U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Building America Program Overview

U.S Department of Energy
Eric Werling, Program Director
202-586-0410 / 202-604-8874

Building AMERICA U.S. Department of Energy

Happy Anniversary, Building America!

Building AMERICA®
U.S. Department of Energy

Building AMERICA Developments

February 2001
Information Bulletin
Number 3

New American Home Showcases Energy Efficiency and Durability

The New American Home for 2001 was a once-in-a-lifetime project for Hedgewood Properties. The New American Home is an annual showcase project sponsored by the National Association of Home Builders' National Council of the Housing Industry (NCHI). To design and build a home that is attractive as well as energy efficient, Hedgewood teamed up with Building America's IBACOS consortium, and the Southface Energy Institute, a nonprofit environmental building group based in Atlanta. The goal was to achieve a rating of 90 on the Home Energy Rating System scale. To achieve this high level of energy efficiency, Hedgewood integrated many advanced building technologies, including two high efficiency furnaces, an energy recovery ventilator, low-e argon-filled windows, and improved insulation.

In addition to these energy-efficient technologies, many durability-related improvements were added to the home's design. Among these improvements: an airtight cathedral ceiling to prevent condensation inside the ceiling during the winter, and close attention to drainage control details that allow the walls to dry properly. It is likely that because of these investments, the entire building assembly will be more durable and long lasting, helping to ensure that the New American Home will remain energy efficient for years to come.

Hedgewood should benefit from reduced warranty and liability claims as a result of these additional technologies. They also learned several important construction lessons in the areas of airtightness and moisture control in the project and IBACOS recommended that Hedgewood incorporate each lesson in future projects.

The New American Home will be monitored extensively for one year while it is occupied. Monitoring data will be posted at a special Internet site and will be accessible to individuals and organizations involved in the project.

For more information on NCHI's New American Home, please contact John Broniek at (412) 765-3021 or jbroniek@ibacos.com.★

Hedgewood Properties' New American Home in Atlanta is a model of energy efficiency.

Ground-Breaking News

Buildings for the 21st Century

U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Office of Building Technology, State and Community Programs

EERE Goals

- Affordability
- Integration
- Security

Affordability

THEN (1994)

Building America Goals:

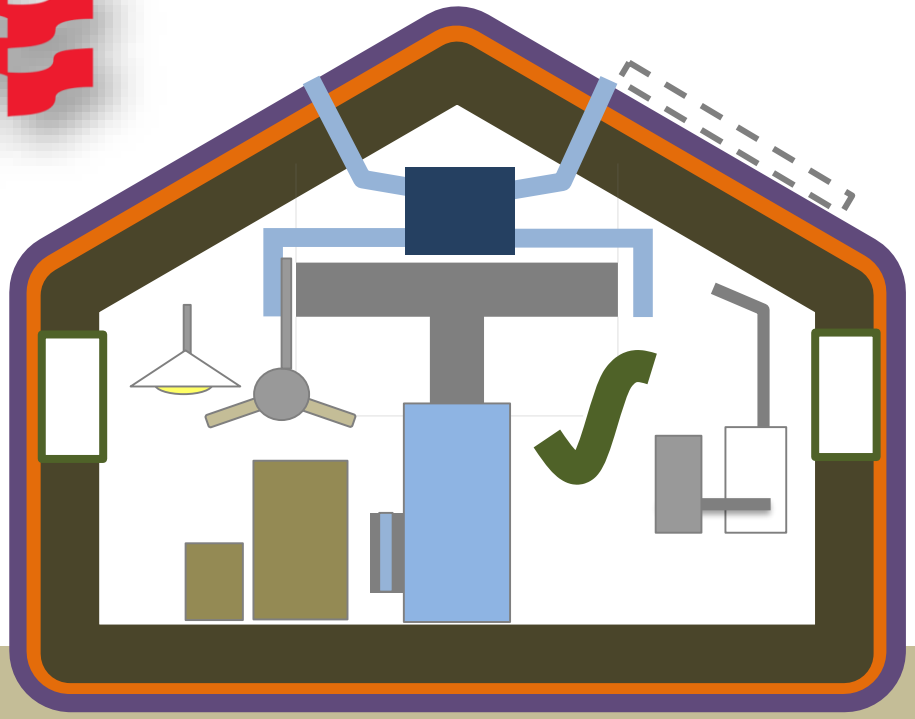
- 50% Energy Savings
- No Increased Cost

NOW (2019)

Building America Goals:

- "Zero Energy Ready"
- No Increased Cost

Building America aims to ***Cut Energy Use of U.S. Homes in Half*** without increasing building construction costs



Zero Energy Ready Homes,

so energy efficient that all or most annual energy use can be offset by renewable energy.


