

Residential Building Integration Program

An Overview of RBI



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

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RBI Program Overview - Agenda

1. Introduction to RBI

- Context within the BTO Ecosystem
- Potential Opportunities of Residential Building Energy Efficiency

2. Program Overview

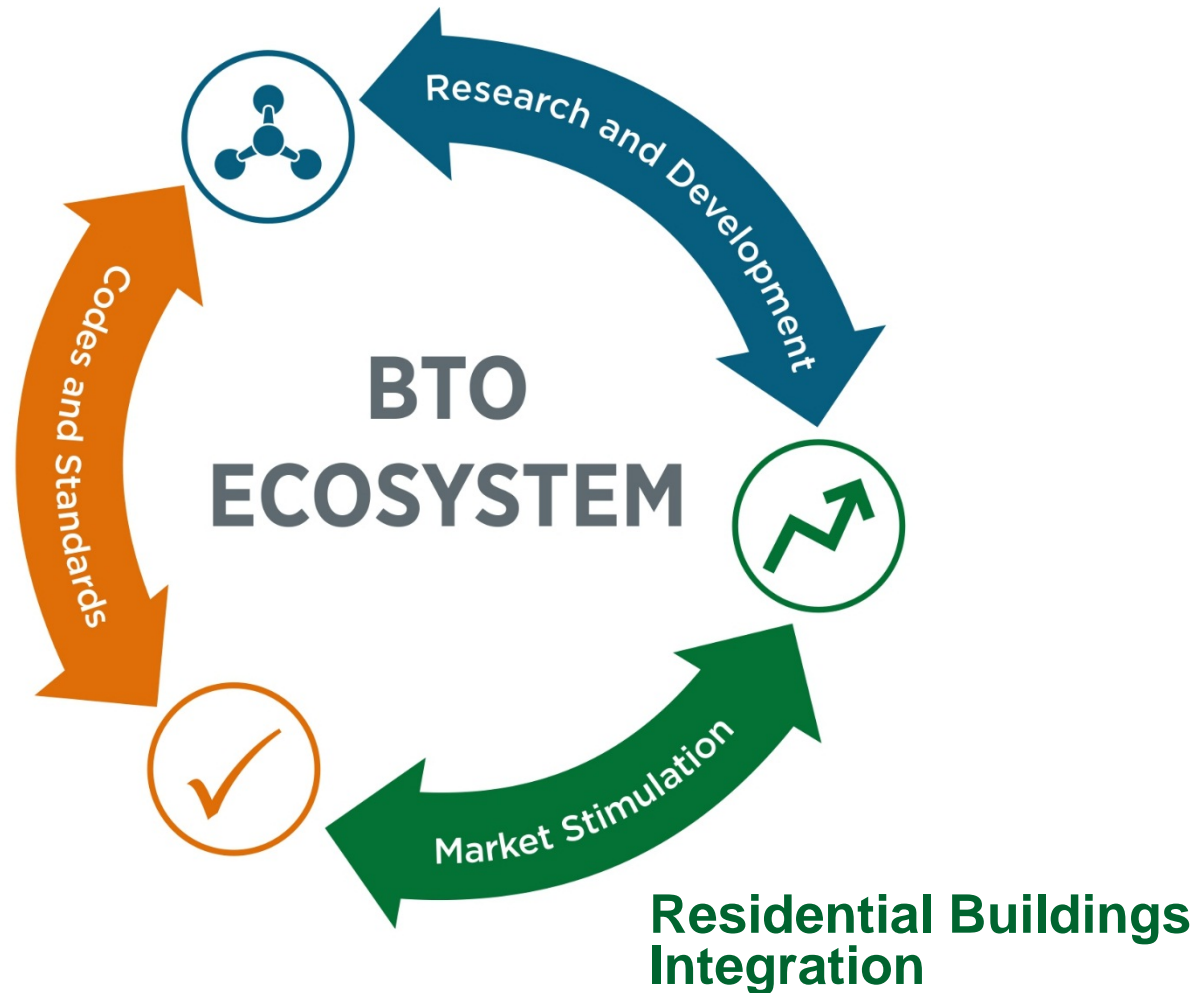
- Building America Research-to-Market Plan
- Better Buildings Residential Program Overview

3. Historical Budget Information

4. RBI Program Logic Model

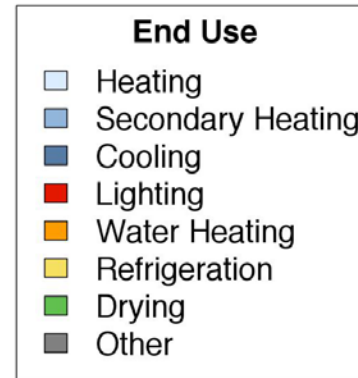
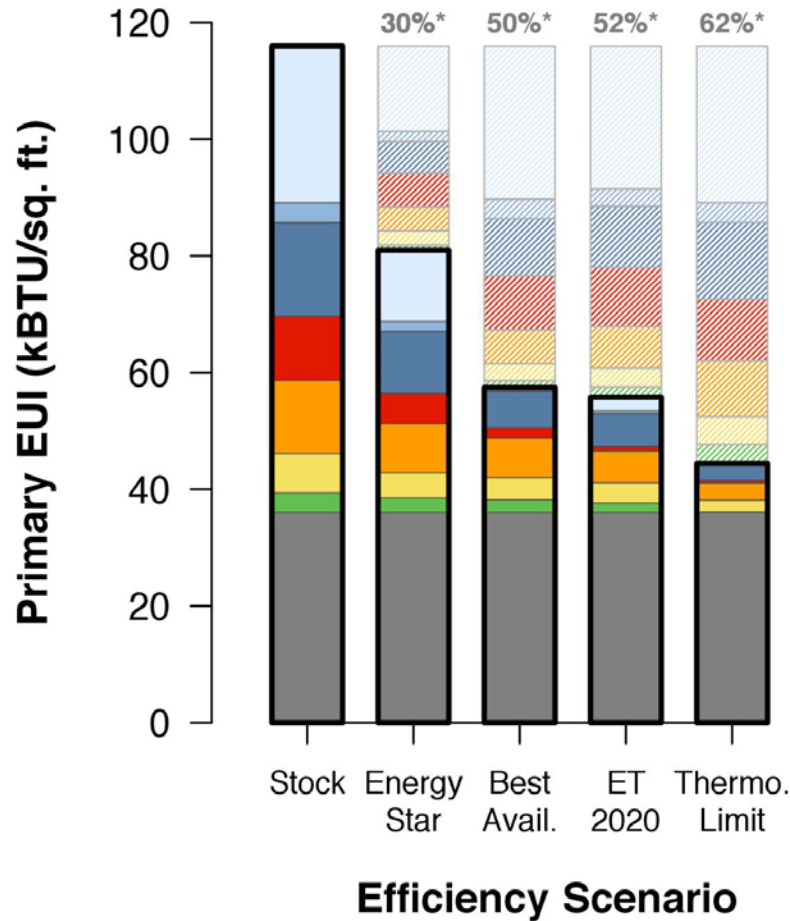
5. Program Goals Overview

