td>
<td>79</td>
</tr>
<tr>
<td>Alaska</td>
<td>14</td>
<td>233,252</td>
<td>60</td>
</tr>
<tr>
<td>Indiana</td>
<td>140</td>
<td>2,443,010</td>
<td>57</td>
</tr>
<tr>
<td>Connecticut</td>
<td>70</td>
<td>1,323,838</td>
<td>53</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>18</td>
<td>406,089</td>
<td>45</td>
</tr>
<tr>
<td><strong>U.S. Totals</strong></td>
<td><strong>2962</strong></td>
<td><strong>111,090,617</strong></td>
<td><strong>27</strong></td>
</tr>
</tbody>
</table>

**Needed to Treat 50% of Homes in 10 years**

~1000

Extrapolated from 2009 Building Performance Institute (BPI) data.
Building Supply Capacity

- Technical training
- Certification/Accreditation
- Quality assurance
- Driving demand
  - Delivery capacity will not grow if contractors do not see growth – or significant potential for growth – in demand!
Driving Demand - Basics

- Rebates
- Financing
- Leveraging HVAC system replacements
- Contractor sales training
- Referrals to quality contractors
- Traditional Marketing & PR
Driving Demand - Innovations

- Leveraging more home investments as “on-ramps”
  - Window replacements
  - Siding jobs
  - Roofing jobs
  - Basement flooding problems
- Customer “hand-holding” (retrofit advisors)
  - Beyond basic home assessments/audits
- Lender/Appraiser education and/or requirements
- Community-based, social marketing
- Building energy labeling
- Creative financing instruments (e.g. on-bill)
- R&D – to develop and test more innovations
# Mapping Strategies to Barriers

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consumers</strong></td>
<td>Tech. Training</td>
</tr>
<tr>
<td>• Lack info on benefits of efficiency</td>
<td>X</td>
</tr>
<tr>
<td>• Difficult to differentiate good contractors from bad</td>
<td></td>
</tr>
<tr>
<td>• Access to capital</td>
<td></td>
</tr>
<tr>
<td>• Split incentives (renters)</td>
<td></td>
</tr>
<tr>
<td>• Risk – Are savings real? Is cost recoverable at sale?</td>
<td></td>
</tr>
<tr>
<td>• Transaction/Hassle costs</td>
<td></td>
</tr>
<tr>
<td>• Efficiency not visible or “sexy”</td>
<td></td>
</tr>
<tr>
<td><strong>Contractors</strong></td>
<td></td>
</tr>
<tr>
<td>• Lack technical tools/skills</td>
<td>X</td>
</tr>
<tr>
<td>• Difficult to differentiate good contractors from bad</td>
<td></td>
</tr>
<tr>
<td>• Weak sales skills</td>
<td></td>
</tr>
<tr>
<td>• Inadequate numbers, infrastructure</td>
<td></td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
</tr>
<tr>
<td>• Lenders don’t value efficiency in appraisals</td>
<td></td>
</tr>
</tbody>
</table>
Key Design Choices/Trade-Offs

- Who does the home assessments/audits?
  - Program contractor can mobilize more quickly
  - Need private contractor capability in long term

- What technical standards will the program use?
  - Using ideal technical standards (e.g. BPI) will lead to longer lead time for generating projects
  - Lesser standards result in lower quality, less savings

- How comprehensive will program aim to be?
  - Deep savings per home better aligns with long-term goals
  - Less comprehensive means more participants in short-term

- How does program integrate or relate to others?
  - E.g., separate or integrated HVAC/DHW measure incentives
Compromises to Consider

- Phase in private sector assessments/audits
- Phase in some technical standards
- Provide options for single measures, but...
  - ...provide a long-term investment “plan”
  - ...encourage measure “loading order”
  - ...provide bonus incentives for comprehensive treatment
Importance of Policy Framework
Key Policy Issues

- Program goals
- Cost-effectiveness requirements
- Funding for program
- Length/Term of commitment to program
- Program management structure
- Degree of flexibility in design/implementatio
- Complementary policies
Goals Affect Design

