



**Better Buildings Residential Network Peer Exchange
Call Series: *Opportunities for Building America
Research to Address Energy Upgrade Technical
Challenges: HVAC, Envelope & IAQ (301)***

July 21, 2015

Call Slides and Discussion Summary

Agenda

- Call Logistics and Introductions
- Opening Polls
- Residential Network and Peer Exchange Call Overview
- Introduction to Building America Technology to Market Roadmaps
 - Eric Werling, Building America Program Director, DOE Building Technologies Office
- Questions, Discussion, and Feedback on Three Technology Areas:
 - High Performance, Moisture Managed Envelope Systems
 - Optimal Comfort Systems for Low Load Homes
 - Optimal Ventilation Systems and IAQ Solutions for Low Load Homes
- Closing Poll

Call Participants

- 1000 Home Challenge
- CalCERTS, Inc.
- Clark County, Nevada
- CLEAResult
- Community Housing Partners
- Efficient Windows Collaborative
- Elevate Energy
- Hacienda CDC
- Kentucky Home Performance
- Midwest Energy Efficiency Alliance (MEEA)
- One Knob Consulting
- OmStout Consulting
- Performance Systems Development (PSD)
- Sage Building Solutions
- Seventhwave
- U.S. Environmental Protection Agency (EPA), Region 7
- Vermont Energy Investment Corporation (VEIC)
- Virginia Center for Housing Research
- WECC (Wisconsin Energy Conservation Corporation)

Opening Poll #1

- Which of the following best describes your organization's familiarity with the DOE Building America Program?
 - Some experience/familiarity – **50%**
 - Very experienced/familiar – **30%**
 - Limited experience/familiarity – **10%**
 - No experience/familiarity – **10%**
 - Not applicable – **0%**

Opening Poll #2

- Which of the following describes your organization's experience with research on energy efficiency upgrade technologies?
 - Use research on EE upgrade technologies in my work – **57%**
 - Participate in research projects on EE upgrade technologies – **52%**
 - Conduct or lead research projects on EE upgrade technologies – **35%**
 - Interested in EE tech research, but have not participated – **9%**
 - Other (please explain) – **9%** (Answers: developing deployment programs, developing content and programs)

Better Buildings Residential Network

- **Better Buildings Residential Network**: Connects energy efficiency programs and partners to share best practices to increase the number of American homes that are energy efficient.
 - Membership: Open to organizations committed to accelerating the pace of existing residential upgrades. Commit to providing DOE with annual number of residential upgrades, and information about benefits associated with them.
 - Benefits:
 - Peer Exchange Calls
 - Tools, templates, & resources
 - Newsletter updates on trends
 - Recognition: Media, materials
 - Optional benchmarking
 - Residential Solution Center

For more information & to join, email bbresidentialnetwork@ee.doe.gov.

Peer Exchange Call Series

- Calls are held the 2nd and 4th Thursday of every month at 12:30 and 3:00 ET
- Calls cover a range of topics, including financing & revenue, data & evaluation, business partners, multifamily housing, and marketing & outreach for all stages of program development and implementation
- Upcoming calls:
 - August 13, 12:30 ET: Assessments: The Good, the Bad, and the Ugly (301)
 - August 13, 3:00 ET: Tailored Marketing for Low-Income and Under-Represented Population Segments (201)
 - August 20, 12:30 ET: Staged Upgrade Initiative Program Design (301)
- Send call topic ideas to peerexchange@rossstrategic.com.

Peer Exchange Call Summaries

Discussion: Challenges and Solutions

- Overcoming Challenges - Solutions:
 - Access trusted, local messengers
 - Engage your satisfied customers as champions to turn them into "lifetime customers"
 - Invite people to make a pledge with a few simple EE activities they can take
 - Connect with the right local partners (Connecticut conducted "community asset mapping")
 - Directly involve the homeowner through DIY work or as energy efficiency demonstration homes to help them feel engaged (San Diego demonstration homes)
 - Minimize paperwork to make it easier to participate



Poll Results

Participant Poll: Which of the following best describes your program's experience with energy efficiency behavior change efforts?