Introduction to RBI



Potential Opportunities of Residential Building Energy Efficiency

Residential Energy (Single Family, All Regions)



Heating, cooling, water heating & lighting shows LARGE potential for efficiency improvement

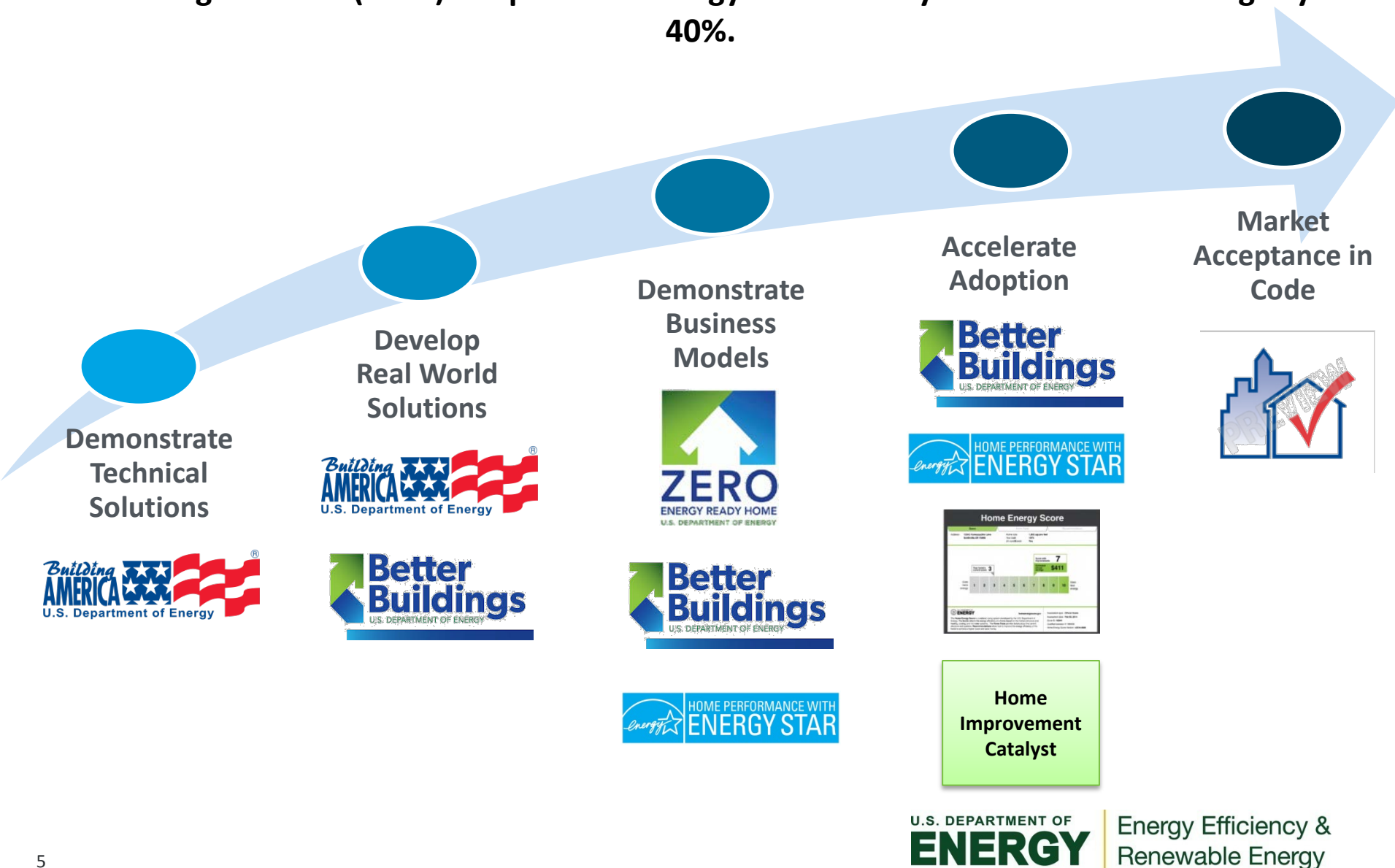
***Energy Savings %**

“Other” dominates in the future: Small electric devices, heating elements, outdoor grills, exterior lights, pool/spa heaters, etc.

