



# Technical Barriers, Gaps, and Opportunities Related to Home Energy Upgrade Business Models



**Residential Energy  
Efficiency Technical  
Update Meeting**

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**9 August 2011**

# Goals

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Associated with home energy upgrade business models, write a report:

- To identify technical barriers, gaps, and opportunities.
  - To identify current business models.
  - To document the available literature and research work.

# Why Home Energy Upgrades?

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- Buildings sector is the single largest contributor to global greenhouse gas emissions (30%).
- Construction sector is responsible for more than a third of global resource consumption (12% of all fresh water use, generates 40% of the total volume of solid waste).
- US residential energy use is very large (22%).

# Benefits of Home Energy Upgrades

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- Energy use in existing buildings can be cost effectively reduced by 20-50% through energy upgrades.
- Home energy upgrades can improve:
  - Comfort
  - Health
  - Durability
  - Property value
- Home energy upgrades can also create jobs.
  - In the EU, €1 million of investment creates 8-14 person-years of direct and 9-40 person-years of indirect employment.

# Building America Efforts

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- BA-PIRC: Evaluation of Public and Private Market Retrofit Delivery Systems
- Dow Habitat: Market Realities and Change Management to Accelerate Adoption of Cost Effective Energy Efficiency Retrofits
- IBACOS: Transitioning HVAC Contractors to Home Performance Contractors
- NAHBRC-IP: Evaluation of Retrofit Delivery Practices

# Related Efforts

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- Home Performance Resource Center
- Financing Mechanisms
- Home Performance with ENERGY STAR
- Better Buildings
- SEE Action
- Workforce Guidelines for Home Energy Upgrades

# Approach

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- Literature review
- Interviews with subject-matter experts

# Business Models

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- How a company makes money
- Programs involving incentives are not considered business models, but enablers

# Current Business Models

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1. Consultant or Independent Auditor
2. Trade Contractor
3. General Contractor
4. Whole-House Energy Upgrade Contractor

and hybrids and variations on these themes

# Knowledge

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| Gap or Barrier                                                                                                          | Opportunities                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Whole-house building science is complex                                                                                 | <ul style="list-style-type: none"><li>•Develop simple and clear educational campaigns targeting homeowners</li><li>•Create permanent or itinerant science museum exhibits</li></ul> |
| Specialization results in unfamiliarity with the full potential of energy efficiency technologies                       | <ul style="list-style-type: none"><li>•Develop continuous learning opportunities to contractors</li><li>•Mentoring</li></ul>                                                        |
| Professionals believe they know their field and do not need new information                                             | <ul style="list-style-type: none"><li>•Develop continuous learning opportunities to contractors</li><li>•Mentoring</li></ul>                                                        |
| Individuals after a week training start a whole-house energy upgrade contracting business with absolutely no experience | <ul style="list-style-type: none"><li>•Develop continuous learning opportunities to contractors</li><li>•Create apprenticeship for contractors</li><li>•Mentoring</li></ul>         |

# Energy Assessment

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| Gap or Barrier                                                                                 | Opportunities                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| There is mistrust in software predictions of energy use in inefficient existing homes          | <ul style="list-style-type: none"><li>•Address software inaccuracy issues</li><li>•Develop certification procedures for building energy simulation tools</li><li>•Obtain data from very well instrumented houses</li></ul>                                 |
| Building characteristics and utility billing data are not available for testing software tools | <ul style="list-style-type: none"><li>•Expand the Field Data Repository</li><li>•Create open data repositories where homeowners can add information</li><li>•Work with utilities to create energy use averages available by specific territories</li></ul> |
| Non-energy benefits are not monetized                                                          | Investigate ways to monetize non-energy benefits                                                                                                                                                                                                           |

# Energy Assessment (cont.)

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| Gap or Barrier                                                                                   | Opportunities                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial house assessment is time consuming                                                       | <ul style="list-style-type: none"><li>•Focus on larger neighborhoods with small number of house models</li><li>•Investigate the minimum requirements of the initial energy assessment</li></ul> |
| Information transfer from initial house assessment to the staff performing the work is difficult | Create a hand-off process from the assessment to the implementation of energy upgrades                                                                                                          |
| Lack of good statistical analysis to verify the quality of collected data                        | Develop such tools                                                                                                                                                                              |

# Upgrade

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| Gap or Barrier                                                                          | Opportunities                                          |
|-----------------------------------------------------------------------------------------|--------------------------------------------------------|
| Comprehensive energy efficiency upgrades may be expensive                               | Create plans for staged energy upgrades                |
| Specific housing types in certain areas are challenging for upgrade solutions           | Develop technical solutions for the issues             |
| Recently installed mechanical equipment prior to a deep energy upgrade                  | Investigate best practices to adopt                    |
| No standard practices to install additional insulating sheathing when re-siding a house | Develop documented field guides for different climates |
| Air sealing enclosure in existing homes                                                 | Research solutions and document them in field guides   |
| Reducing miscellaneous electric loads is challenging                                    | Discuss the occupant behavior in energy use            |

# General

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| Gap or Barrier                                                 | Opportunities                                                                                             |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Good contractors compete against bad ones                      | Identify good certifications for contractors and inform homeowners and other stakeholders that they exist |
| Programs may create barriers to contractors                    |                                                                                                           |
| Contractors have to work with multiple programs in a territory | Work with program developers in a territory to coordinate                                                 |
| Contractors do not treat utilities as potential customers      |                                                                                                           |

# Next steps

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- Feedback from stakeholders is being collected
- Report will be sent for peer review shortly (weeks).
- Results will provide input to Residential Strategic Plan.
- Report will be published in FY11.