AF TIMES
NEWS FLASH

We already know how to build Zero Energy Homes

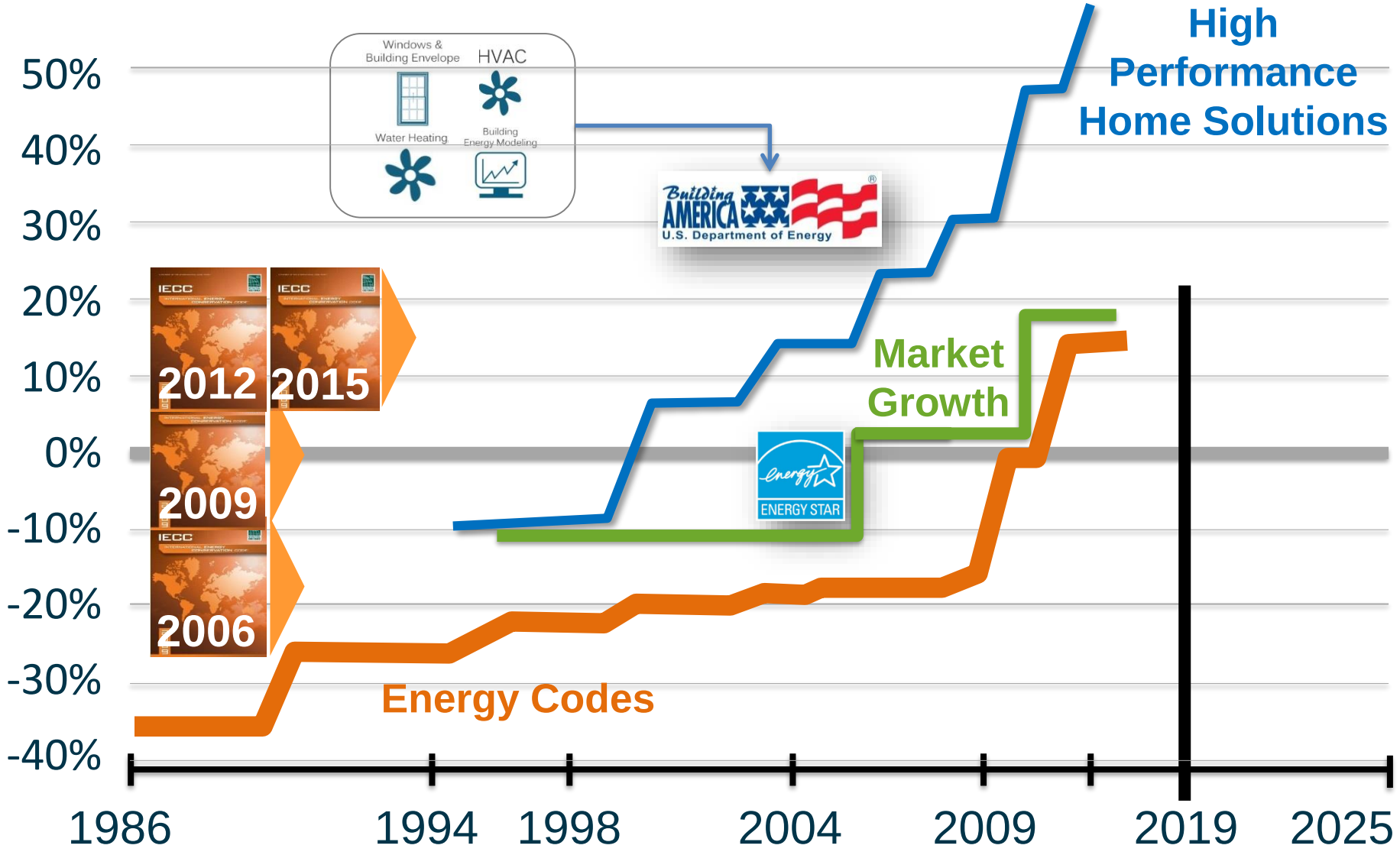
“In theory, there is no difference between theory and practice. In practice, there is.”

Yogi Berra

Housing Industry Problems/Barriers (Opportunities)

- **Housing industries under-invest in R&D:**
  - <0.4% of Industry Revenue goes to R&D and
  - virtually 0% private investment in integrated whole house performance improvement solutions
- **Perceived risks of innovation are high:**
  - Uncertainty about envelope moisture durability of houses built to current standards with modern building materials
  - System integration and cost tradeoff challenges
  - Indoor air quality and ventilation system performance concerns
- **Housing infrastructure lacks sufficient resources to effectively manage performance risks:**
  - No/Low-tech performance measurement technologies; inability to measure/predict/manage installation quality & operational performance
  - Lack of consistent code approval for proven innovations
  - Insufficient training & education for trades

Research to Market to Standard Practice



Integration

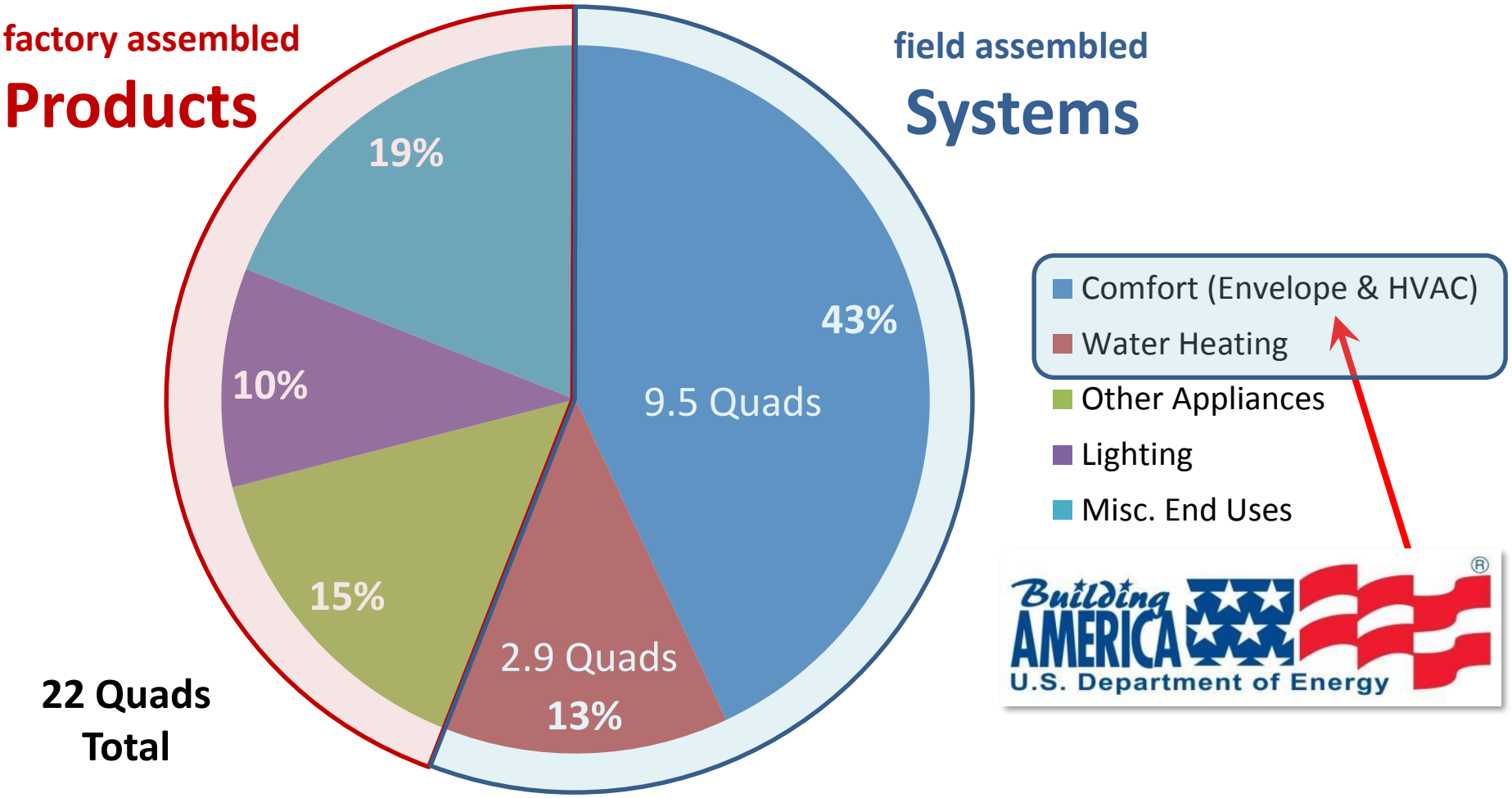
THEN (1994)