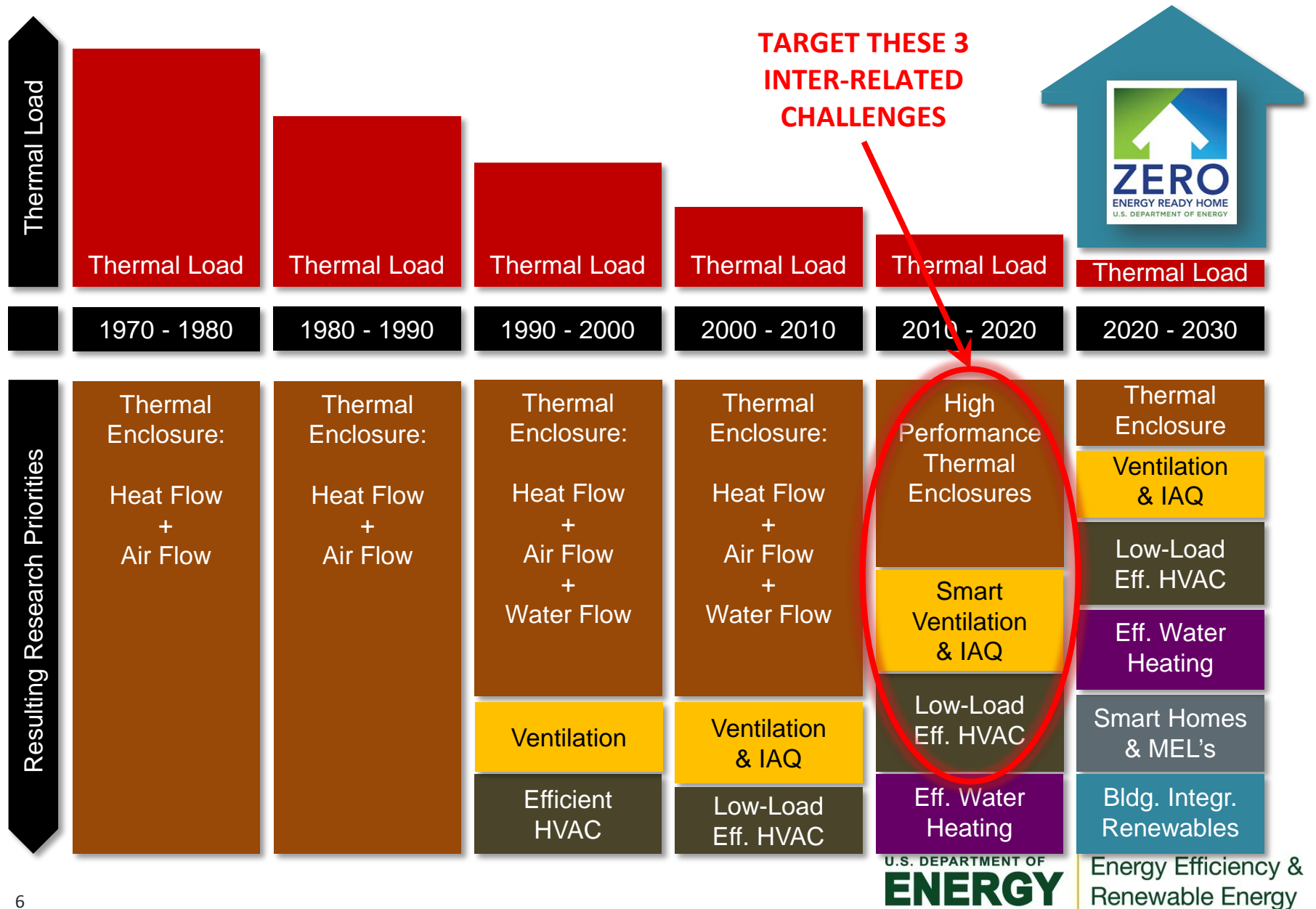
Best available does not consider cost
ET 2020 includes cost effectiveness

Program Strategy Overview

RBI Program Goal (2030): help reduce energy use intensity in residential buildings by 40%.



Building America Target Challenges



Building America Research-to-Market Plan

The Building America strategy focuses on developing and demonstrating solutions to the following three critical technology challenges, and on improving the ability of the housing market infrastructure to adopt these innovations:

- *High-Performance, Moisture-Managed Envelope Solutions.*
- *Optimal Comfort Systems for Low-Load Homes.*
- *Optimal Ventilation and Indoor Air Quality (IAQ) Solutions.*

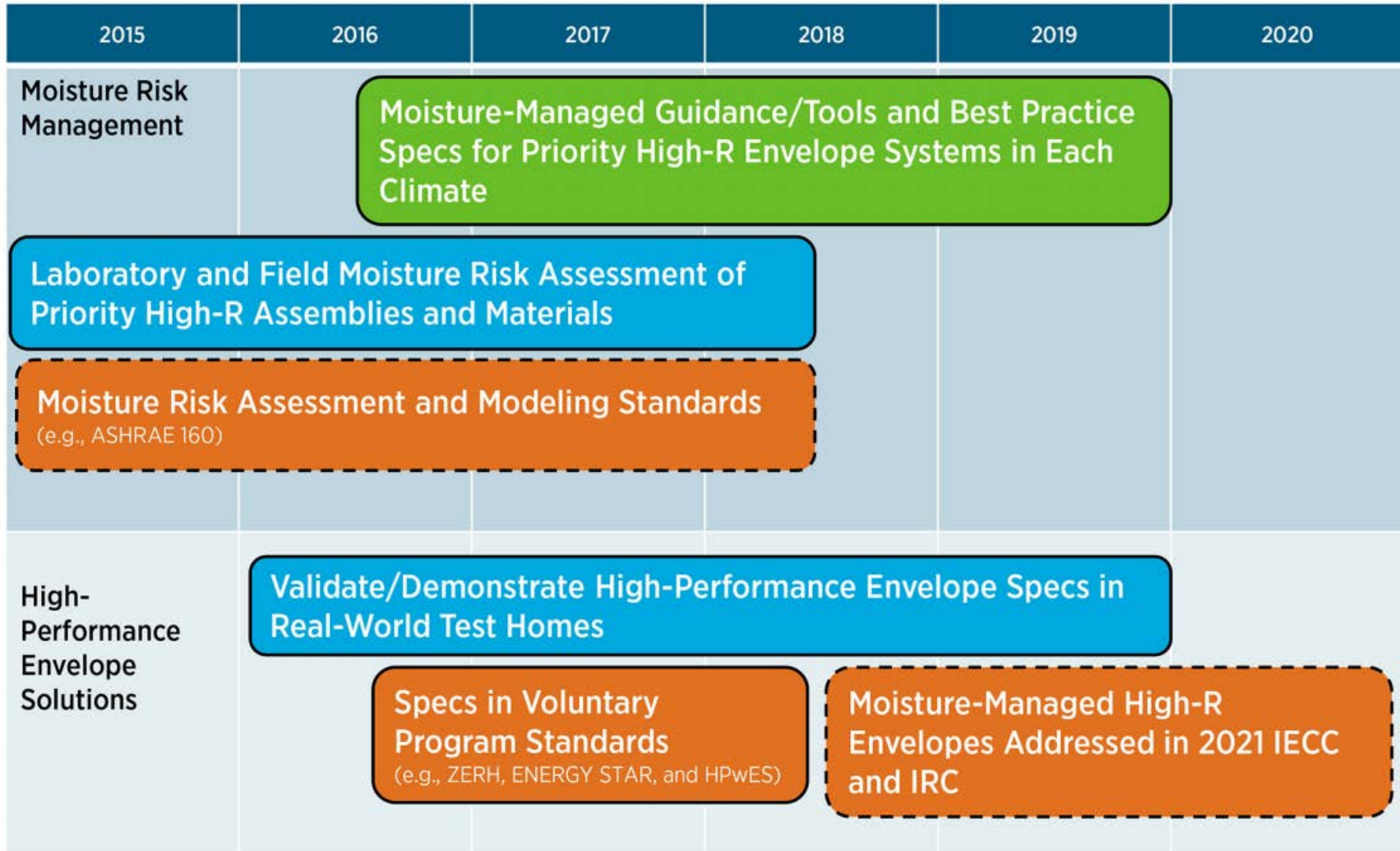
Current FOA Projects

- Gas Technology Institute
- Home Innovation Research Labs
- IBACOS
- The Levy Partnership, Inc.
- University of Central Florida