- Currently implementing: 31%
- Planning to implement: 31%
- Thinking about it: 19%
- Haven't thought about it: 0%
- Not applicable: 19%

The screenshot shows the Home Energy Pros website interface. At the top, it says "HOME ENERGY PROS" with the tagline "Connecting home energy professionals". Below this is a navigation menu with links for Home, Invite, My Page, Members, Forum, Blogs, Groups, Photos, Videos, and Events. The main content area is titled "Peer Exchange Archive: Program Sustainability" and lists several call summaries with their dates and links to PDF presentations and discussion summaries. The summaries include:

- Incorporating Behavior Change Efforts into Energy Efficiency Programs** (July 10, 2014)
- Collaborating with Utilities on Residential Energy Efficiency** (June 12, 2014)
- BBRN Voluntary Initiative: Partnering to Enhance Program Capacity** (May 8, 2014)
- Complementary Energy and Health Strategies** (April 10, 2014)
- Mastermind: Jim Mikel, Spirit Foundation** (March 13, 2014)

How do you eat an elephant? One bite at a time. A slight shift in perspective goes a long way.

Understanding how EE can solve a financial, public relation, or customer service problem for the utility is the right place to start.

Residential Program Solution Center – We Want Your Input!

Web portal of residential EE upgrade program resources, & lessons learned to plan better, avoid reinventing the wheel.

- BB Neighborhood Program, Home Performance with ENERGY STAR Sponsors+
- Provides:
 - Step-by-step guidance
 - Examples
 - Tools and Templates
 - Quick Links and Shortcuts
 - Lessons learned
 - Proven Practices posts
 - Tips
- Continually add content to support residential EE upgrade programs—**member ideas wanted!**



<https://bbnp.pnnl.gov/>

Building America Technology to Market Roadmaps

Eric Werling

**Building America Program Director
Building Technologies Office**



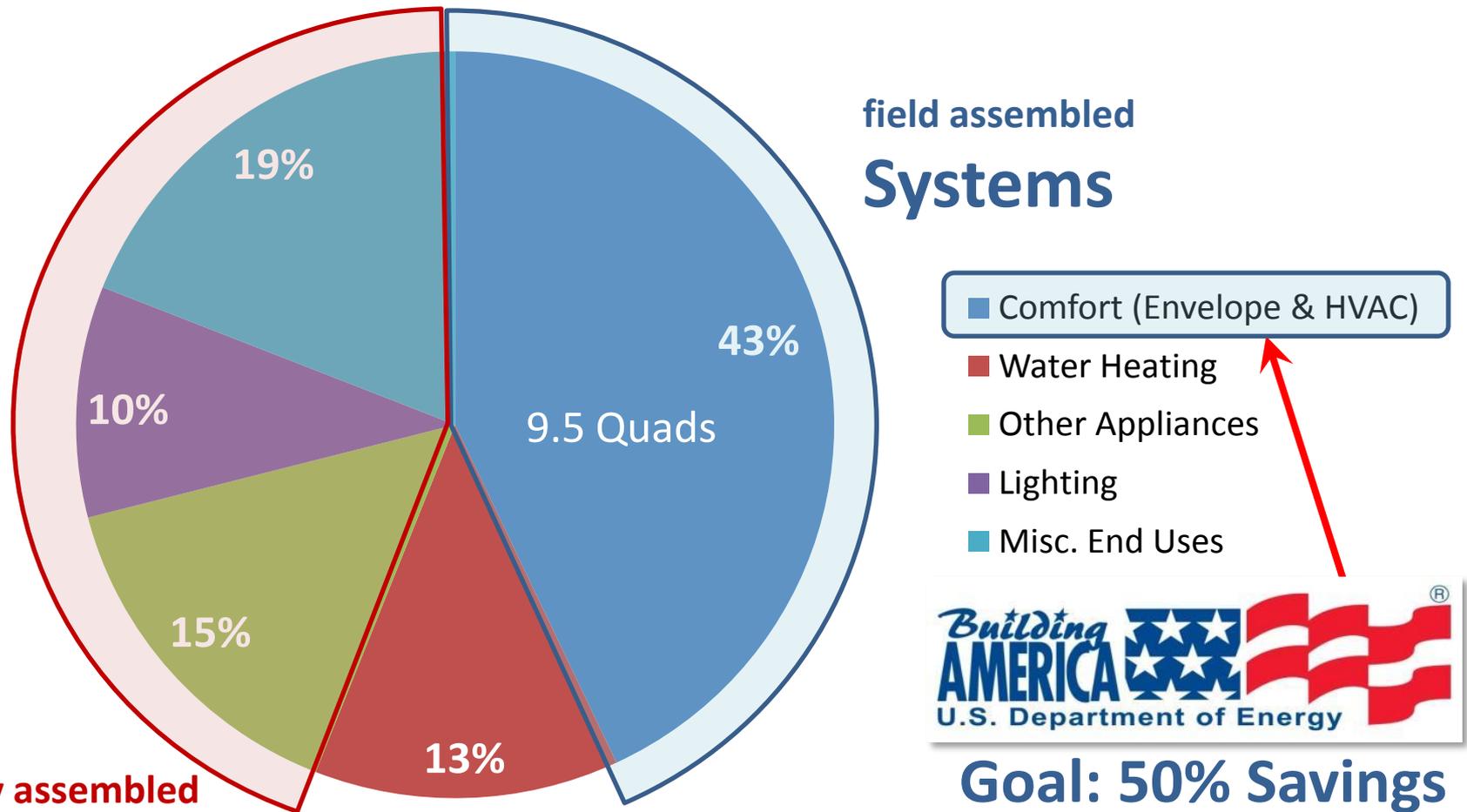
Building America Technology to Market Roadmaps

