U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Residential Buildings Integration (RBI)

David Lee
Program Manager

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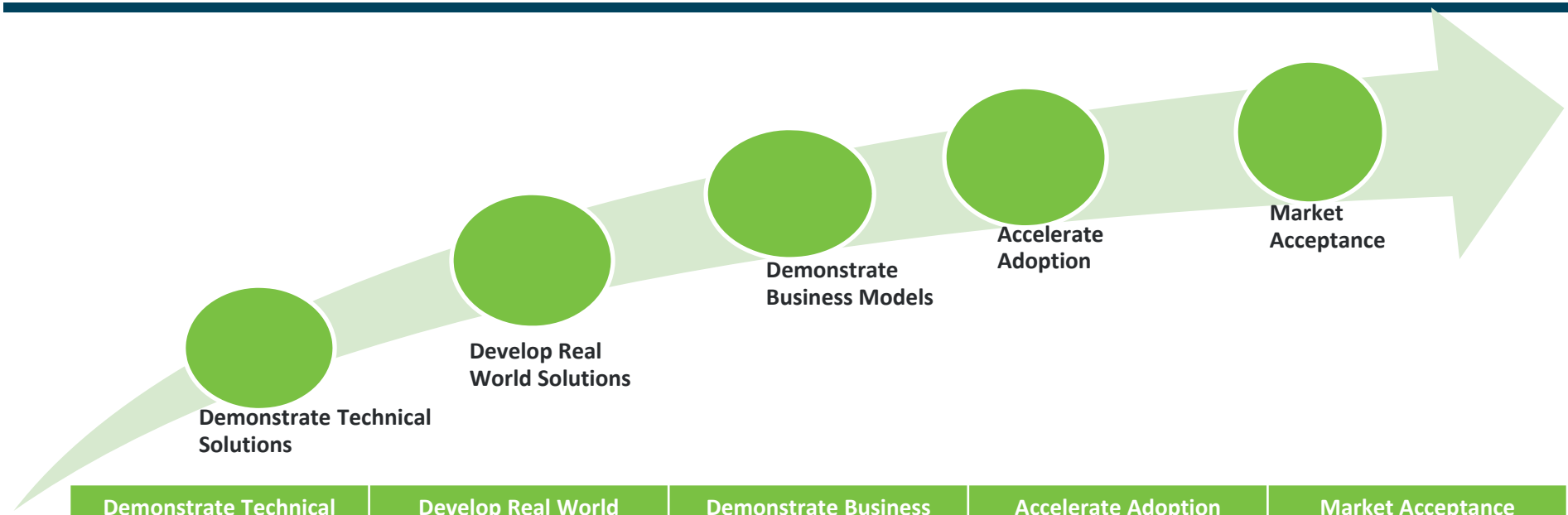
RBI Mid-term and Long-term Goals

Goals: Residential Buildings Integration		
Existing Buildings	**2020**	Demonstrate at scale market-relevant strategies offering existing home savings of 20%
	2025	Demonstrate at scale market-relevant strategies offering existing home savings of 25% or more by 2030
	2030	Demonstrate at scale market-relevant strategies offering existing home savings of 40% or more by 2030
New Buildings	**2025**	Demonstrate at scale the reduction of energy use of new homes by 50%*, while improving overall indoor air quality, durability and comfort.

***Baseline: 2010 or IECC 2009 (for new)**

Overview: The RBI Program Strategy



Demonstrate Technical Solutions	Develop Real World Solutions	Demonstrate Business Models	Accelerate Adoption	Market Acceptance
Building America U.S. Department of Energy	Building America U.S. Department of Energy Better Buildings U.S. Department of Energy	ZERO ENERGY READY HOME U.S. Department of Energy Better Buildings U.S. Department of Energy Home Performance with ENERGY STAR	Better Buildings U.S. Department of Energy Home Performance with ENERGY STAR Home Energy Score	PREVIEW