- Cost savings through integrated design
- "House as a System"

NOW (2019)

- Building Science +
- "High Performance"
- "Connected" technology
- Advanced Construction

Building America Aims to ***Cut Energy Use of U.S. Homes in Half*** by Helping Industry Improve "Integrated" (Field Assembled) Systems



U.S. Residential Buildings Primary Energy Consumption

* Source: U.S. EIA

Security (Risk Management)

THEN (1994)

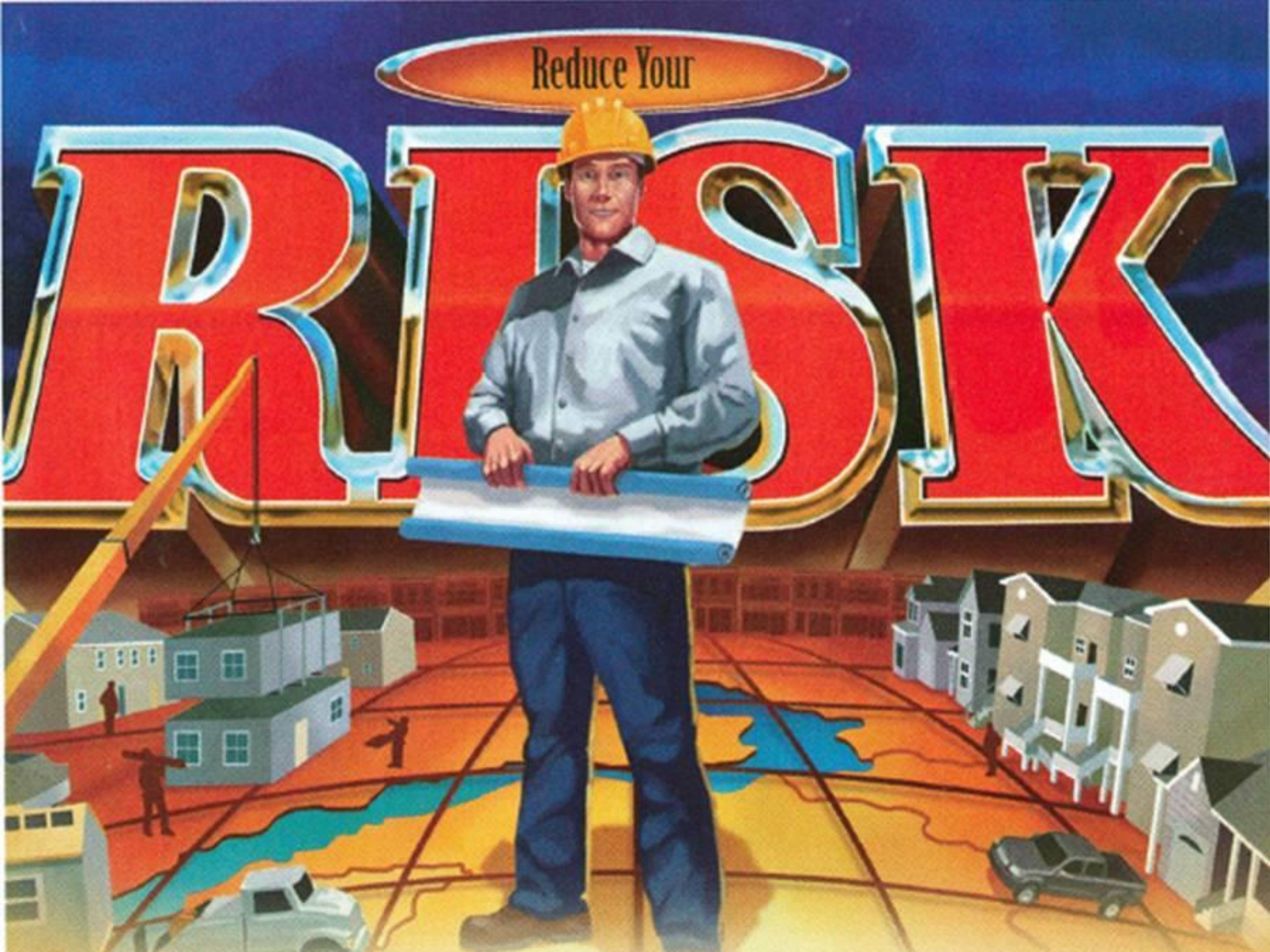
Achieve EE goals with …

- Indoor Air Quality (IAQ)
- Comfort

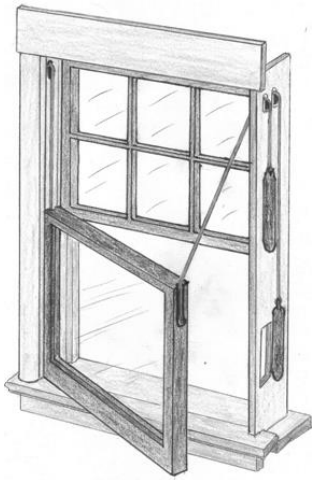
NOW (2019)