Building America Technology-to-Market Roadmap

High Performance Moisture Managed Envelope Solutions

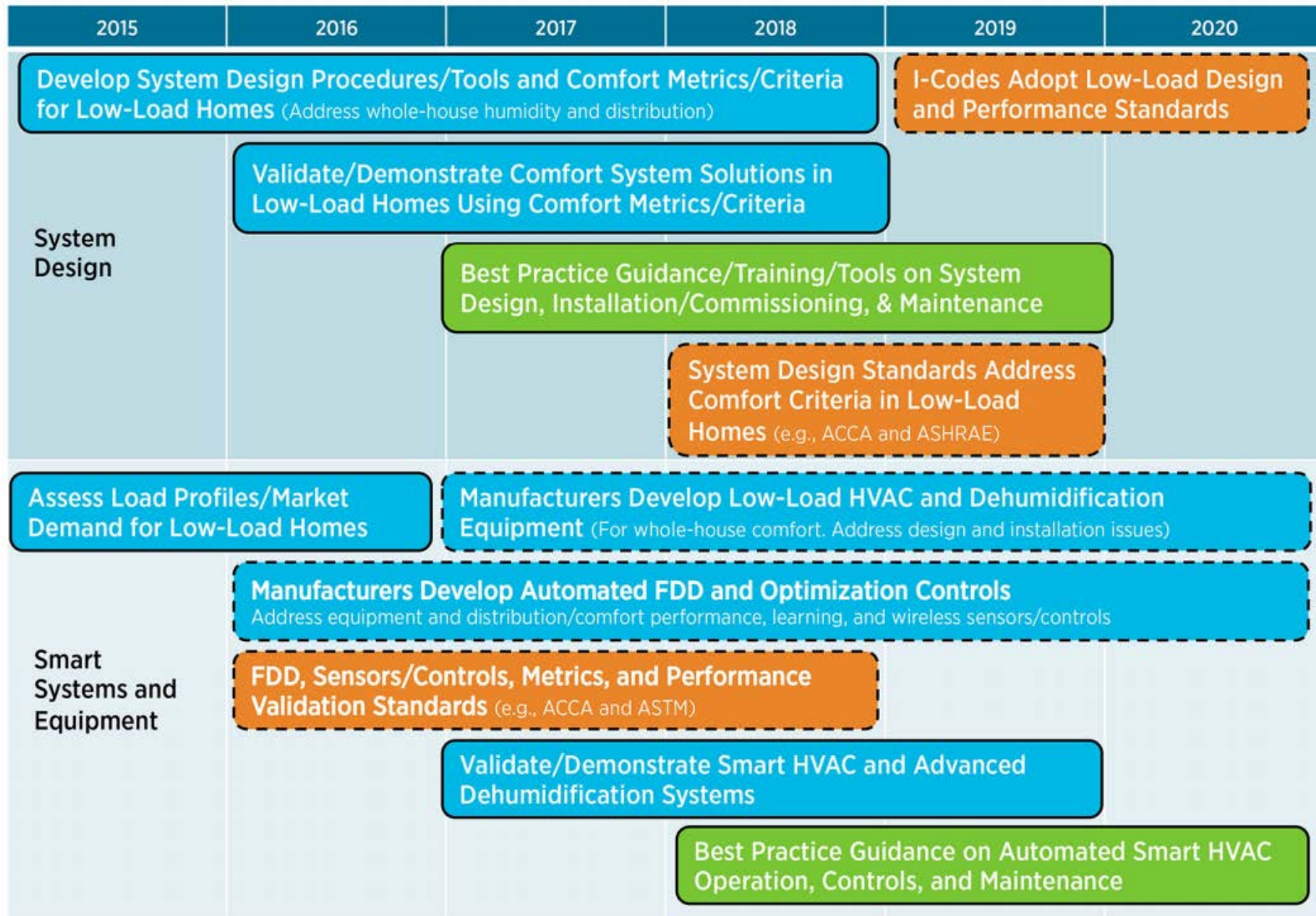
A. High-Performance, Moisture-Managed Envelope Solutions