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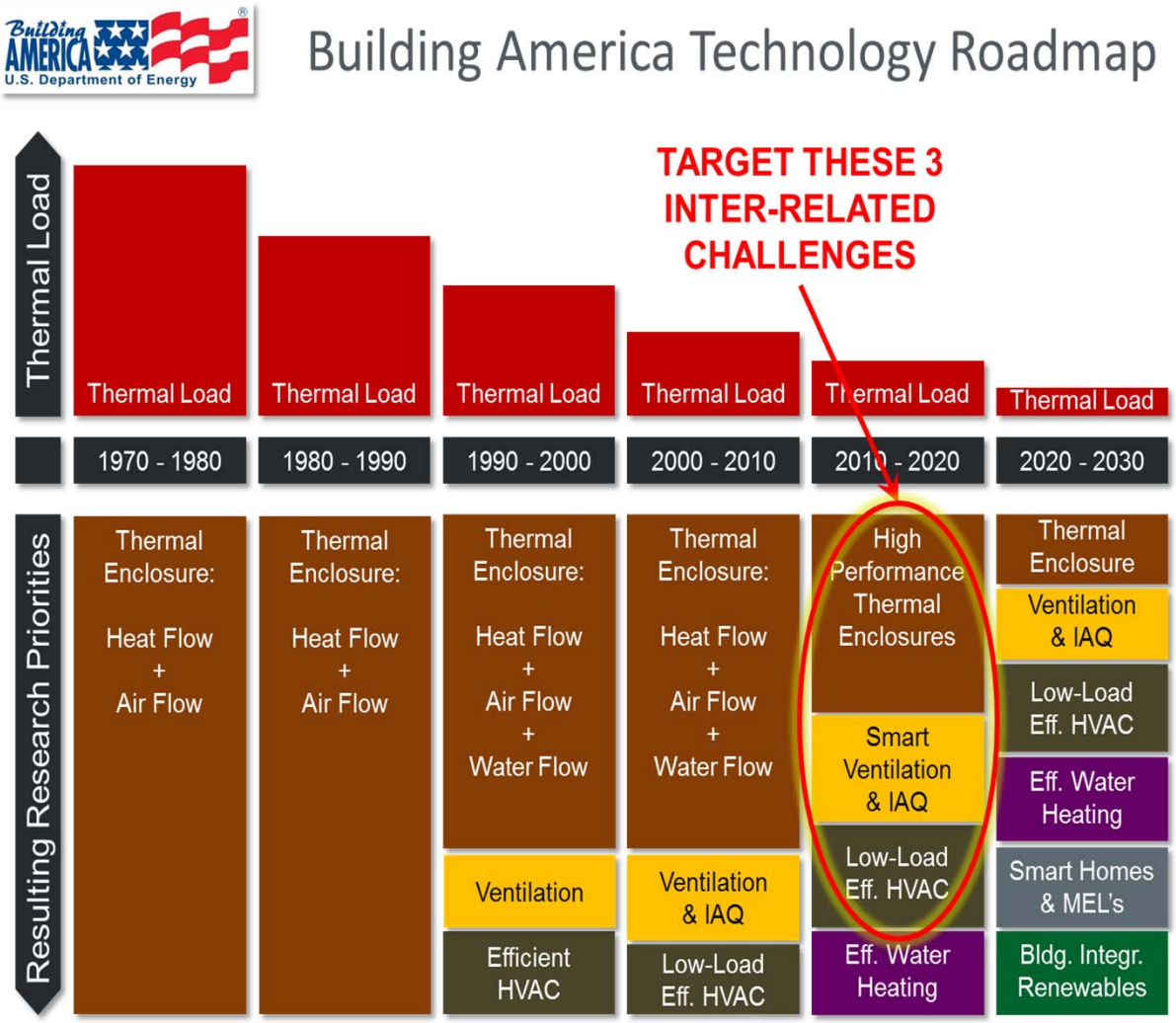
Field Research & Demonstration Focus & Activities



DOE's Building America Program has engaged leading industry and building science teams for more than 20 years to research, develop and demonstrate home energy innovations that enhance comfort, safety and indoor air quality

The current five year strategy is to focus on reducing heating & cooling energy use in new and existing homes, the highest impact end use, without affecting durability or indoor air quality. Working with BTO's Code Program, Building America Research is focusing on the following topics

Moisture manage High R envelopes: Design high performance homes with increased insulation, reduced air infiltration to reduce the risk of condensation, providing adequate drying potential inside building assemblies.