Achieve EE goals with …

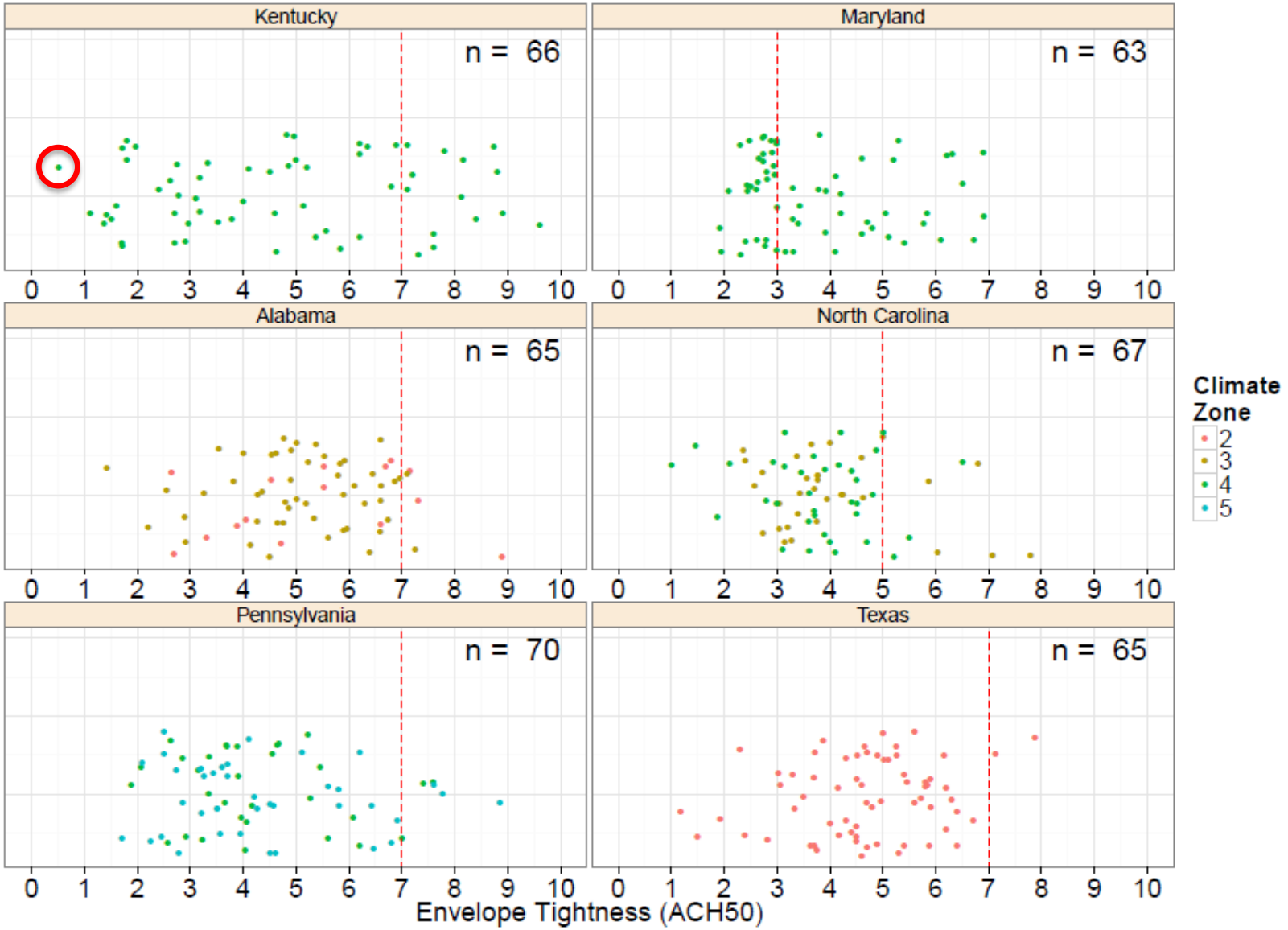
- IAQ & Comfort +
- Moisture Control
- Construction/Installation Quality (Cx & AFDD)