- What are primary goals? Which are most important?
  - Economic efficiency
  - Environment
  - Economic development/jobs
  - Community building

- What is balance between short-term and long-term?
  - Participation
  - Depth of savings per participant

Clarity on answers to these questions is critical
Cost-Effectiveness Requirements

- Traditional utility emphasis on TRC test problematic
  - Ignores substantial non-energy benefits
  - Hinders going after deep savings

- Different solutions being pursued in different states
  - Utility Cost Test
  - TRC cost adjustment
  - TRC w/non-energy benefits

- Time horizon for assessment also critical
  - Home retrofit programs never cost-effective 1st year
    - Emphasis on infrastructure – overhead w/little participation
  - May take until year 3 (or later) to pass screening
### Cost-Effectiveness Approaches

<table>
<thead>
<tr>
<th>Costs</th>
<th>Scenario</th>
<th>TRC Cost Today</th>
<th>TRC Cost Adjusted</th>
<th>TRC Cost w/NEBs</th>
<th>PACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Costs</td>
<td>$7,500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rebate</td>
<td>33% $2,500</td>
<td>$2,500</td>
<td>$2,500</td>
<td>$2,500</td>
<td>$2,500</td>
</tr>
<tr>
<td>Participant</td>
<td>67% $5,000</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>Administration</td>
<td>$1,500</td>
<td>$1,500</td>
<td>$1,500</td>
<td>$1,500</td>
<td>$1,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer Attribution of Costs</th>
<th>Scenario</th>
<th>TRC Cost Today</th>
<th>TRC Cost Adjusted</th>
<th>TRC Cost w/NEBs</th>
<th>PACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Reasons</td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Energy Reasons</td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Adjustment</td>
<td>$ (3,750)</td>
<td></td>
<td>-$3,750</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Costs: $9,000 $5,250 $9,000 $4,000

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Scenario</th>
<th>TRC Cost Today</th>
<th>TRC Cost Adjusted</th>
<th>TRC Cost w/NEBs</th>
<th>PACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy - Avoided Costs</td>
<td>$ 6,000</td>
<td>$6,000</td>
<td>$6,000</td>
<td>$6,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Non-Energy</td>
<td>$ 6,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Benefits: $6,000 $6,000 $12,000 $6,000

Net Benefits: -$3,000 $750 $3,000 $2,000

FAIL, PASS, PASS, PASS
Funding & Term of Commitment

- Success will not come cheaply
  - Fixed costs for admin, training, outreach, data tracking, etc.
  - Investment in marketing
  - Subsidized assessments/audits
  - Rebates $\geq 25\%$ of costs, + comprehensive bonus

- Expensive programs per unit of $1^{st}$ year savings, but…
  - savings last longer than for most other programs
  - More potential for long-term market transformation
  - Largest untapped source of savings

- Bottom line: needs to be seen as long-term investment
  - At least 5 year vision, ideally 10 years
Complex program puts premium on:
- Strategy integration – all oars rowing in same direction
- Simplicity to consumers
- Consistency in messaging
- Accountability

Ideal solution:
- One entity responsible for all program elements
- Same entity accountable for meeting goals
Flexibility

- Program not simple – can’t be given market complexity
- Need to be nimble in response to market feedback
  - Changing strategies/tactics
  - Changing rebate levels
- “Locking in” designs for even a year is problematic
- Micro-managing program decisions also problematic
- Ideal solution:
  - 3 year goals
  - 3 year budget
  - flexibility (within reasonable limits) to change strategy
Complementary Policies

- Building labeling/disclosure requirements
- Rental energy codes
- Renewables incentives

Few U.S. jurisdictions have these, but they could be invaluable
Results from Leading Programs
2009 Participation – U.S.

Depth of Savings

- Best programs average ~30% heating/cooling savings
- Pilots in Europe and U.S. exploring much deeper levels
Chris Neme
Energy Futures Group
cneme@energyfuturesgroup.com
Phone: 802-482-5001
Cell: 802-363-6551