Optimized Low-Load Comfort Solutions: Effectively manage airflow & Indoor RH comfort for low load cooling load homes, providing a reduction in relative humidity in energy efficient homes. .

Smarter Indoor Air Quality Solutions: Control fresh air supply and contaminants removal. Added air tightness demands improved source control, dilution, and high efficiency, with little or no energy penalty.

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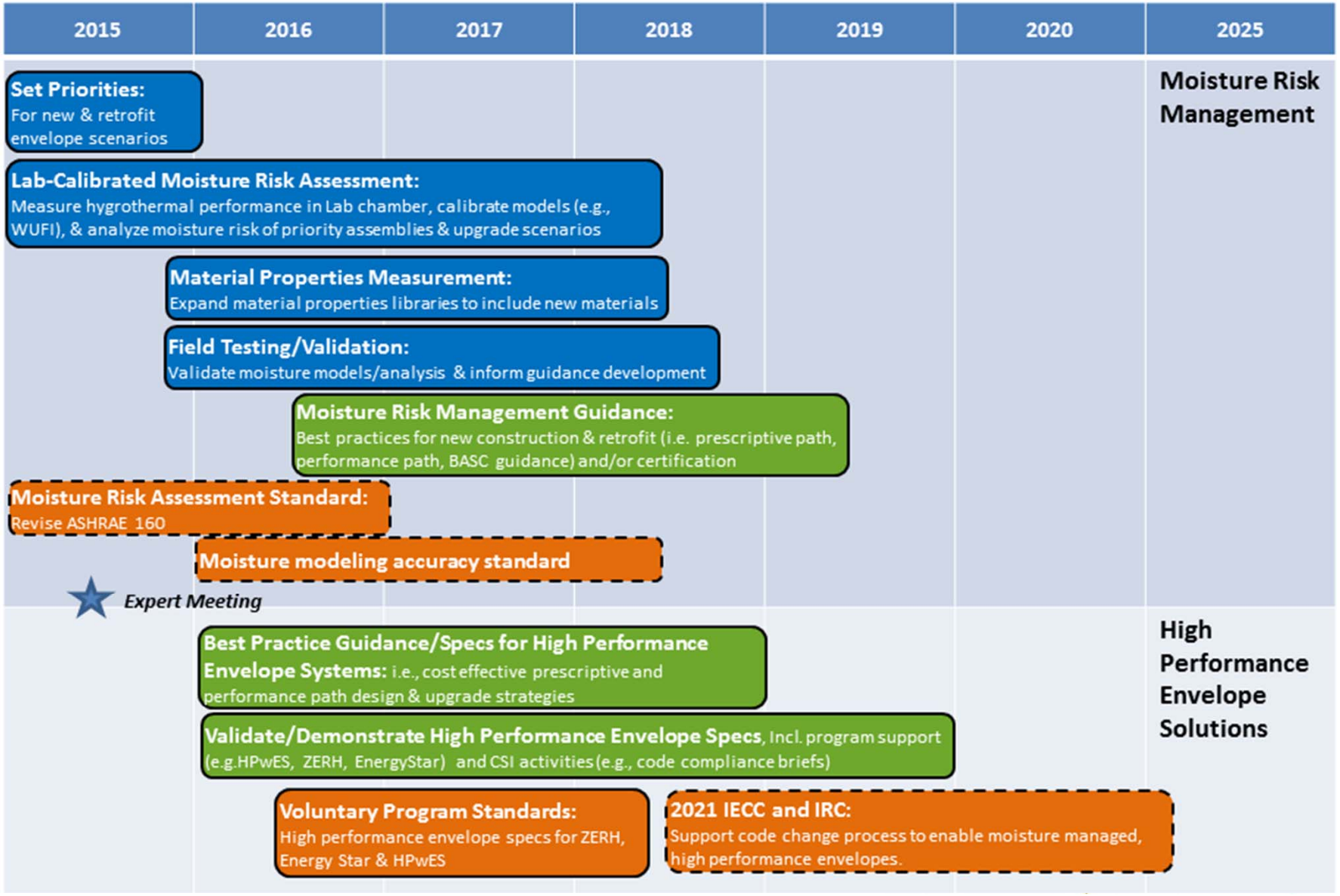
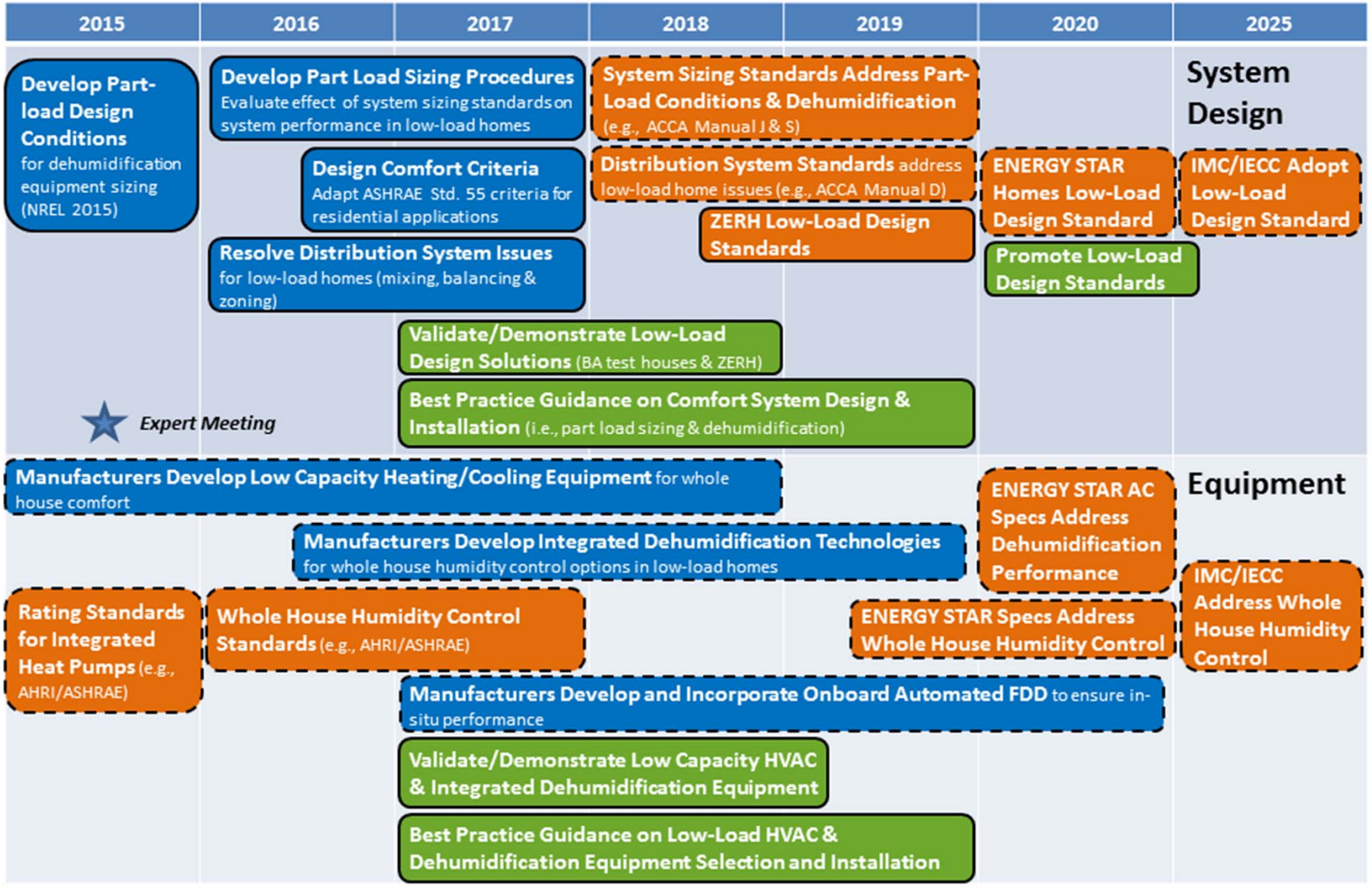
Building America Research to Market Strategy