Reduce Your
RISK

Building Materials Are Changing



Average New Homes are Tighter

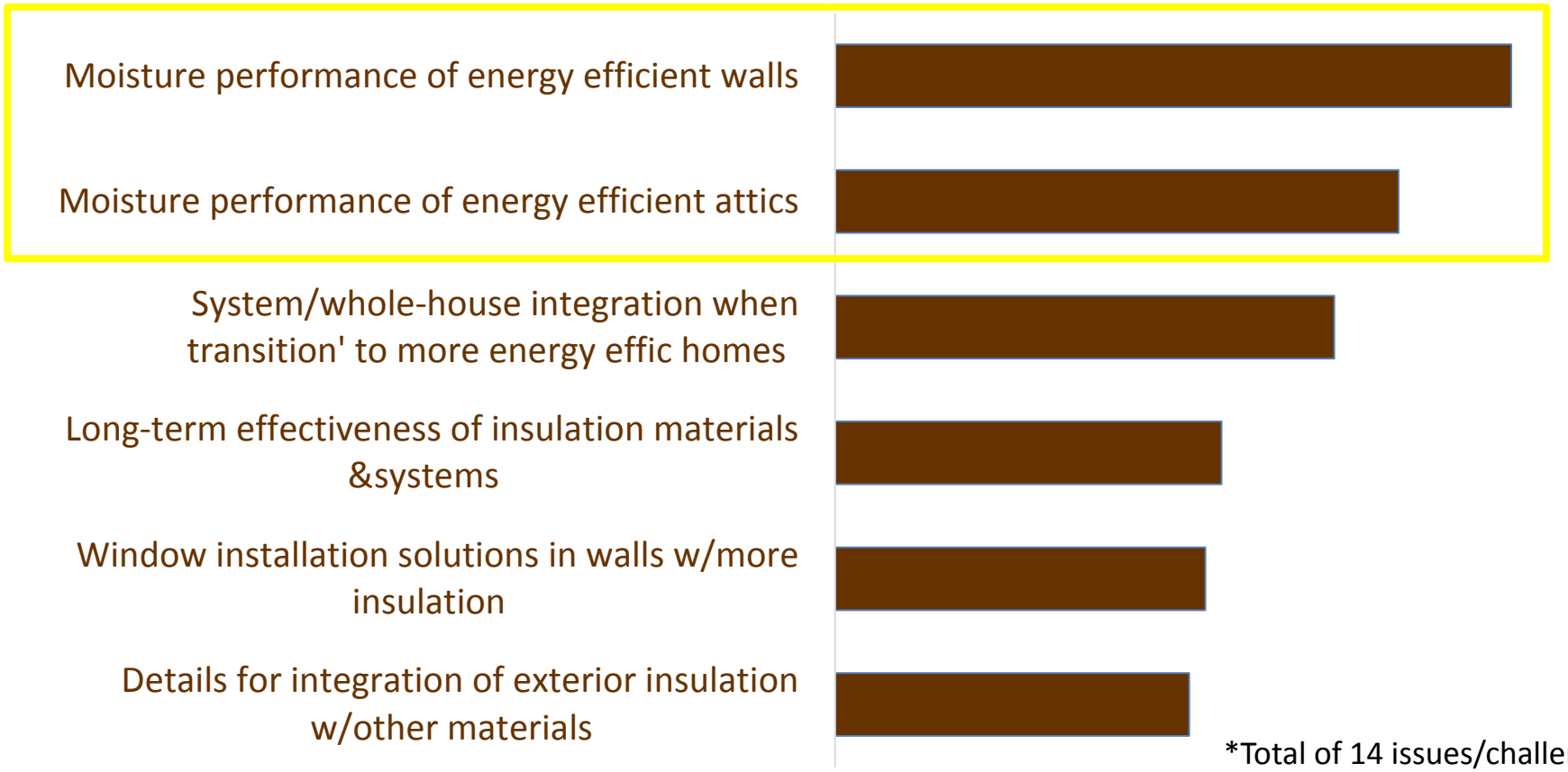


Technology & Expectations are Changing

Anyone who looks can find defects

Building Industry Concerns

Top Challenges in Energy Efficiency



*Total of 14 issues/challenges presented to respondents

The Top 3 Technical Challenges

1. Moisture Durability Risks of Insulated Envelopes

Risk of condensation & inadequate drying potential inside building assemblies

2. Comfort Risks in Low-Load Homes

Risk of inadequate air flow and RH control at part load conditions

3. Indoor Air Quality Risks in Tight Homes

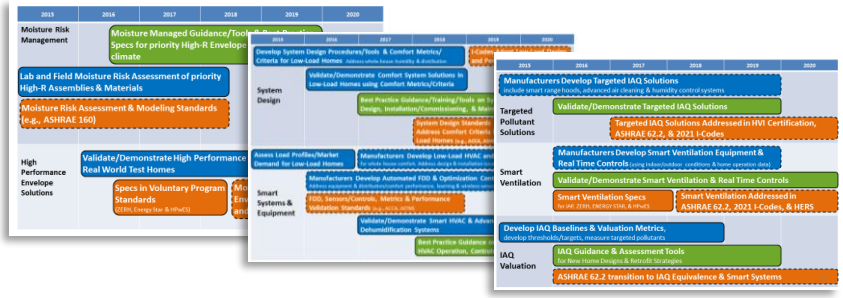
Risk of poor indoor air quality in tight homes

