Breakthrough Building Envelope Sealing

A Sea Change In Technology & Methodologies

Why Does It Matter

Energy Usage

Indoor Comfort

Indoor Air Quality

Sound Transfer

Odor Transfer

Mold/Mildew

"Leaks in the building envelope are usually **the single biggest source affecting the performance of buildings**."

- Environmental Protection Agency

"Air sealing the building envelope is **one of the most critical features** of an energy efficient home."

- Department of Energy

"One third of the energy you pay for leaks through holes in your house. Air leaks can also **cause moisture and indoor air quality problems**."

- Green Building Advisor

Benefits of Reduced Air Leakage

Experience dramatic savings on home heating and cooling
See immediate savings of up to one-third on heating and cooling

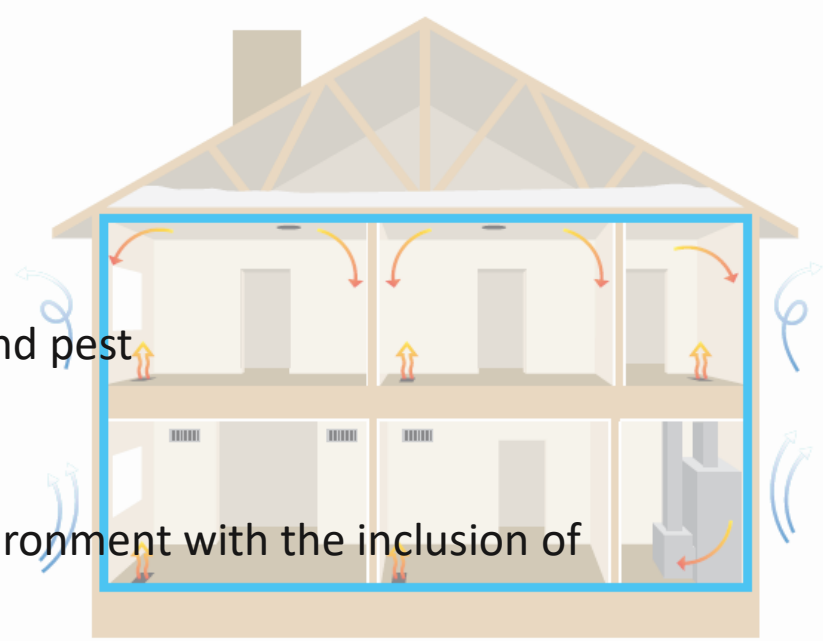
Enjoy a more comfortable home
More consistent room-to-room comfort with fewer drafts. Feel warmer in the winter, cooler in the summer

Help prevent moisture from entering the wall system
Reduce conditions that can lead to mold growth

Diminish outside noise
Up to 40% reduction in outside noise from traffic and neighbors

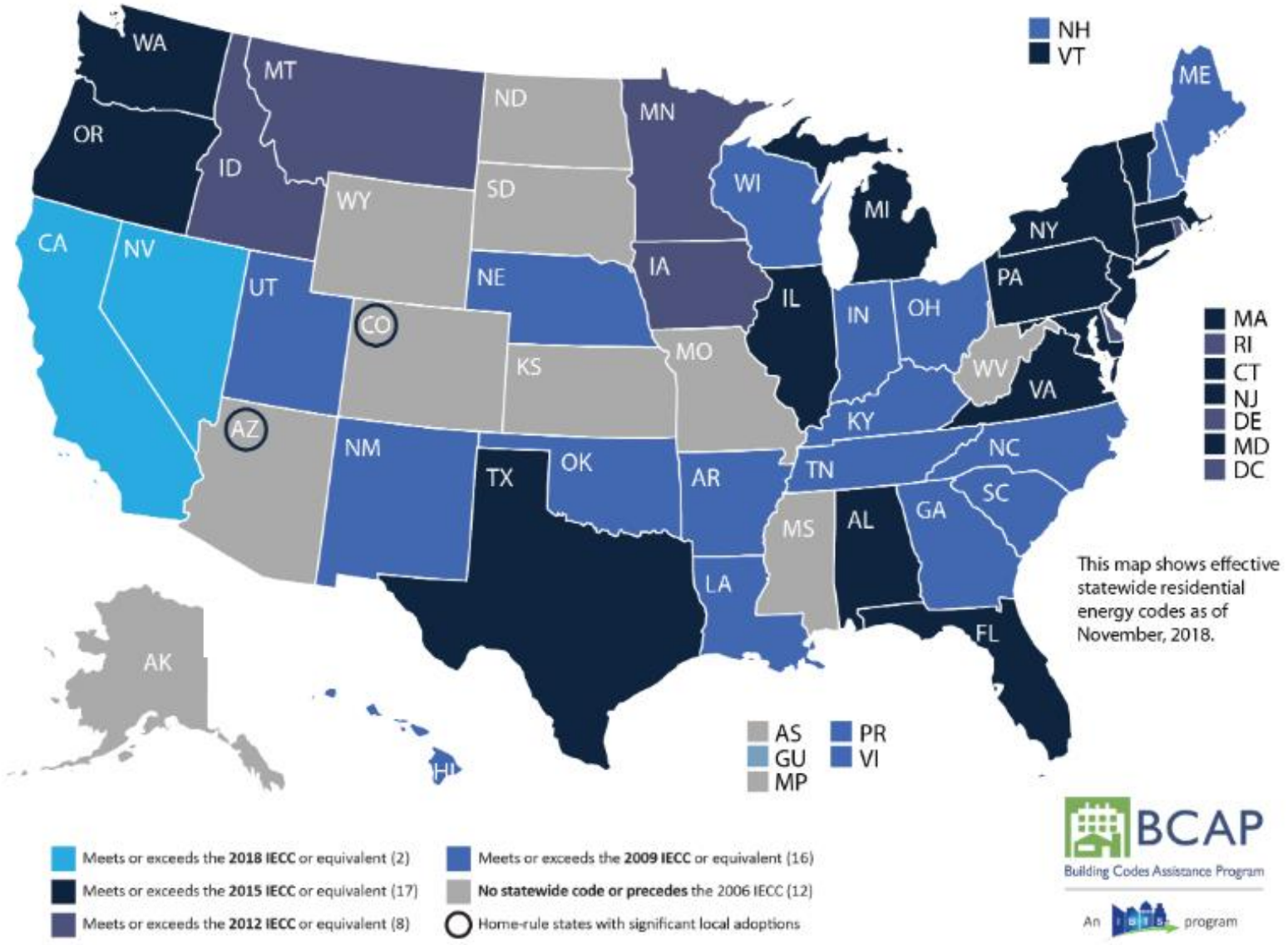
Defend against insects and pests
Seal gaps and holes to create the first line of defense against critters and pest