ERIC WERLING

Building America Program Director

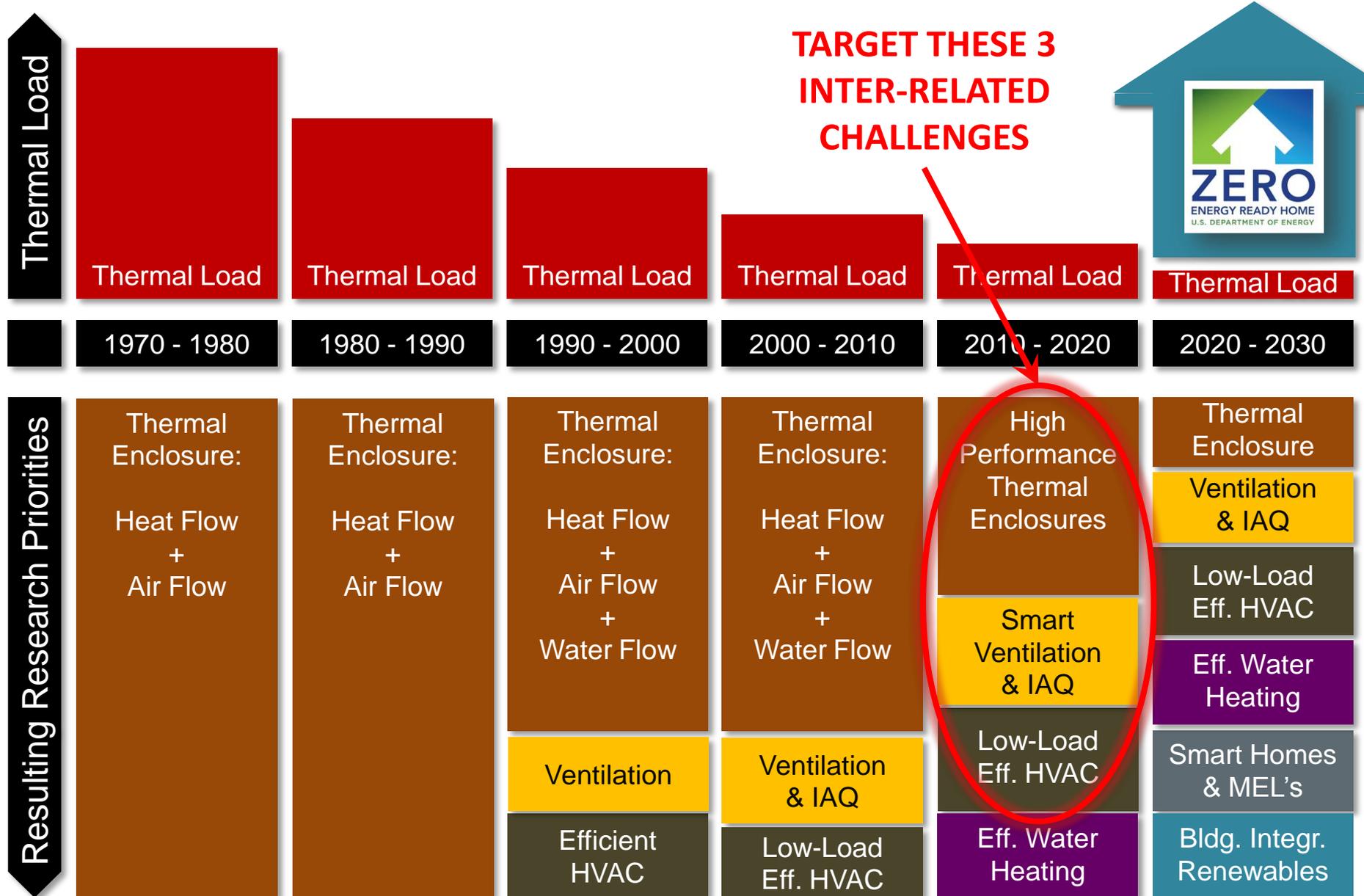
Building Technologies Office

U.S. Residential Buildings Primary Energy Consumption (22 Quads)*



* Source: U.S. EIA

Building America Target Challenges



DOE 50% Savings Scenarios Require...

More Insulation & Tighter Homes That Can:

- **Cause Envelope Assemblies to Get/Stay Wet**

Increased insulation levels and air tightness can elevate risk of condensation and substantially limit drying potential inside building assemblies

- **Lower Airflow & Increase Indoor RH**

Lower loads reduce air flow, increase relative latent load, extend swing seasons

- **Reduce Fresh Outdoor Air Exchange**

Added air tightness demands improved source control, dilution, and filtration

If these performance issues are not solved, high efficiency homes may have comfort and durability problems, builders will not go further than current codes, & mainstream contractors will be reluctant to upgrade homes beyond modest energy efficiency improvements.

We Need High Performance Home Solutions!

Energy Efficient New and Existing Homes with ...

Moisture Managed High-R Envelopes

- **Are Less Likely to Get/Stay Wet**
High performance homes with increased insulation, reduced infiltration, reduced risk of condensation, & adequate drying potential inside building assemblies

Optimized Low-Load Comfort Solutions

- **Effectively Manage Airflow & Indoor RH for Comfort**
High efficiency comfort systems for homes with low thermal loads, including optimal efficiency, managed air flow and RH control at all part load conditions

Smarter Indoor Air Quality Solutions

- **Control Fresh Air Supply & Contaminant Removal**
Added tightness with improved source control, dilution, and high efficiency filtration, with little or no energy penalty



Integrated Roadmaps

- A. High Performance, Moisture Managed Envelope Systems
- B. Optimal Comfort Systems for Low Load Homes
- C. Optimal Ventilation Systems and IAQ Solutions for Low Load Homes

Overall Roadmap Objectives:

- Codes and Standard practice as endpoints
- Manage risks to minimize problems of adoption
- Address optimal performance & cost-effectiveness
- Solutions must be practical & profitable for builders and home improvement contractors

KEY:

Research & Development

Market Engagement

Codes & Standards

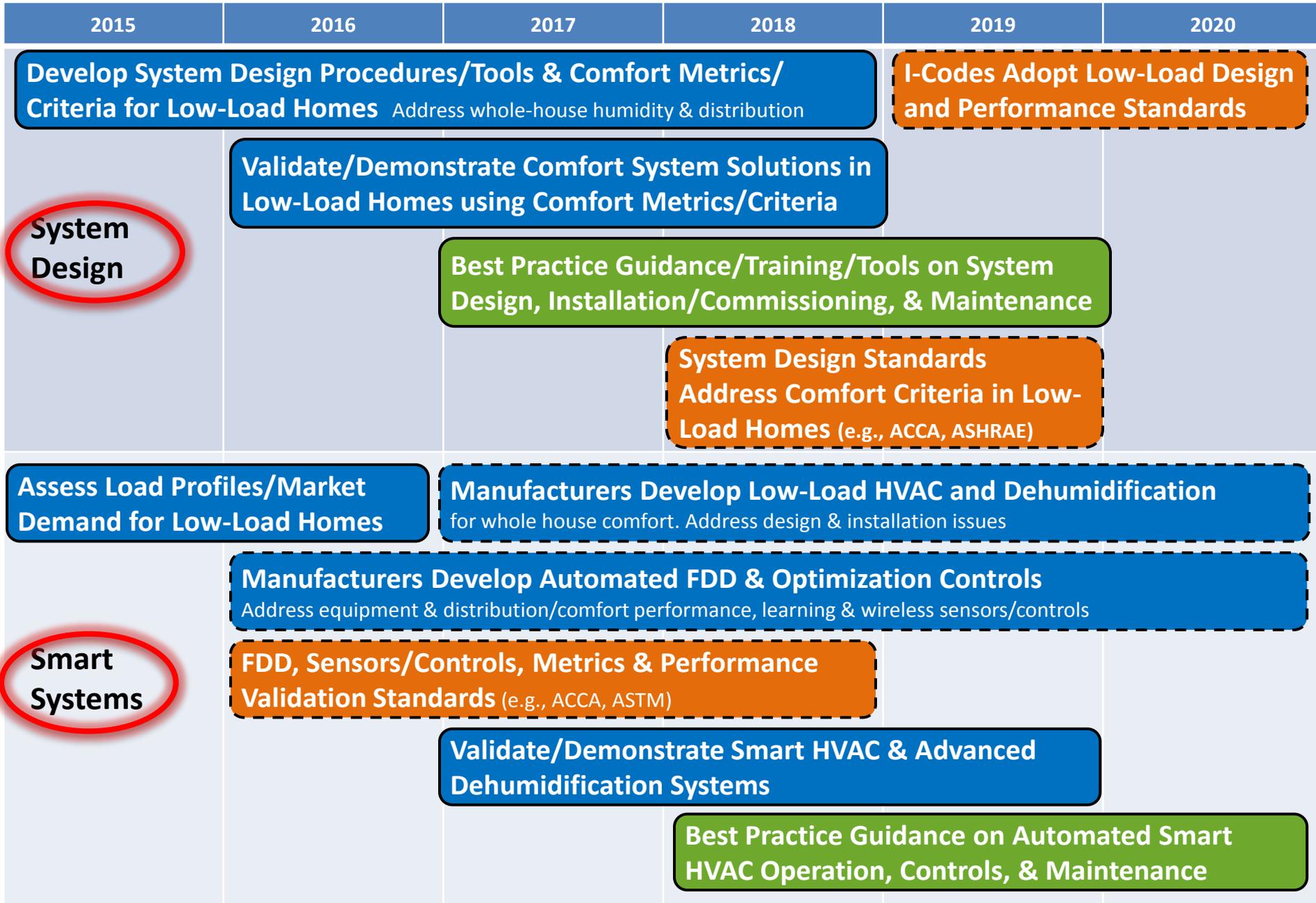
DOE lead

Industry lead

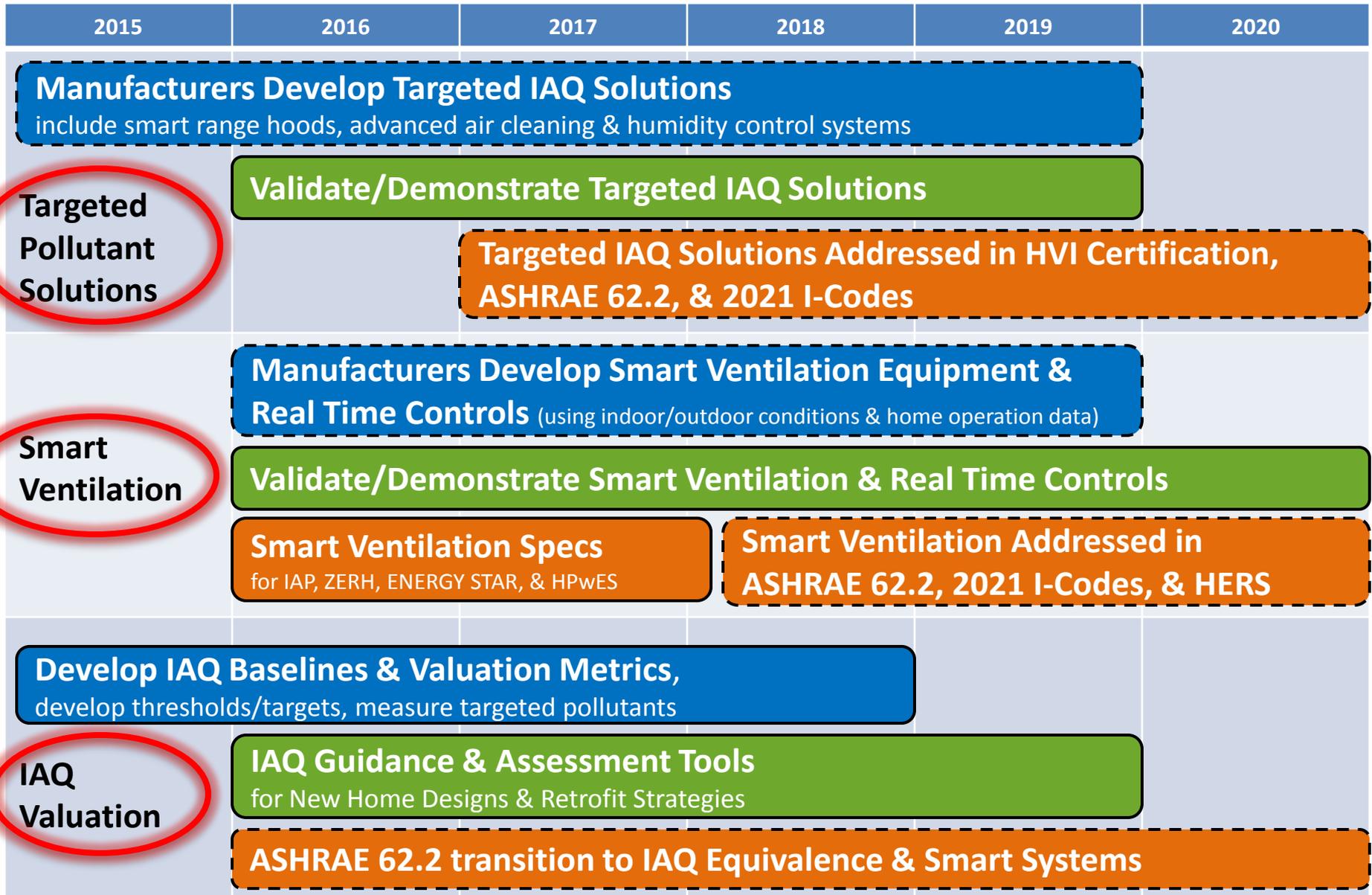
High Performance Moisture Managed Envelope Solutions

2015	2016	2017	2018	2019	2020
Moisture Risk Management	Moisture Managed Guidance/Tools & Best Practice Specs for priority High-R Envelope Systems in each climate				
	Lab and Field Moisture Risk Assessment of priority High-R Assemblies & Materials				
	Moisture Risk Assessment & Modeling Standards (e.g., ASHRAE 160)				
High Performance Envelope Solutions	Validate/Demonstrate High Performance Envelope Specs in Real World Test Homes				
	Specs in Voluntary Program Standards (ZERH, Energy Star & HPwES)			Moisture Managed High-R Envelopes addressed in 2021 IECC and IRC	