Building AMERICA
U.S. Department of Energy

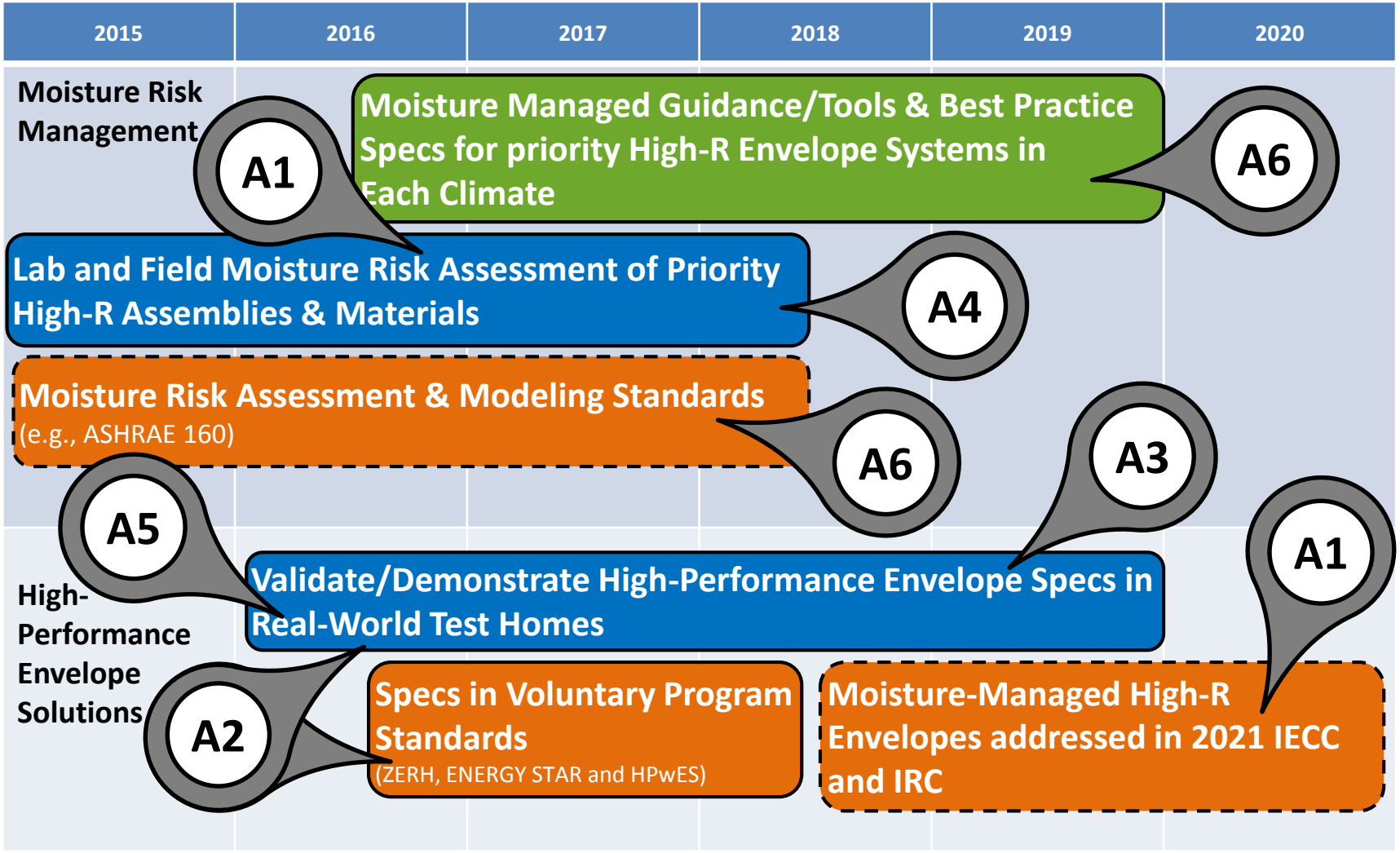
2015 - 2020

Research-to-Market Plan and *Technology-to-Market Roadmaps*

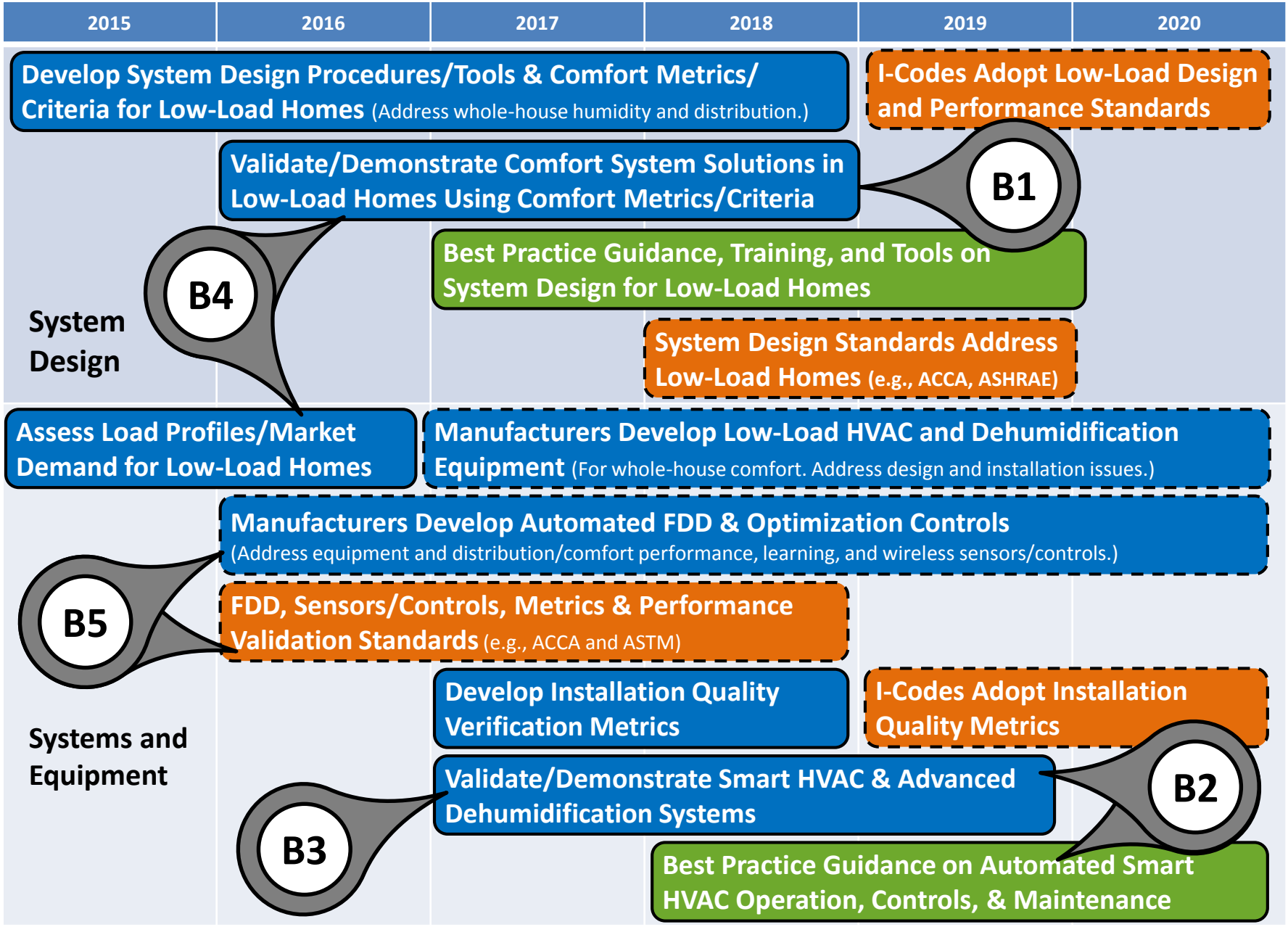
- Published in late 2015
- Guides Building America's research activities with specific & strategic objectives
- Fills critical research and information gaps that prevent wide adoption of High Performance Homes
- Validates cost-effective solutions that are practical and profitable for builders and home improvement contractors



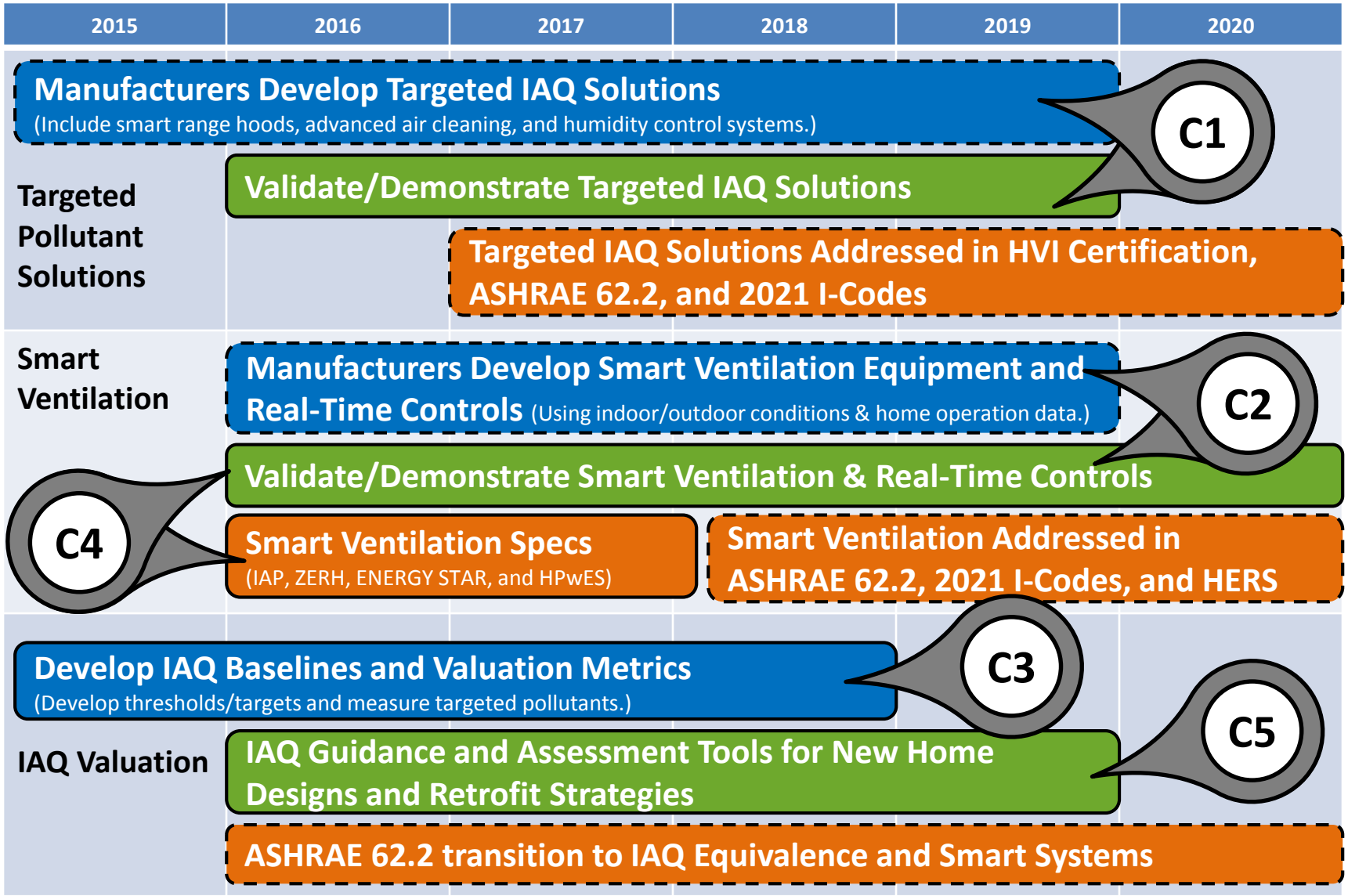
A. High-Performance Moisture-Managed Envelopes