Improve indoor air quality
Help seal out pollutants and allergens to create a healthier indoor environment with the inclusion of mechanical ventilation



Residential Energy Code Adoption

More stringent codes are forcing builders to change the way they build their homes



Why Does It Matter – Consumers Care

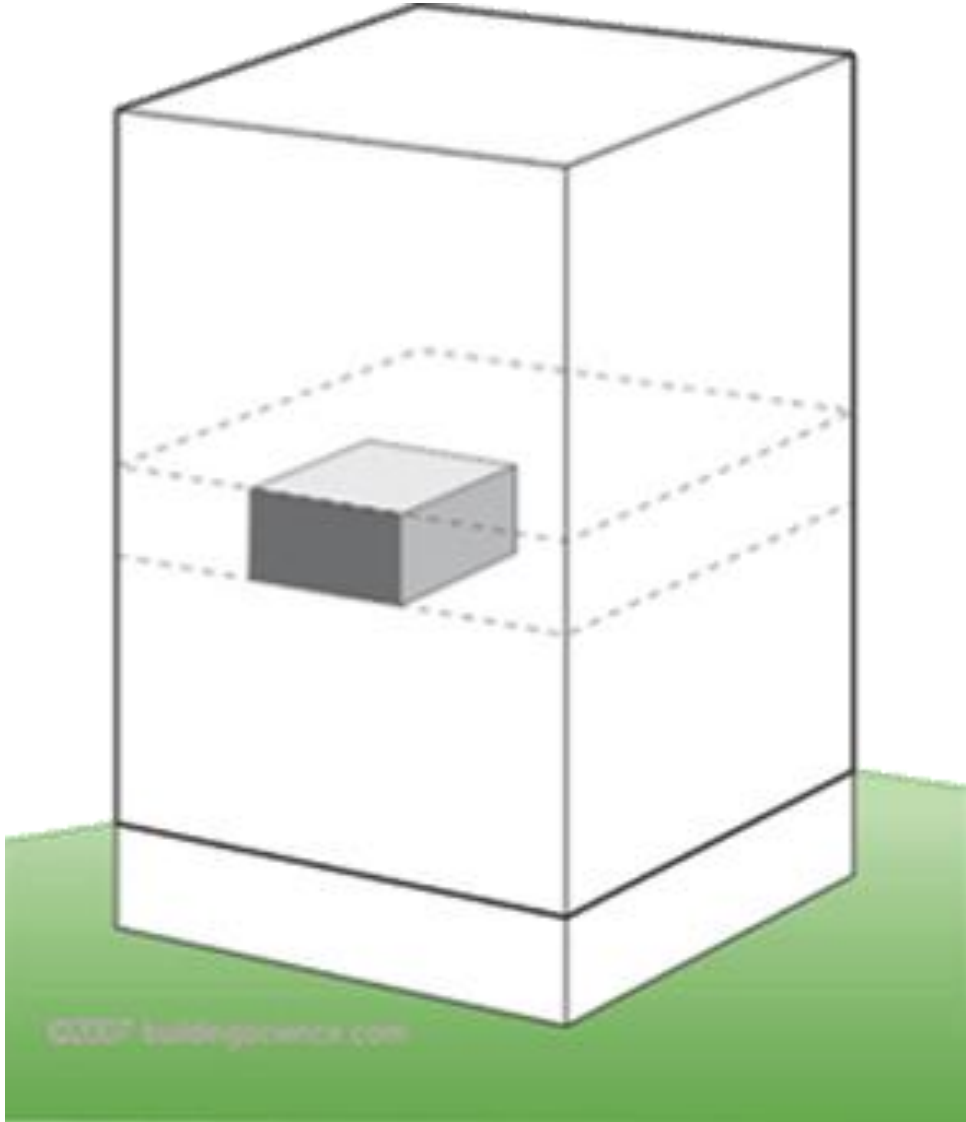
LIVING
BUILDING
CHALLENGE℠

5.2b EGC Certification Requirements: Certify the project in a program that requires advanced levels of building envelope performance such as PHIUS, Living Building Challenge and/or DOE Zero Energy Ready Home.