Building America Technology-to-Market Roadmap

Optimal Comfort Systems for Low-Load Homes

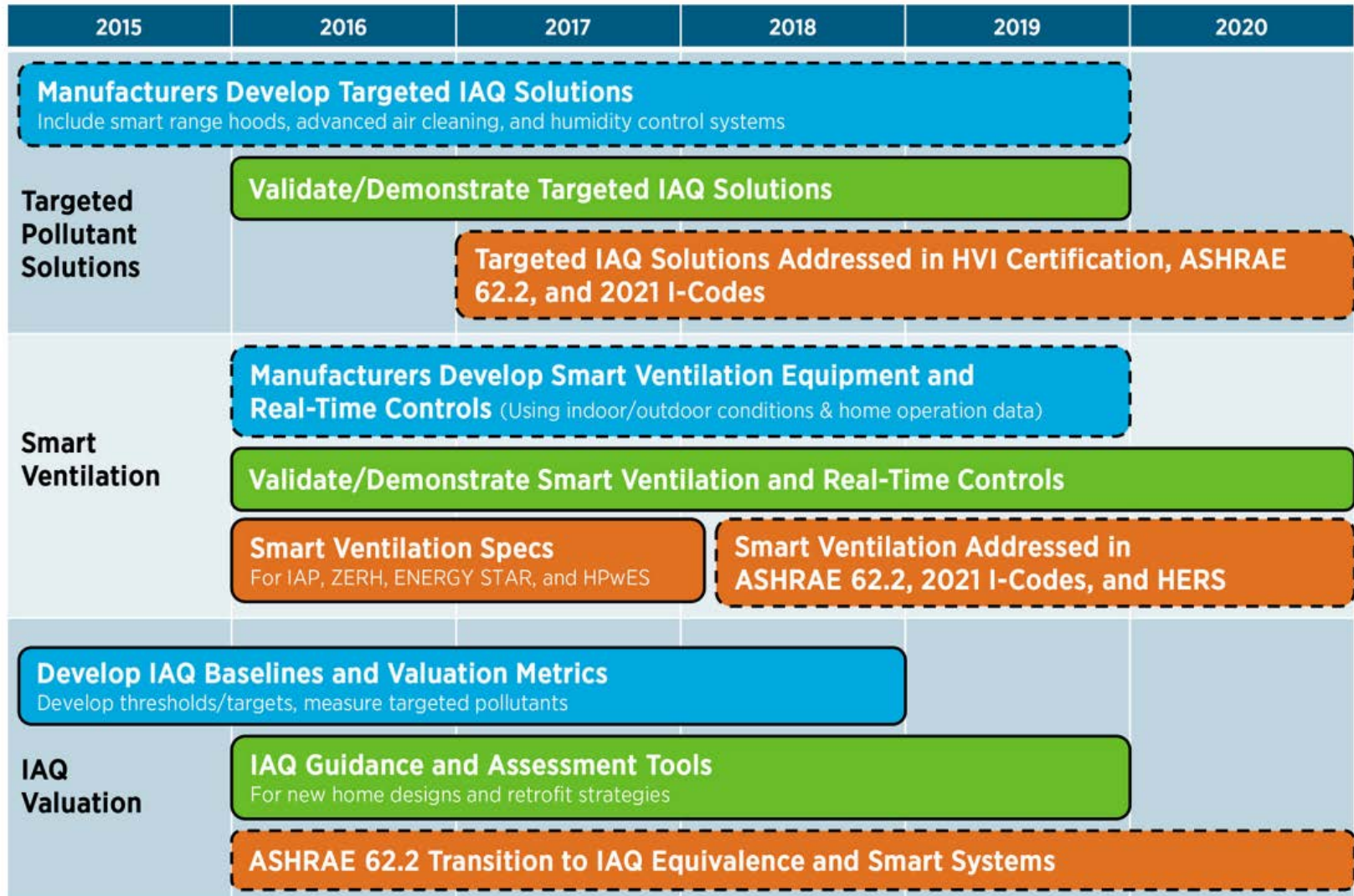
B. Optimal Comfort Systems for Low-Load Homes



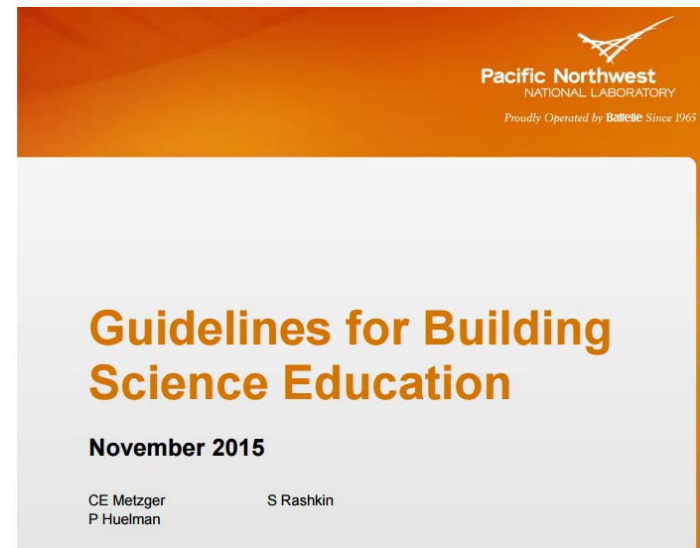
Building America Technology-to-Market Roadmap

Optimal Ventilation & IAQ Solutions

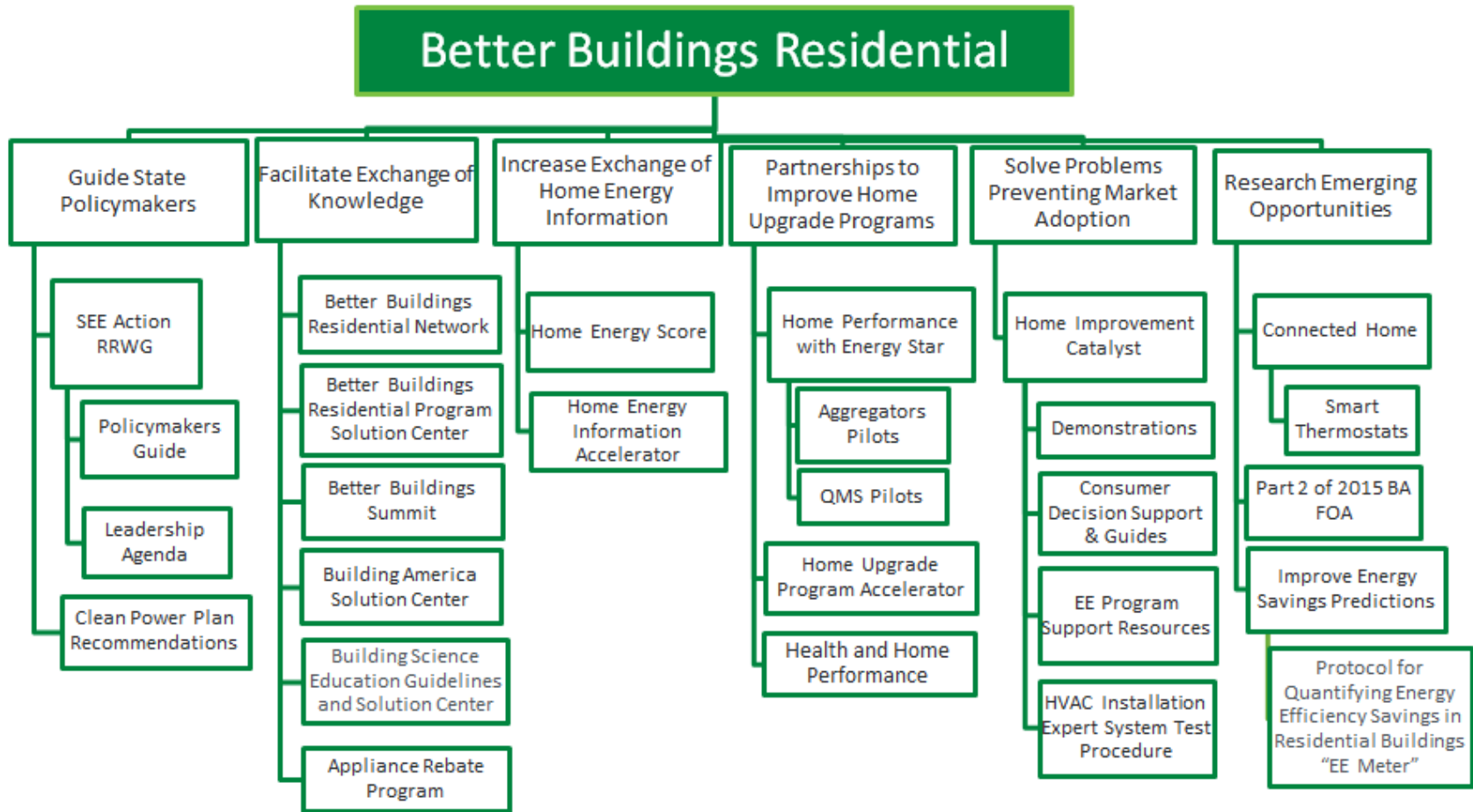
C. Optimal Ventilation and IAQ Solutions