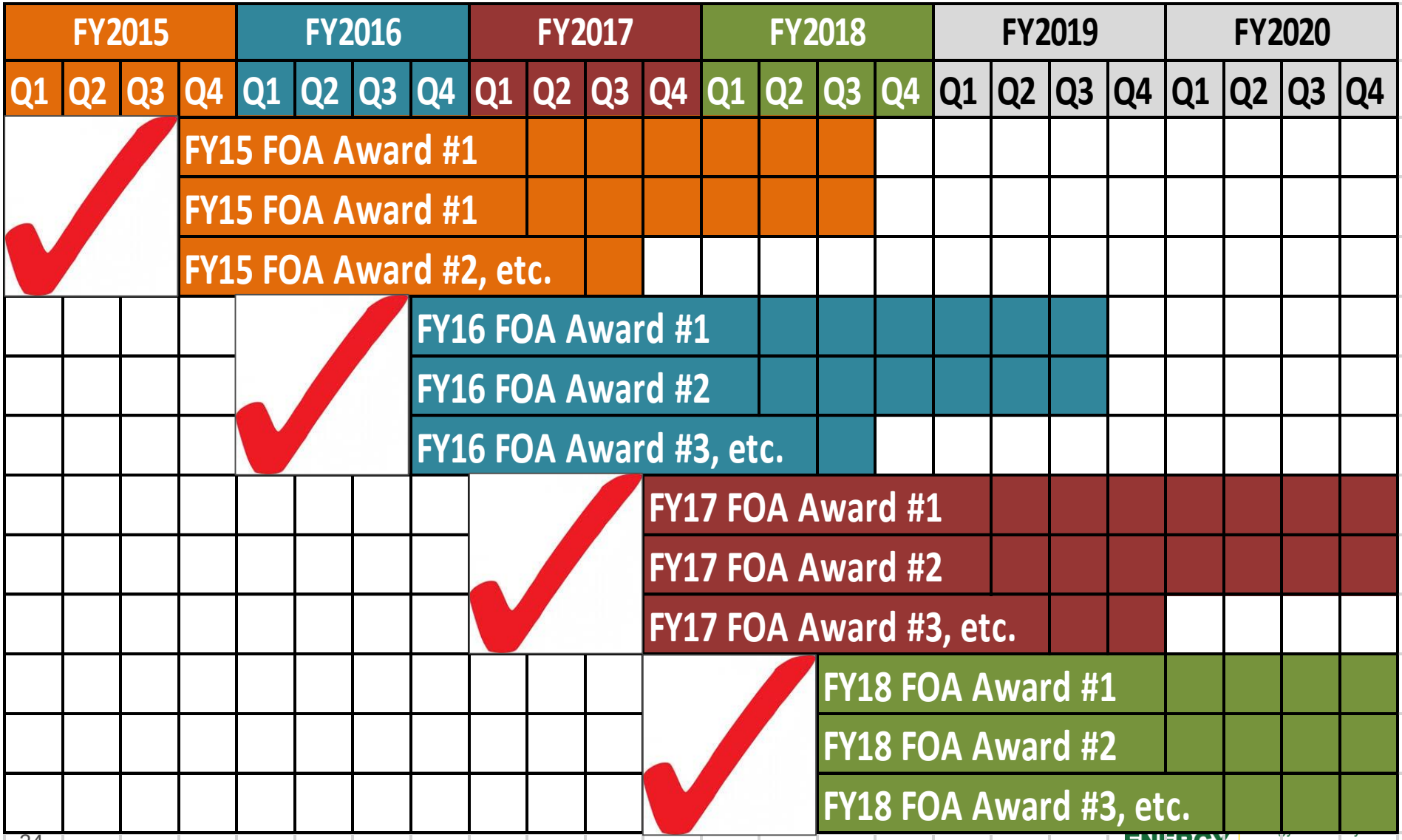
B. Optimal Comfort Systems (Revised)



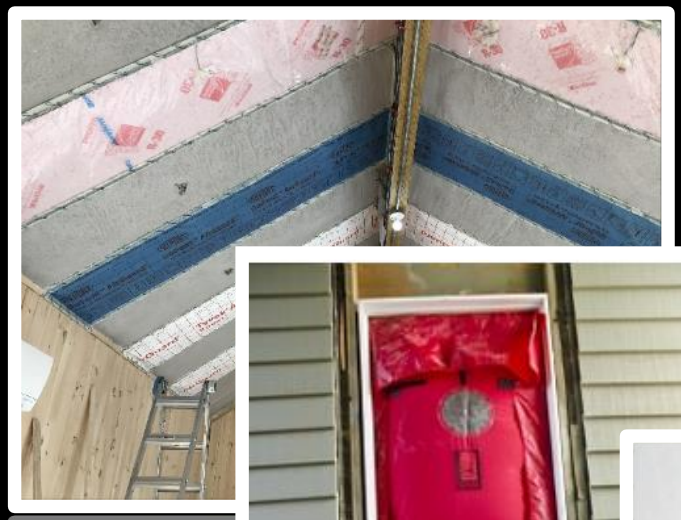
C. Optimal Ventilation & IAQ Solutions

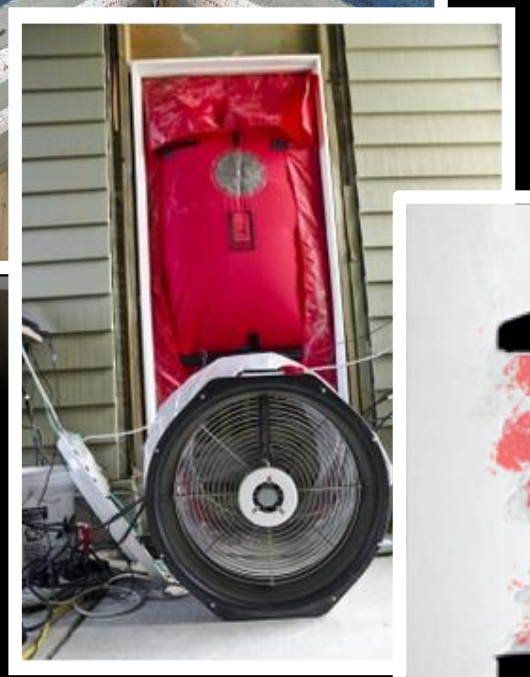


Building America Multi-Year FOA Schedule (subject to appropriations)



Building America Project Photo Album





2018

2017

2016

2015

Summary: Building America TODAY

Building America 2015-2020:

Building Science & Systems Engineering for High Performance Homes

BA is Watching …

Smart Home Technologies:
- Connected Thermostats & IAQ Sensors
- Performance Measurement Technologies
- Building Integrated Renewables

Current BA Strategy

Moisture Managed High Performance Envelopes

Optimal **Ventilation & IAQ** Solutions

Optimal **Comfort** (H/AC) **Systems for Low-Load Homes**

Building Science and Systems Engineering
Knowledge, Tools, & Analysis

Where to Next?