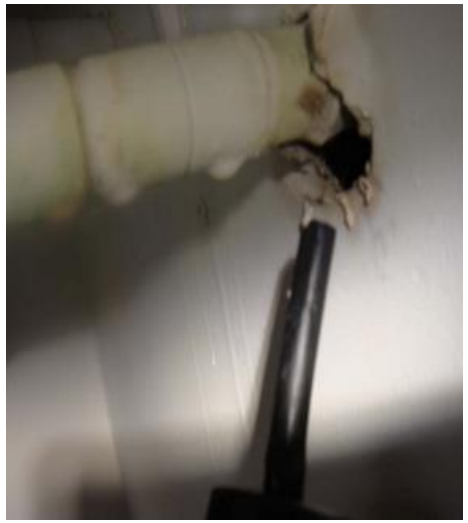
Why Does It Matter - Compartmentalization

"Sealing envelope leakage in multi unit buildings is particularly difficult and costly to implement."

- U.S. Department of Energy



More trades = Less control



Problem: Sealing the Envelope isn't Easy

Many Trades Involved

- Framer, HVAC, plumber, insulator, electrician, etc…
- Superintendent is often left to manage the outcome

Many Materials Involved

- Caulks, foams, tapes, gaskets, membranes, etc…
- What is the right combination?

Have to Know Where to Seal

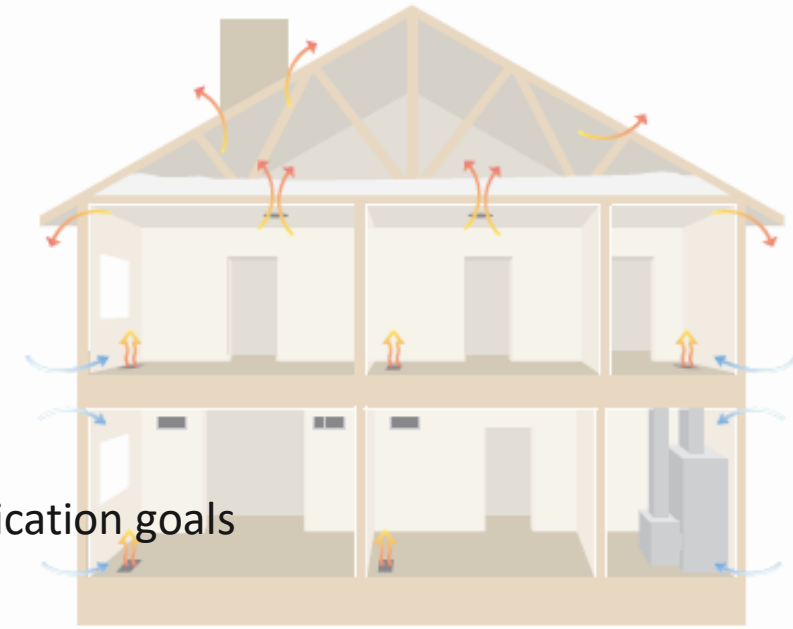
- Houses are getting more complex which means so is the building envelope
- Trades need to be well trained on where to seal and what products go where