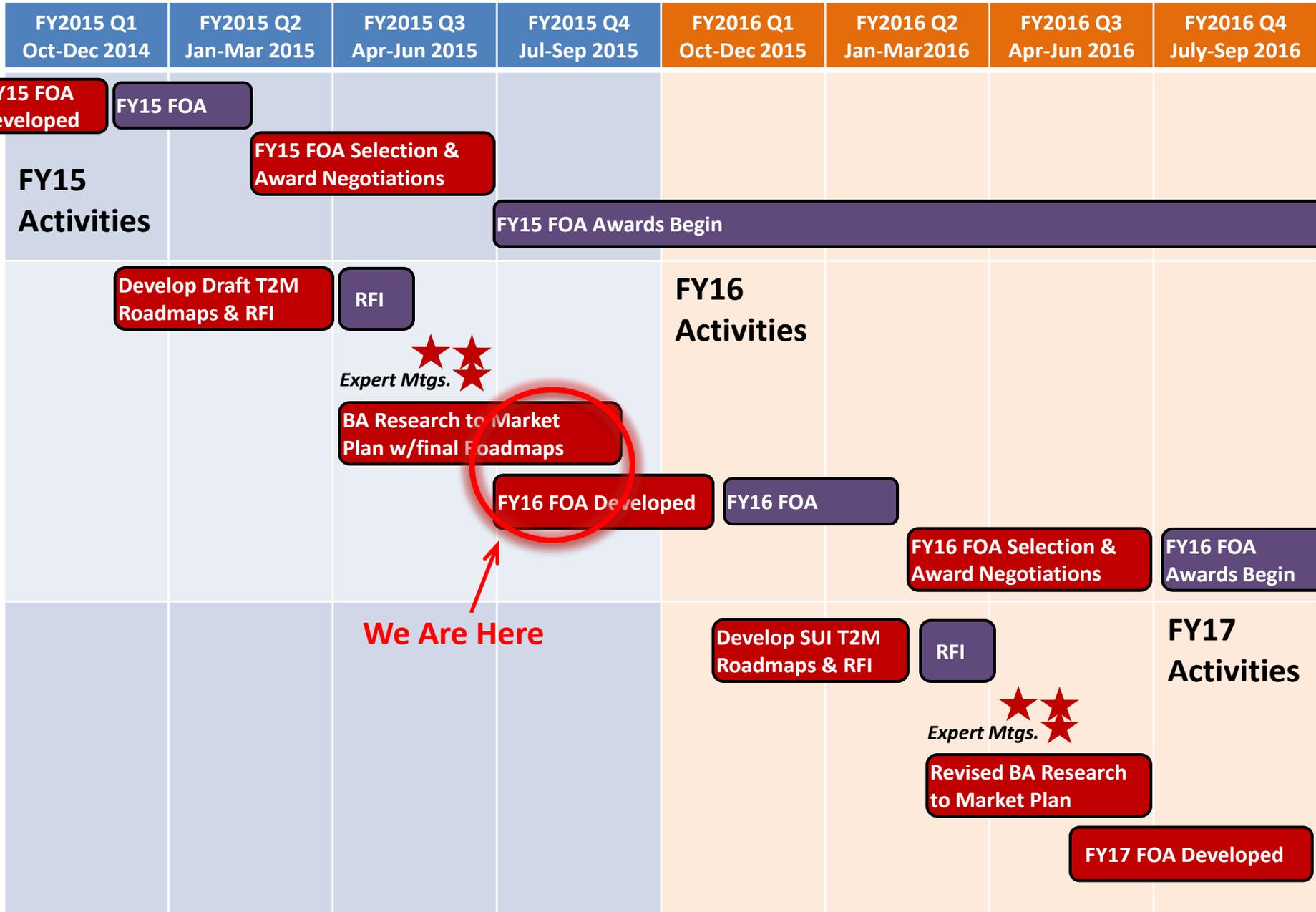
Optimal Comfort Systems for Low-Load Homes



Optimal Ventilation & IAQ Solutions



Building America FY15-17 Planning Timeline



Building America Planned FOA Schedule (subject to appropriations)

	FY2015				FY2016				FY2017				FY2018				FY2019			
Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
NREL contract down select (FY15 bridge-funding)	\$ High-R																			
	\$ Comfort																			
	\$ IAQ																			
	FOA15			FY15 FOA Award #1																
				FY15 FOA Award #2, etc.																
					FOA16			FY16 FOA Award #1												
				FY16 FOA Award #2																
				FY16 FOA Award #3, etc.																
									FOA17			FY17 FOA Award #1								
								FY17 FOA Award #2												
								FY17 FOA Award #3, etc.												