High-Performance Moisture-Managed Envelope Solutions Roadmap



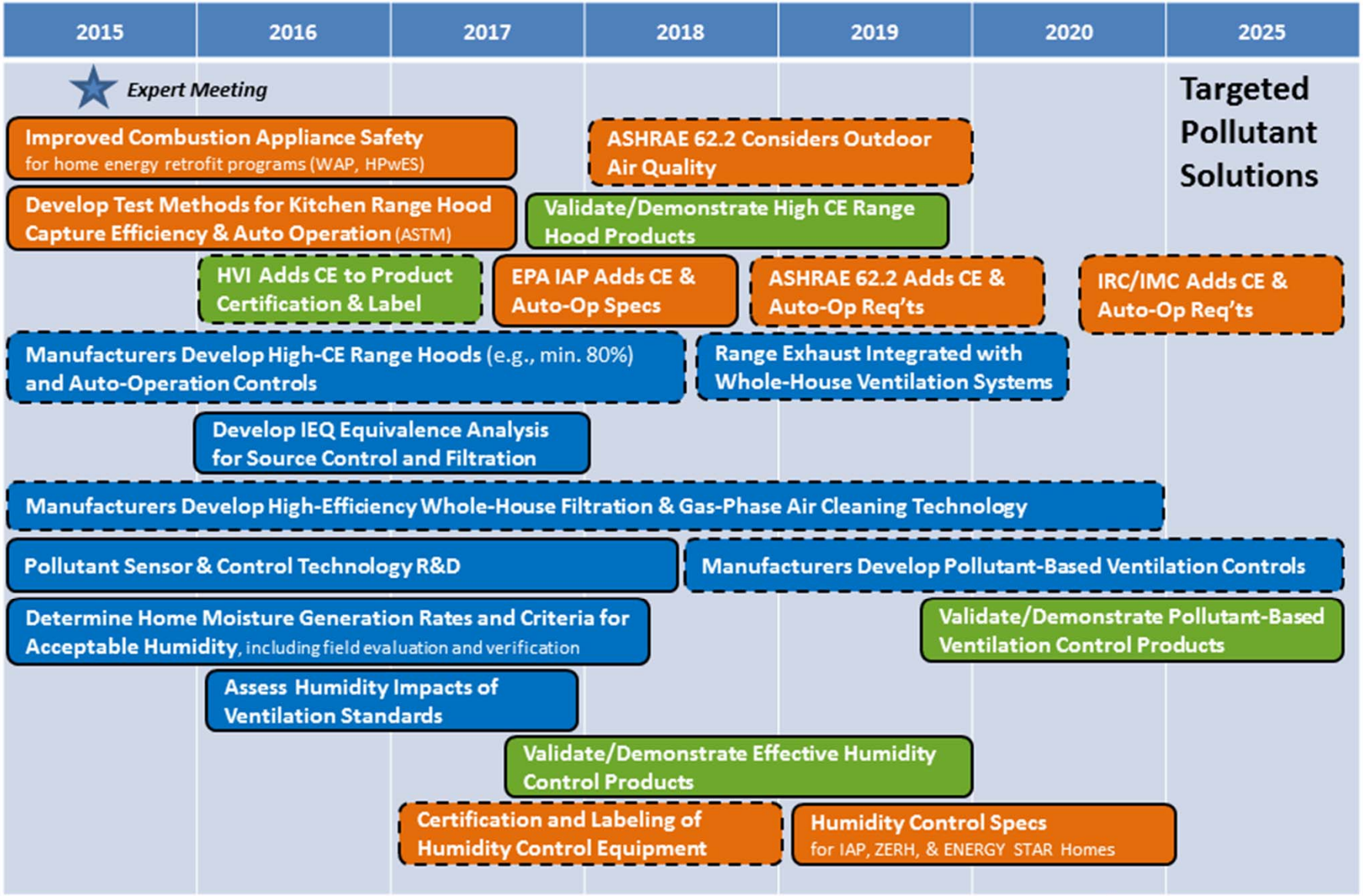
Building America Research to Market Strategy