Unpredictable Results

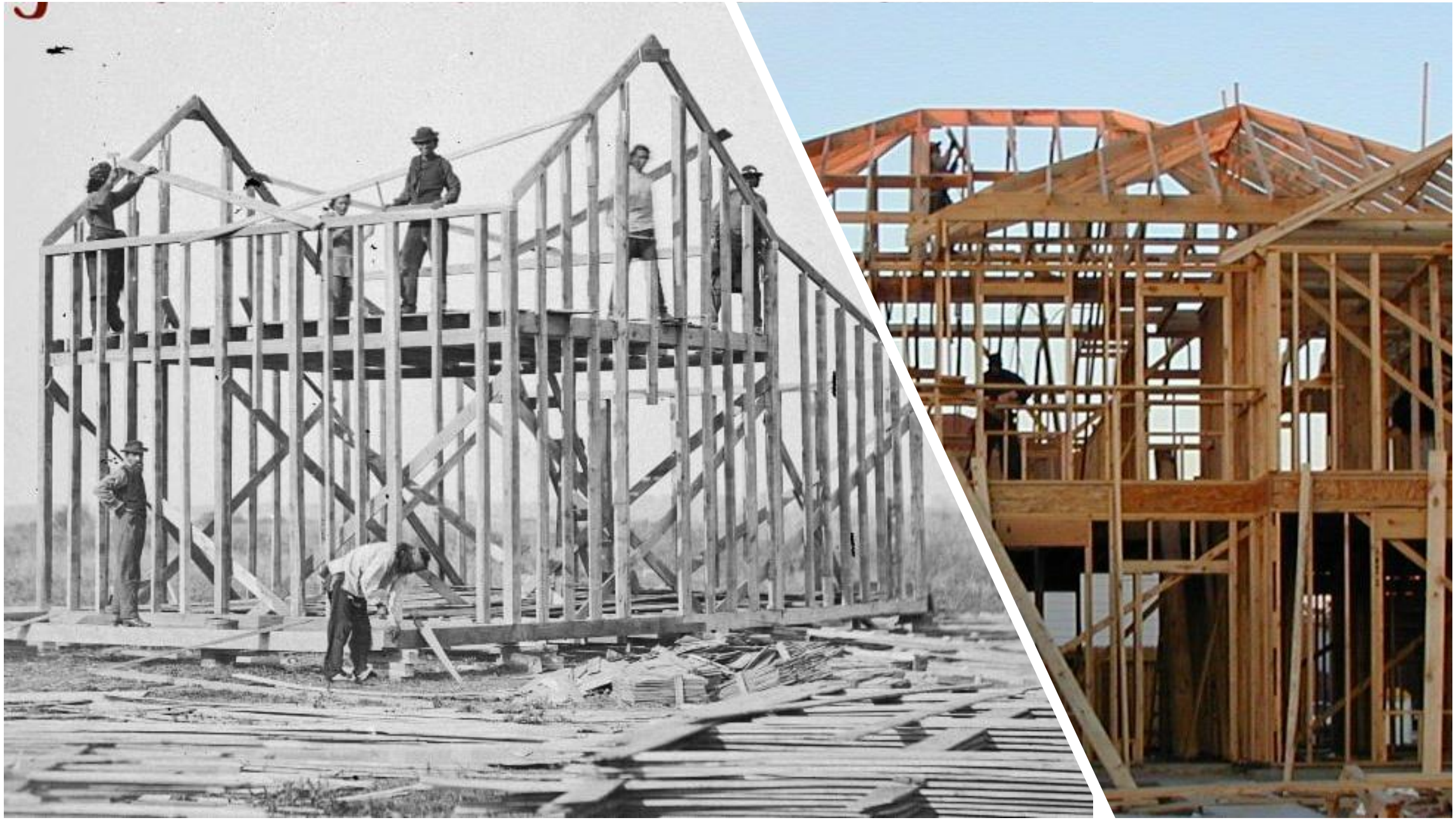
- Leakage results aren't typically available until later in the construction process
- Failing a requirement causes additional cost and last minute scrambling to remediate the problem

Getting it Right Matters

- Getting the envelope sealed properly is key to meeting code and/or other certification goals
- Failing to meet code or desired leakage can result in $1,000's to fix



Problem: Industry is Slow to Evolve and Adopt



Mission: Find a Solution

WCEC
WESTERN COOLING EFFICIENCY CENTER

UCDAVIS
UNIVERSITY OF CALIFORNIA

Dr. Mark Modera

U.S. Department of Energy
Former lead scientist, LBNL

University of California, Davis
Dept. of Mechanical Aerospace Eng.
Dept. of Civil and Environmental Eng.

The Starting Point:

Aerosol-based duct sealing

1997:
Dr. Mark Modera: Led team that developed revolutionary approach to finding, sealing & measuring duct leakage

The Starting Point:

BERKELEY LAB

U.S. DEPARTMENT OF ENERGY

1997:
Dr. Mark Modera: Led team that developed revolutionary approach to finding, sealing & measuring duct leakage

Thousands of homes…

… and buildings:

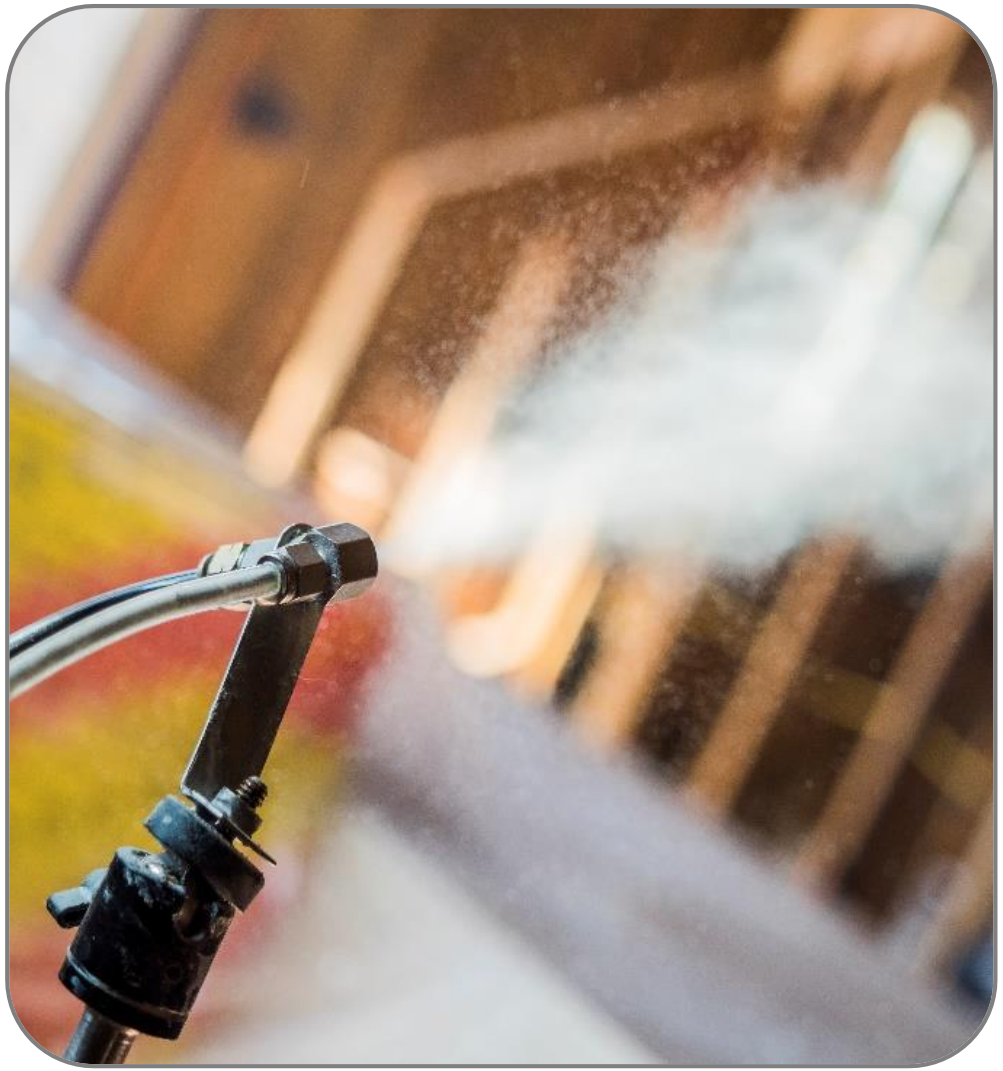
MetLife • Chicago Hilton • NYU Medical Center • Princeton University • Hyundai America HQ • Eastman Corporation • Florida Capitol Building • Nemours Children's Hospital • LA Unified School District • San Diego Naval Facility • Harbor Towers Condos • John Muir Medical Center • Harvard University • Museum House • JW Marriott • Arzanah Medical Complex • Houwman Federal Building • Wynn Hotel Las Vegas • Cornell Passive House