RBI Program Tools and Resources



Better Buildings Residential for Existing Homes



RBI Budget Information

Historical Program Budget

2014	2015	2016	2017
\$21,722,460	\$21,283,240	\$20,637,000	\$19,652,000

Funding Opportunities:

- *Building America Partnerships for High Performance Housing Innovation - \$5.5M*

Major Performers

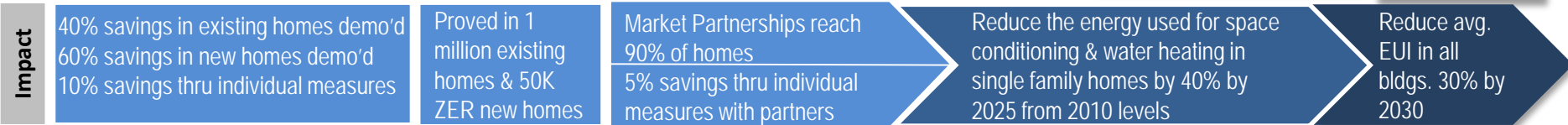
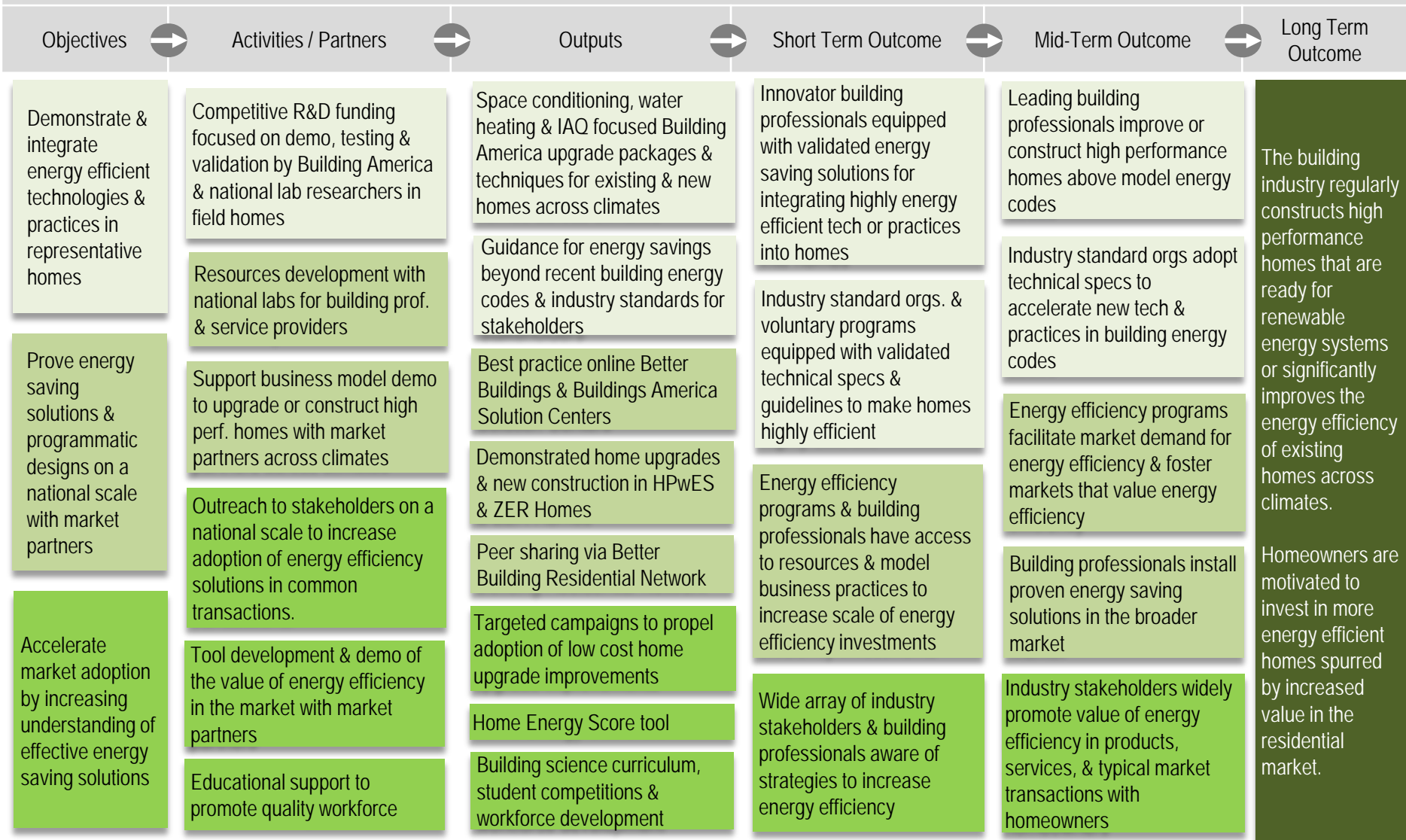
National Labs	Support Contractors
NREL	Catalyst
LBNL	Allegheny Science and Technology
ORNL	Newport Partners
PNNL	Elevate Energy

Project Size

Performer	Range/Average
National Laboratories	\$280,000 - \$2,100,000
2015 FOA Awardees	\$600,000 - \$1,000,000
Support Contractors	\$700,000