Building America & RBI **Next Up**:

Building Science and Advanced Construction/Renovation Research

Updated BA Strategy

Smart Home Technology Integration:
Building Energy Savings Validation, Integration Solutions, & Performance Optimization

Durable High Performance Envelopes & Advanced Construction/ Renovation Technologies

Advanced Mechanical Systems Integration & Installation:
HVAC, IAQ, & DHW

Building Science and Systems Engineering
Knowledge, Tools, & Analysis

Resources from **Building America**

World Class Guidance & Research for High-Performance Homes…

… at Your Finger Tips

2,700,000 Served!

>350,000 users

Building AMERICA
U.S. Department of Energy

ZERO
ENERGY READY HOME
U.S. DEPARTMENT OF ENERGY

Building Science Advisor v1.0

- Quick easy Expert answers & guidance
- User friendly input
- “What if” learning

Building AMERICA
U.S. Department of Energy

Home Improvement Expert

Home Improvement Expert™

- For homeowners
- 21 contract checklists

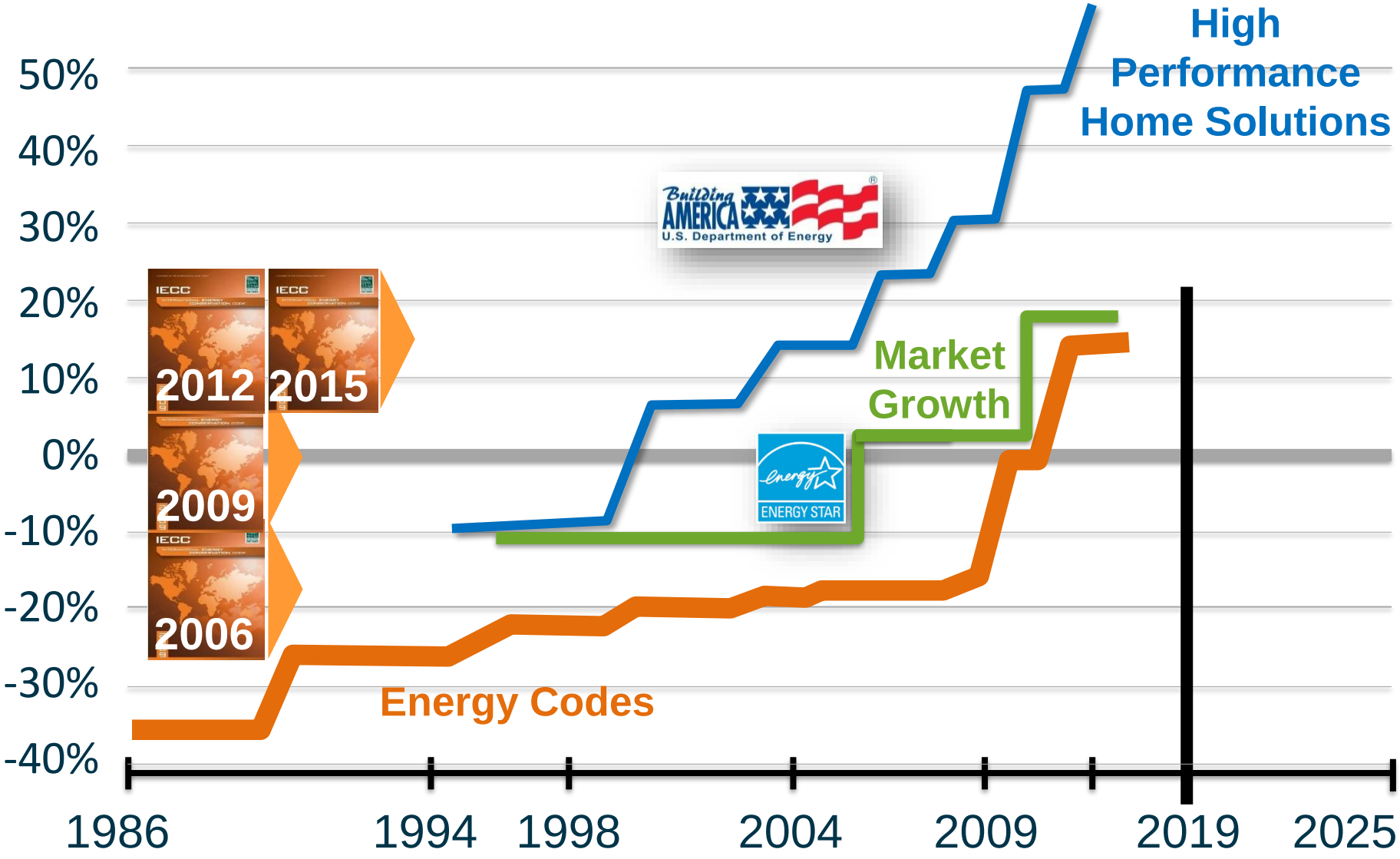
View Checklists

Building AMERICA
U.S. Department of Energy

Measuring Progress

Building AMERICA
U.S. Department of Energy

High Performance Homes have arrived!



Independent Program Evaluation: March 3rd, 2018

- $700 million in estimated energy cost savings (2006-2015) from 4 studied innovations:
  - Air Sealing
  - Duct Sealing
  - Insulation
  - Thermal Bridging
- Lifetime **program benefits estimated at $2.3 B**
- Up to **$30 in energy savings for every $1 spent** by Building America

Another measure of success …

The Building America Program is filling an essential role in the marketplace*—one that would be extremely difficult for the private sector to perform. I believe that investments by the federal government in this program reap huge rewards at the local level in terms of energy savings, comfort, and consumer protection.*

*—**Ron Flax**, Sustainability Examiner for Boulder County Land Use (Colorado)*

*"Pulte has been working with the Building America Program since it began. **Building America has helped our business** research and develop strong new high-performance products that keep us competitive and offer our homebuyers exceptional efficiency and quality."*

*—**Robert Broad**, PulteGroup Southern California/Southern Nevada Division*

*"We used the U.S. Department of Energy's Building America program and its work with the energy efficiency industry to **bring state-of-the-art construction innovations and resources to the public**."*

*—**Carolyn G. Goodman**, Mayor of Las Vegas, Nevada*

*"**Building America provides a much needed resource to our business and the industry**. As a new home builder, we rely on the program to develop and demonstrate innovative technologies before we take the risk of putting them into our construction practices. Without Building America, the construction industry would have great difficulty adopting new practices."*

*—**Tom Wade**, Palo Duro Homes*

Questions?

Thank You

Email me (I ran out of business cards):
eric.werling@ee.doe.gov