A Sea Change in Envelope Sealing: Aerosol Sealing

A convenient, cost effective approach that seals homes in less than 3 hours and provides verification that the air-tightness requirement has been achieved.

Changing the Way Homes are Built with:

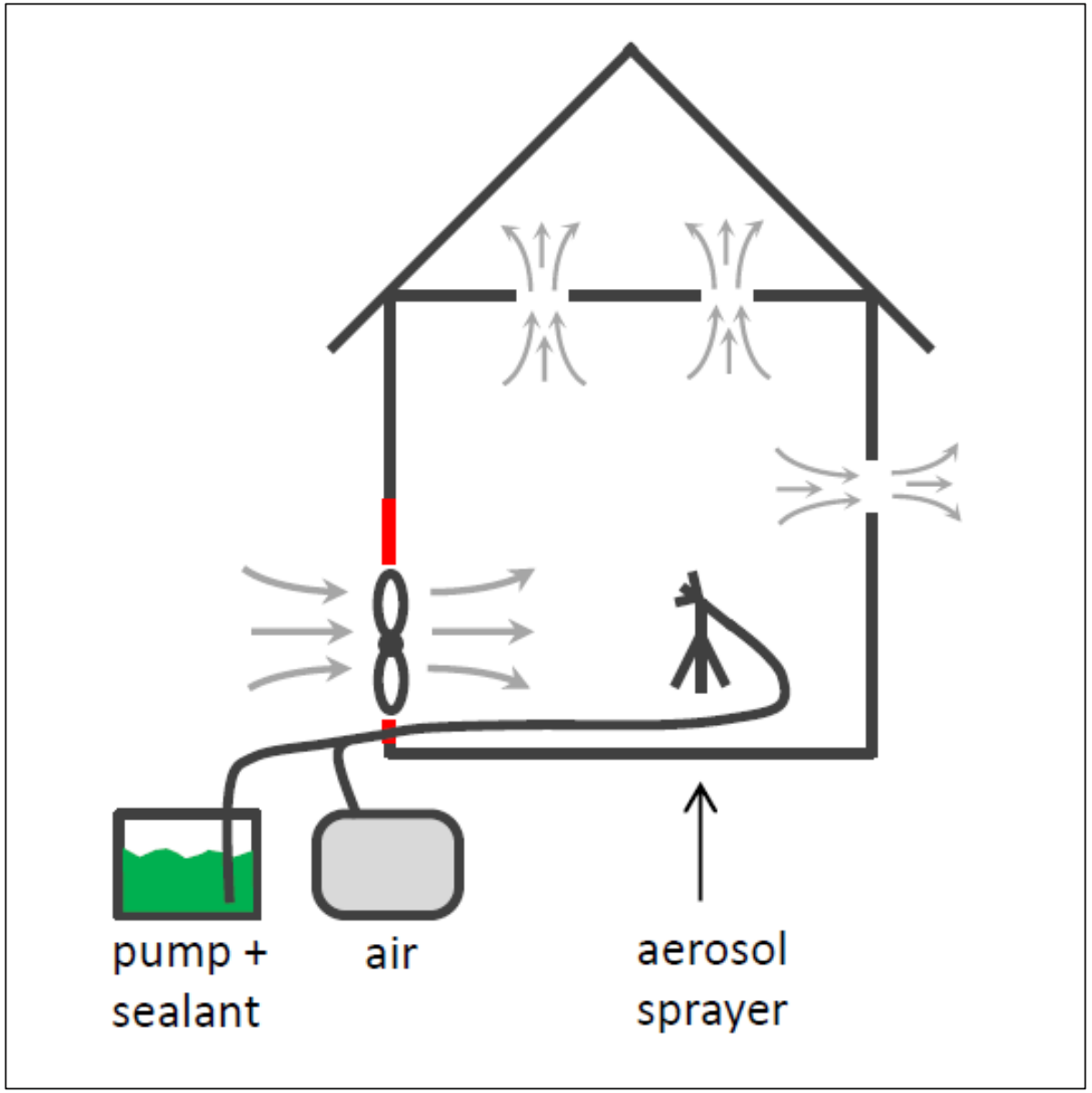
- Consistently tighter building envelopes
- A single step process
- Guaranteed and documented results
- Save time, labor, and material