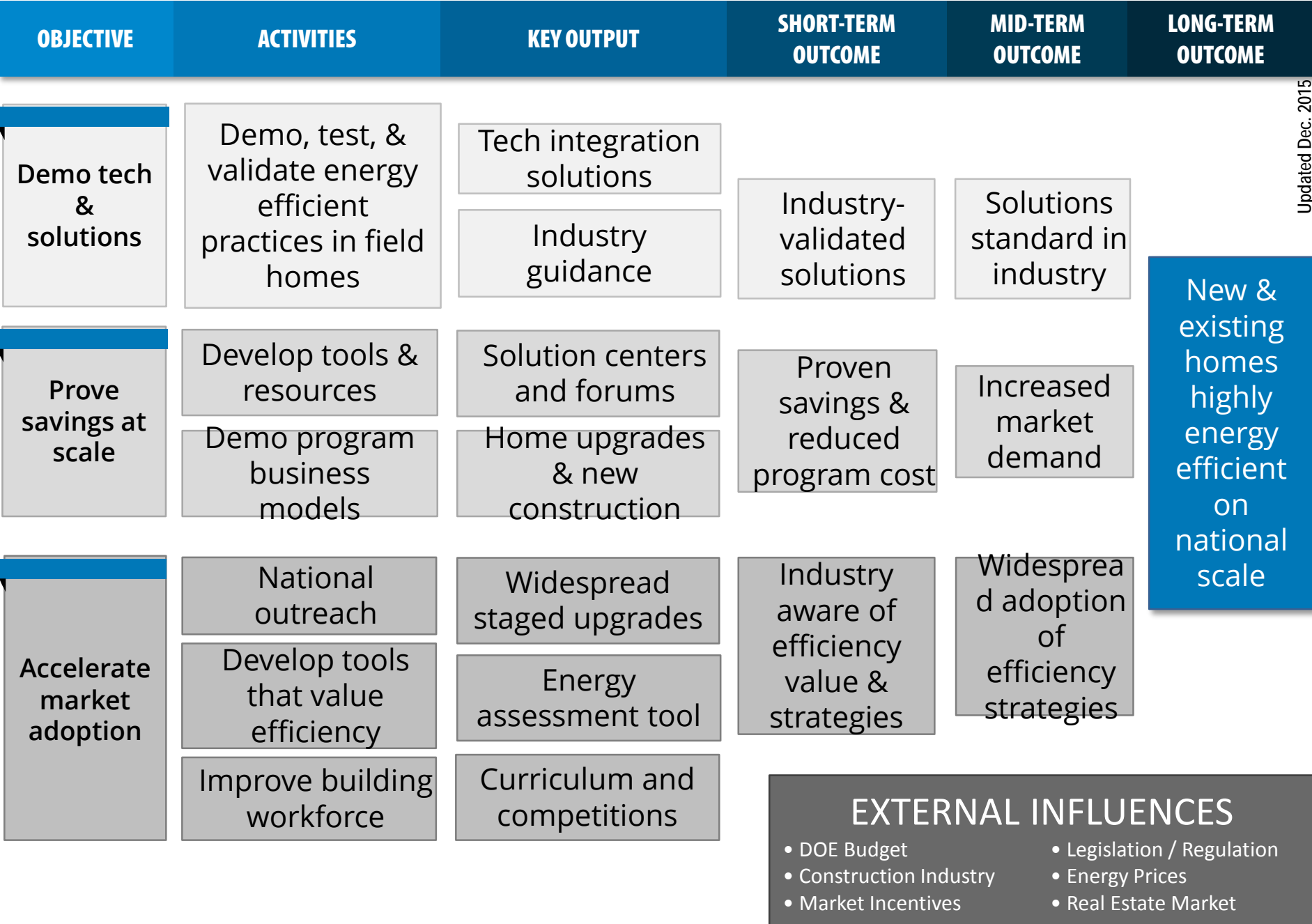
The Residential Integration Program accelerates energy improvements in existing and new residential buildings by reducing technical and market barriers to spur investment and achieve high performance homes.

External Influences: DOE budget, Construction industry, Energy prices, Real estate market, Market incentives, State/local policies, Regulation

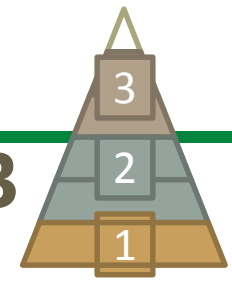
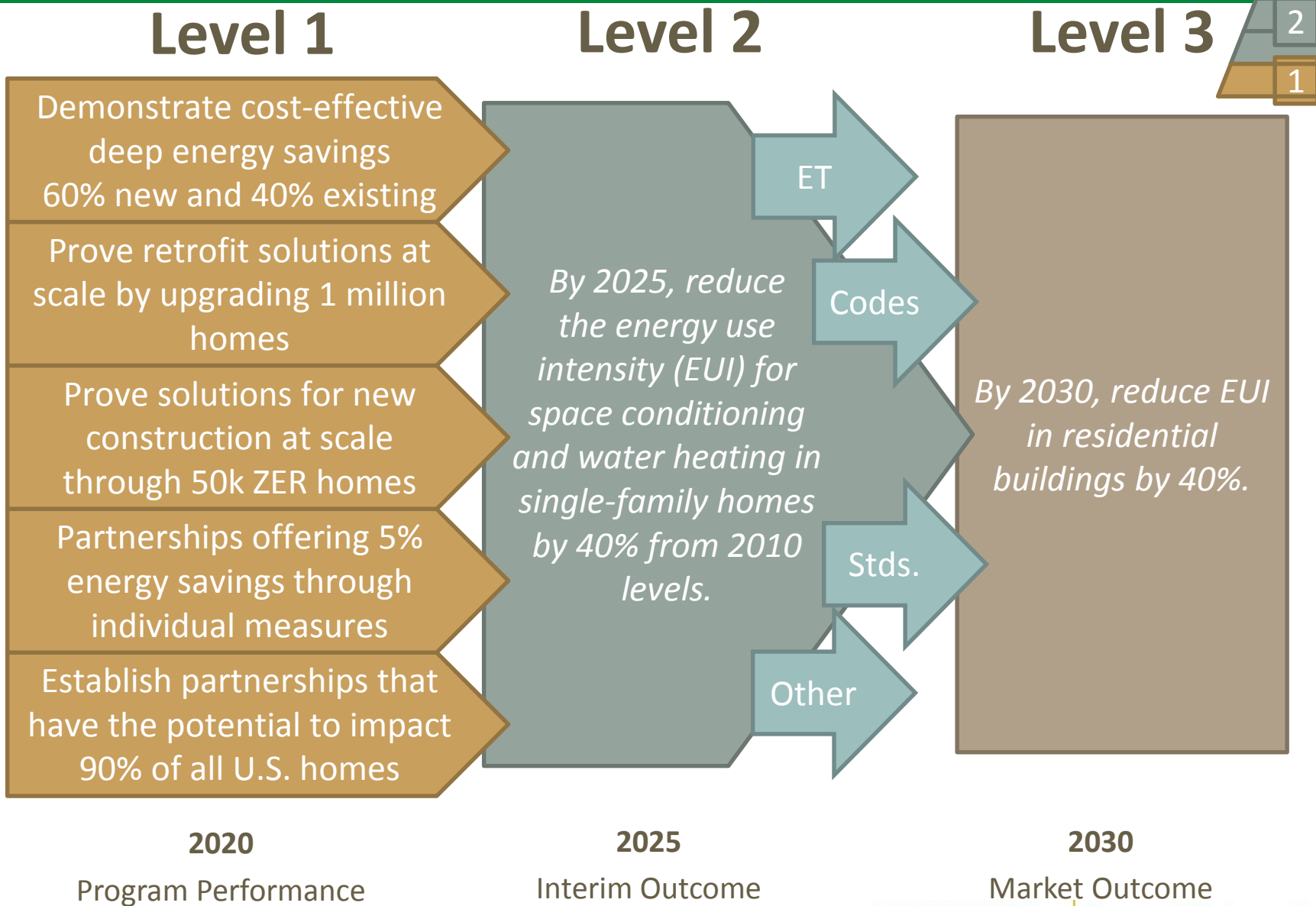