Notes:

1. All FOA's are fully funded up front
2. No. of awards each year will depend on award negotiations and budget.



We Want Your Input

A. High Performance, Moisture Managed Envelope Systems

- Envelope system improvement Demo ideas?
- Data collection needs?
 - Questions about upgrade performance?
 - Questions about upgrade risks?
- Needed guidance, tools, specifications?
- Standards & codes that get in the way?
- Missing standards & codes?

Research & Development

Market Engagement

Codes & Standards



We Want Your Input

B. Optimal Comfort Systems for Low Load Homes

- HVAC system replacement Demo ideas?
- Data collection needs?
 - Questions about upgrade performance?
 - Questions about upgrade risks?

- Needed guidance, tools, specifications?

- Standards & codes that get in the way?
- Missing standards & codes?

Research &
Development

Market
Engagement

Codes & Standards



We Want Your Input

C. Optimal Ventilation Systems and IAQ Solutions for Low Load Homes

- IAQ & Ventilation systems needed for WH upgrades?
- Data collection needs?
 - Questions about system performance?
 - Questions about IAQ risks?
- Needed guidance, tools, specifications?
- Standards & codes that get in the way?
- Missing standards & codes?

Research & Development

Market Engagement

Codes & Standards

Thank You

Eric Werling

DOE Building America Program

<http://energy.gov/eere/buildings/building-america-bringing-building-innovations-market>



Overview: Building America

- Building America program is the research, development, and demonstration program for DOE's work in new and existing residential housing markets
- Projects are led by DOE national laboratories and expert building science teams, in partnership with leading industry players
- DOE selects Building America projects that can develop and demonstrate better technologies and practices while overcoming market barriers to adoption

Building America Technology-to-Market Roadmaps

- The 5-year *Building America Research-to-Market Plan* is focused on the 3 main technology areas with technical challenges discussed in the presentation
- Draft Roadmaps are [available online](#)
- These roadmaps are relevant to new construction and upgrades to existing homes
- Final roadmaps with goals should be available in August 2015

Comments and Discussion: Addressing Technical Challenges of EE Upgrades

- There may be opportunities to use smart thermostats for continuous commissioning
 - Installers need to be trained on how to commission the thermostats for this to work properly
- Indoor air quality (IAQ) may not always correspond to the “leakiness” of the house
 - Mechanical ventilation and dehumidification could be generic recommendations during envelope improvements in some cases
 - However, a dehumidification recommendation may not be appropriate if not connected to a drain; some tailoring is needed

Comments and Discussion: Addressing Technical Challenges of EE Upgrades

- Inefficient basements and crawlspaces are not always addressed as energy efficiency improvement areas
 - These are connected to IAQ, radon, broken pipes, and other comfort issues
 - Part of the problem may be that there is not a single “basement professional” to call
- There are also sometimes educational barriers associated with different upgrade technologies
 - Consumers and business owners may not understand the tradeoffs between different technologies
 - Contractors may not be aware of new technologies to address technical challenges

Closing Poll

- After today's call, would you like to stay engaged on this topic?
 - Yes, I'd like to receive future BA project announcements – **93%**
 - Yes, I'd like to talk further with DOE about ideas/comments – **40%**
 - Other (please explain) – **13%** (*not specified*)
 - No, I am not interested in special BA announcements – **0%**

To stay informed about the Building America Program, subscribe to the Building America Newsletter at:

<http://energy.gov/eere/buildings/building-america-update-newsletter>

Please send any follow-up questions or future call topic ideas to:
peerexchange@rossstrategic.com