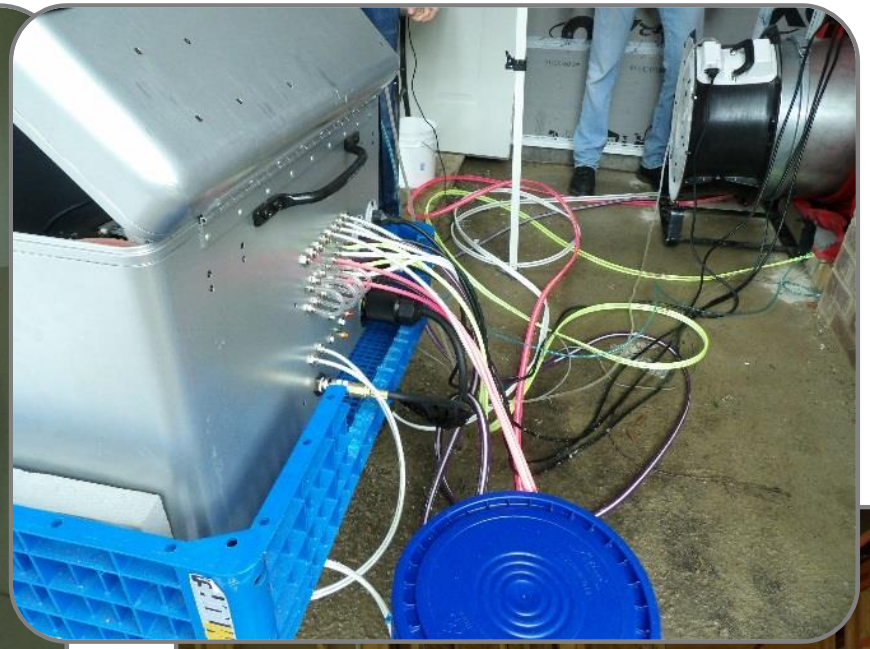
The Process:

STEP 1:

Prepare house for sealing. Cover all large openings (drains, bathroom vents, etc.) and horizonal surfaces, set up sealing equipment, and pressurize home.