Residential Buildings Integration Program Logic Model

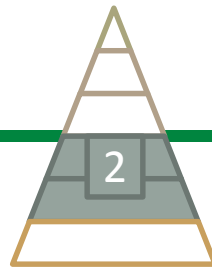
Updated Dec. 2015



Program Goals Flow Diagram



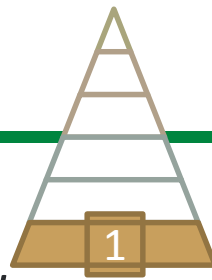
RBI's Interim Market Goal



By 2025, reduce the energy used per sq. ft. for space conditioning and water heating in single-family homes by 40% from 2010 levels.

- Connections Between Interim Goal and Program Strategy
 - RBI is focused on addressing the market segments with the greatest energy savings potential that are not being addressed by other government or market based programs.
- Current Status
 - EIA's most recent estimate of EUI in the residential sector for space heating & cooling and water heating in 2014 was: 54 kBtu per sq. ft. which is about 4% lower than the EUI for these end uses in 2010.

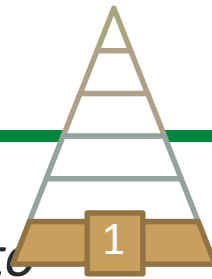
RBI's Program Performance Goal: Demonstrate Cost-Effective Deep Energy Savings



By 2020, develop cost-effective technologies and practices that can reduce the energy use intensity of new single family homes by at least 60% and existing single family homes by at least 40% relative to a 2010 baseline while maintaining performance in all major climate regions with a focus on reducing heating, cooling, and water heating loads, and demonstrate performance of individual technologies and solutions that provide at least 10% energy savings relative to a 2010 baseline.

- Connections Between Goal and Program Strategy
 - Before construction firms or contractors will integrate new energy efficiency measures into their practices they need to be confident that they will perform well.
 - RBI's demonstrations on new and existing homes will help resolve integration questions and increase the likelihood of later adoption.
- Current Status
 - DOCUMENTATION UNDERWAY, ASSESSMENT WILL FOLLOW

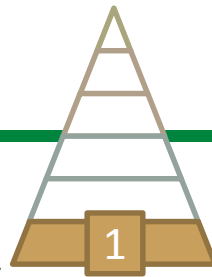
RBI's Program Performance Goal: Prove Retrofit Solutions at Scale



Between 2010 and 2020, prove to homeowners that it is possible to cost effectively reduce the average energy use intensity of homes by at least 25% by upgrading in at least 1 million single family homes covering every major climate zone, with a focus on heating, cooling, and water heating loads.

- Connections Between Goal and Program Strategy
 - RBI will help prove the scalability of both technologies and market transformation solutions through programs like Home Performance with Energy Star and the Better Buildings Residential Network.
- Current Status
 - DOCUMENTATION UNDERWAY, ASSESSMENT WILL FOLLOW

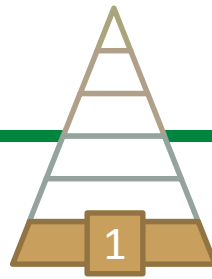
RBI's Program Performance Goal: Prove Solutions for New Construction at Scale



Between 2010 and 2020, prove to market leading energy efficiency programs that it is possible to cost effectively reduce the average energy use intensity of new homes by at least 40% relative to the average home in 2010 while still maintaining performance by certifying at least 50,000 single family homes as “zero energy ready,” with a focus on very low heating, cooling, and water heating loads in every climate zone.

- Connections Between Goal and Program Strategy
 - In order to affect a new construction in a substantial way, BTO must prove that cost-effective deep energy savings are possible to programs such as Energy Star New Homes (which were nearly 10% of the new construction market in 2014).
 - Affecting these kinds of broadly accepted labeling programs is a critical step toward influencing the minimum building code.
 - To achieve these objectives RBI has developed its Zero Energy Ready Homes program.
- Current Status
 - DOCUMENTATION UNDERWAY, ASSESSMENT WILL FOLLOW

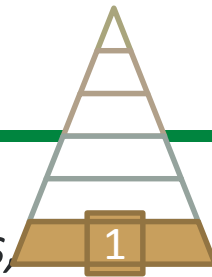
RBI's Program Performance Goal: Partnerships on Individual Measures



By 2020, establish partnerships with states, utilities, manufacturers, distributors and installers, serving at least 75% of U.S. households, in each major climate zone, to expand the purchase of a variety of high efficiency technologies and services capable of cost effectively reducing the energy use intensity of existing homes by at least 5%.

- Connections Between Goal and Program Strategy
 - While deep energy upgrades offer one pathway to substantial energy savings individual measures offer another.
 - Link to “Staged Measures” activities
- Current Status
 - DOCUMENTATION UNDERWAY, ASSESSMENT WILL FOLLOW

RBI's Program Performance Goal: Establish Broad Partnerships



By 2020, partner with a variety of state, local, and utility stakeholders, as well as other market actors, who have the ability to reach at least 90% of single family homes.

- Connections Between Goal and Program Strategy
 - To have a transformative impact RBI cannot focus its activities on selective states or localities but needs to build partnerships across the nation.
- Current Status
 - DOCUMENTATION UNDERWAY, ASSESSMENT WILL FOLLOW