Optimal Comfort Systems for Low-Load Homes Roadmap



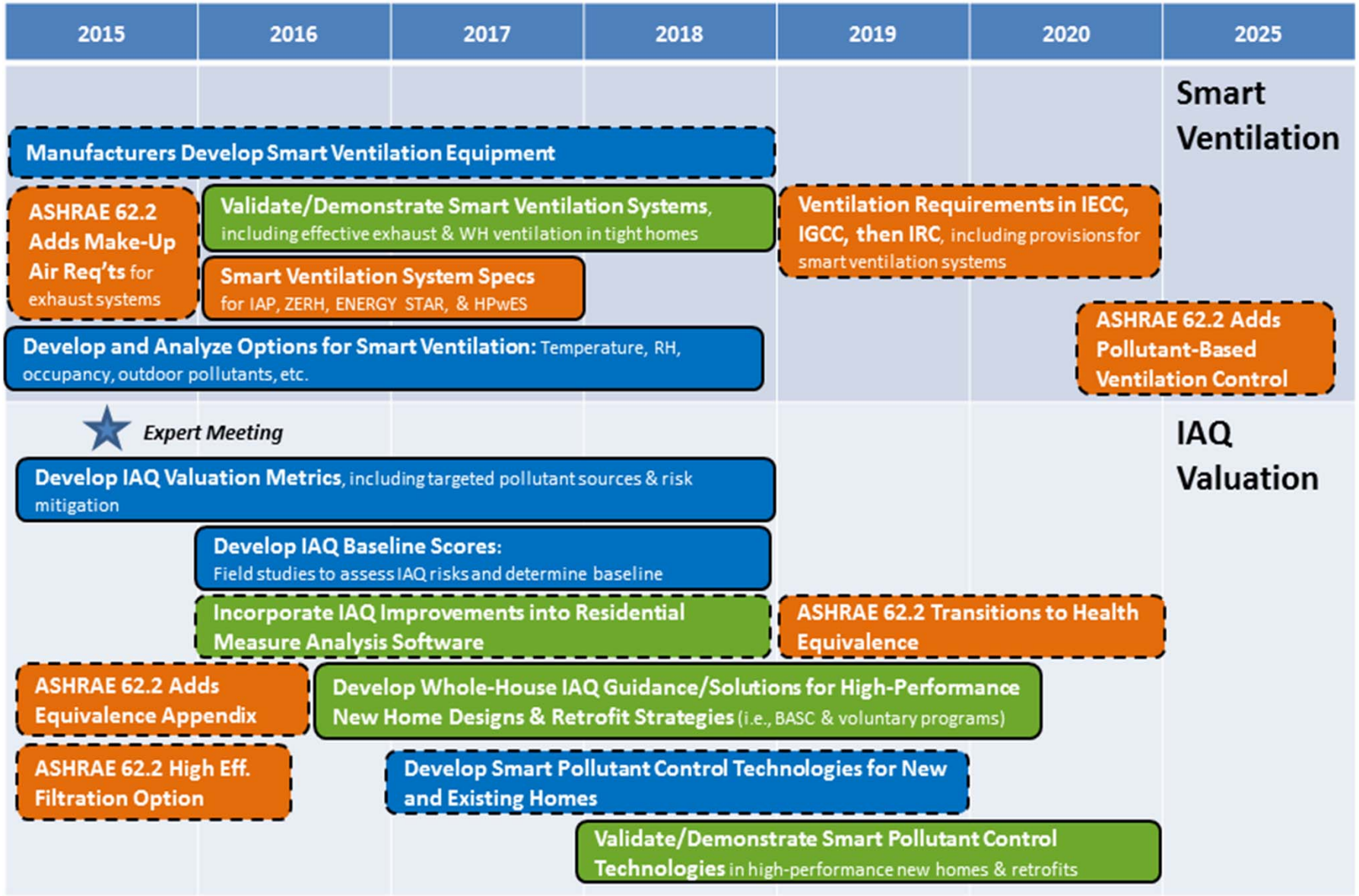
Building America Research to Market Strategy

Optimal Ventilation and IAQ Solutions Roadmap (Part 1)



Building America Research to Market Strategy

Optimal Ventilation and IAQ Solutions Roadmap (Part 2)



RBI BTO Peer Review Project Summaries

Building America – Total Quality Management

Presenter: Stacey Rothgeb, NREL

Project Goal	Ensure high-quality, impactful results from Building America (BA) team research that demonstrates market-relevant strategies to enable 50% energy savings in new homes and 40% energy savings in existing homes.
Target Audience	Residential building industry stakeholders - developers, builders, trade partners, architects, whole house contractors, utilities and other program developers with focus on “above code” market actors.
Project Impact	Residential buildings consume more than ***one fifth of the nation’s energy***, but the housing industry invests far less into R&D and innovations than any other comparably sized industry. NREL ensures the delivery of high-quality, impactful results from the BA teams by leading the technical planning and management and coordinating with other related RBI research. Project objectives are successfully demonstrated via credible BA team outcomes that result in the ***voluntary change of practices*** (business, homebuilding) among the nation’s leading builders, ultimately resulting in ***broad market adoption of BA innovations***.

RBI BTO Peer Review Project Summaries

Building America, Building Science Consortium

Presenter, Joseph Lstiburek, BSC

Project Goal	To develop methods of constructing unvented conditioned attics using air permeable insulations such as fiberglass and cellulose. This has application in new house construction and in the weatherization of existing houses.
Target Audience	Residential homebuilders DOE Weatherization program
Project Impact	Can reduce the construction of unvented roofs by more than 50 percent and allow the use of dense pack cellulose in retrofit applications without risk. 1. Project endpoint(s): Code change allowing use of air permeable insulation in the construction of unvented conditioned attics. 2. Impact path: • Near-term – the moisture content of the roof sheathing • Intermediate-term – adoption by IRC • Long-term – significant market penetration

RBI BTO Peer Review Project Summaries

Building America, ARIES: High Performance Factory Built Housing

Presenter: Jordan Dentz, ARIES/The Levy Partnership

Project Goal	Provide factory homebuilders with high performance, cost effective alternative envelope designs as a comprehensive solution for reaching net zero energy use.
Target Audience	Manufactured housing industry.
Project Impact	Demonstrated solutions for building affordable, high performance MH; clear guidelines for plants and installers. Goals: • Near-term (through 2016): Pilot projects; limited adoption by progressive plants. • Intermediate-term (2017-2019): New HUD standards drives adoption. • Long-term (2020+): Reach critical mass; adoption starts in north then spreads south. SBRA helps facilitate adoption.

RBI BTO Peer Review Project Summaries

NREL Energy Efficiency Potential Mapping

Presenter: Scott Horowtiz, NREL

Project Goal	To produce actionable national-scale analysis and visualizations that assess technical and economic potential of residential energy efficiency technologies through comprehensive EnergyPlus building models.
Target Audience	Market: Residential new/existing homes; single family and multifamily Audience: National/regional/state policy makers, utilities, manufacturers
Project Impact	Project Outputs: Technical and economic potential analysis for EE technologies Impact Measures: Number of active use cases of EE potential analysis, number of EE potential results (visualizations) delivered

RBI BTO Peer Review Project Summaries

HVAC Resarch

Presenter: Jeffrey Munk, ORNL

Project Goal	Accelerated adoption of variable-speed heat pumps (VSHPs) and implementation of new sizing guidelines leading to a 10-15% energy savings over traditionally sized VSHPs
Target Audience	Builders, HVAC Contractors, Homeowners
Project Impact	Accelerated adoption of VSHPs with a 10-15% target energy savings compared to traditionally sized VSHPs (estimated at 25 trillion BTUs) • Final Deliverable: VSHP sizing guide for the mixed-humid climate • Adoption of New Sizing Guidelines ➢ Short Term: Building America Solution Center ➢ Long Term: ACCA Manual S