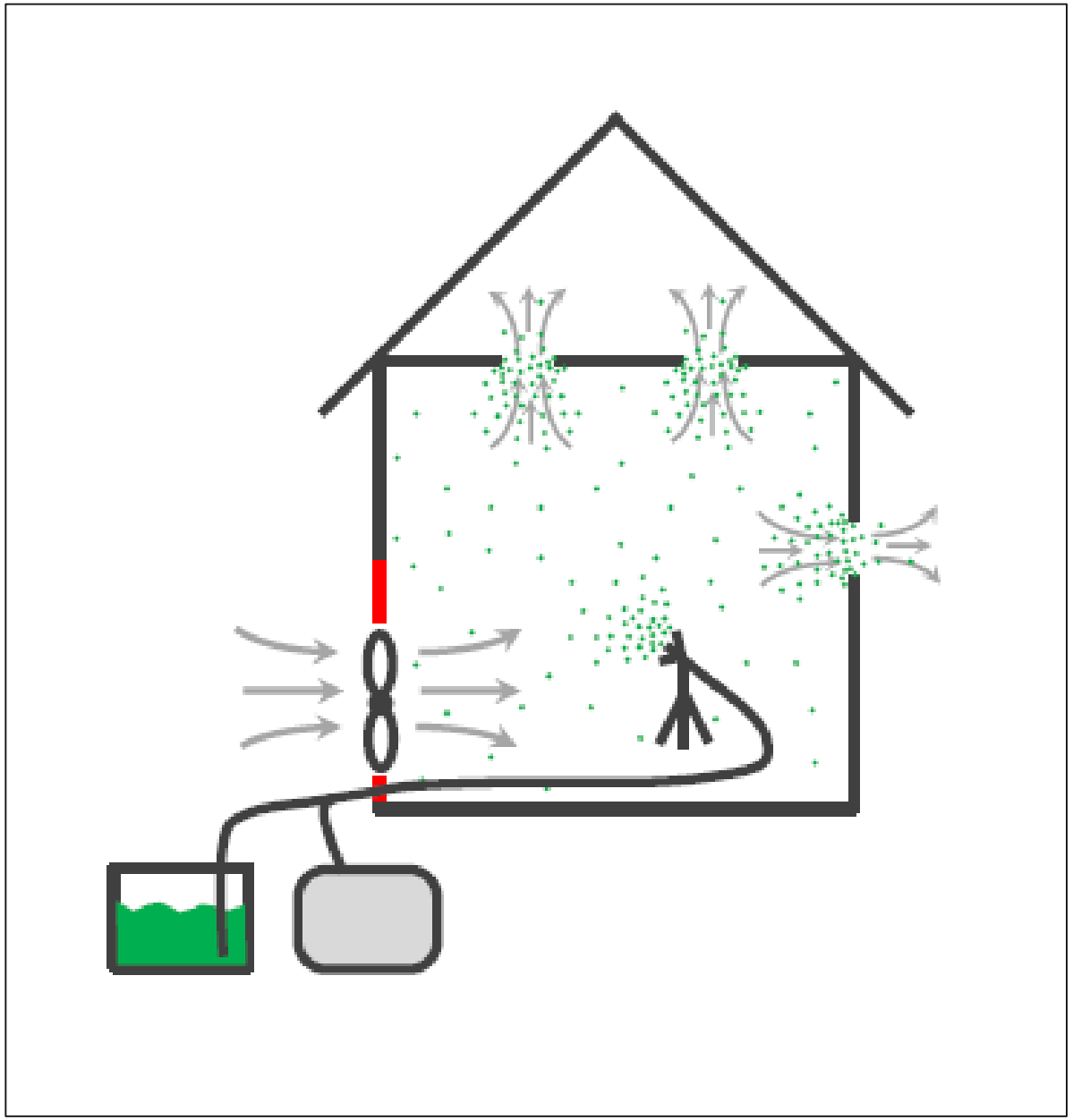
The Process: Step 1



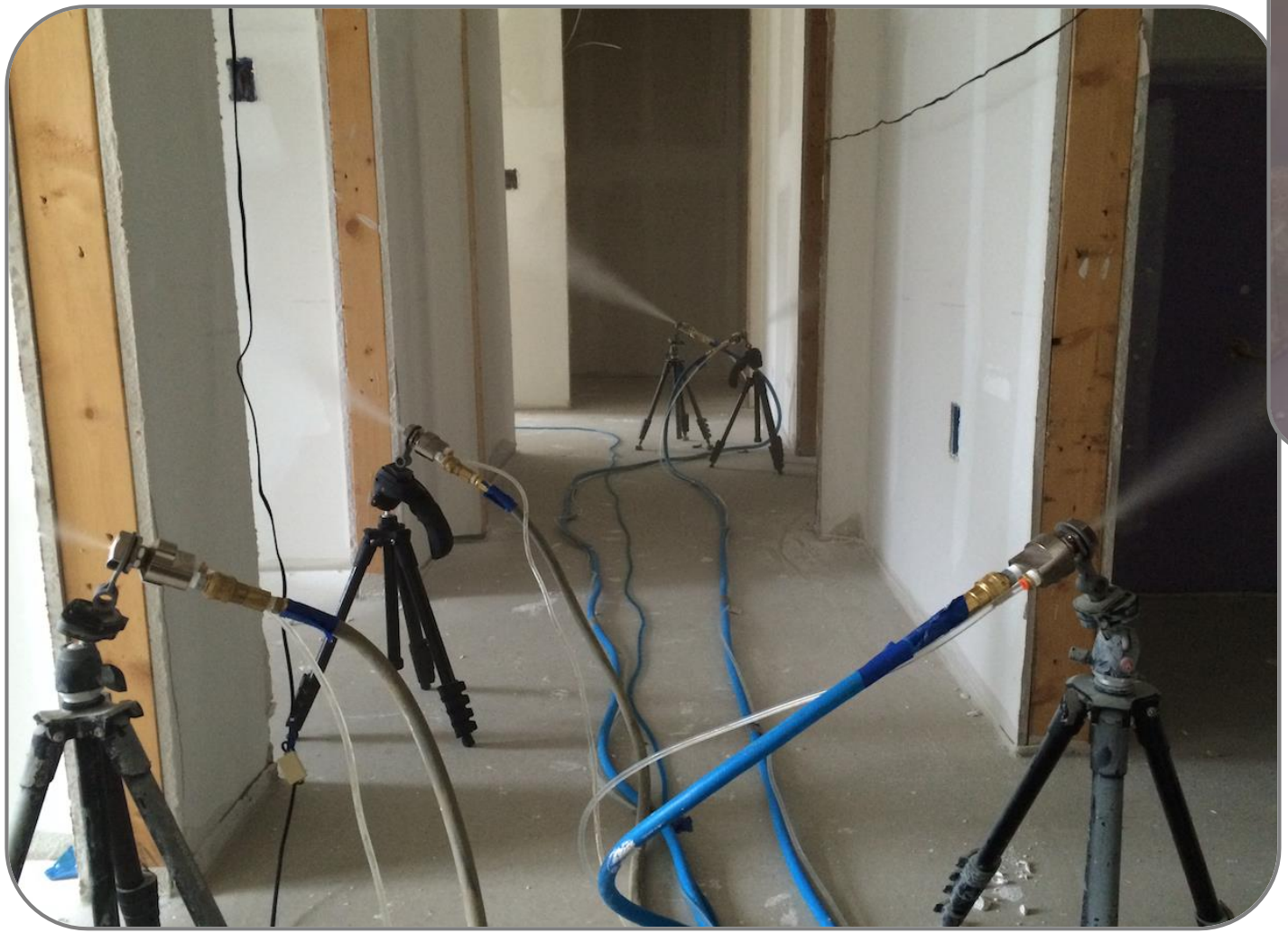
The Process:

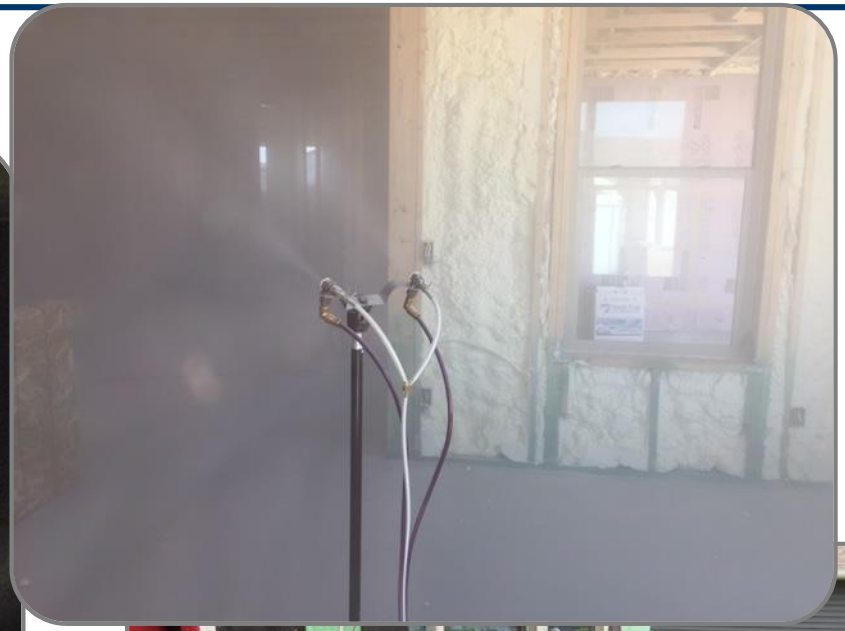
STEP 2:

Start the sealing process and begin to aerosolize the sealant. Air currents will transport & deposit sealant particles along the leaks throughout the space.



The Process: Step 2

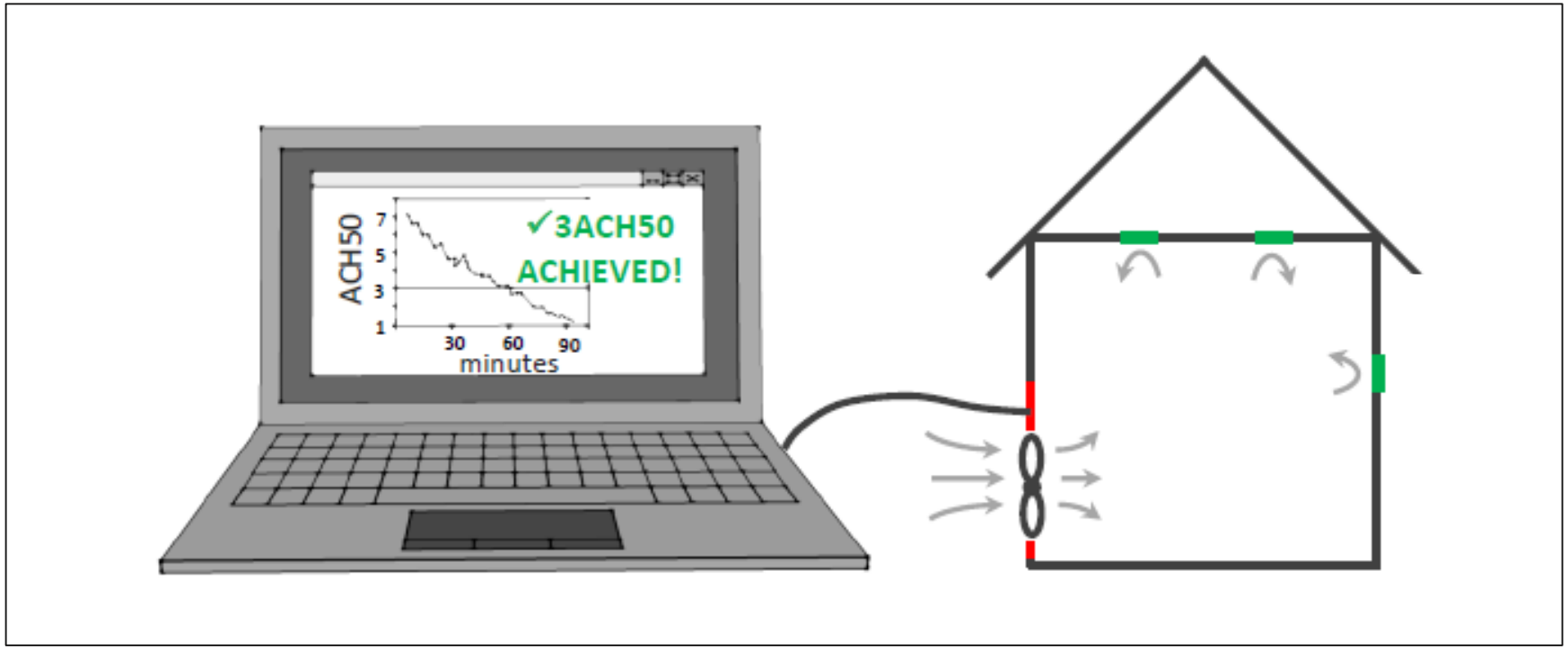




The Process:

STEP 3:

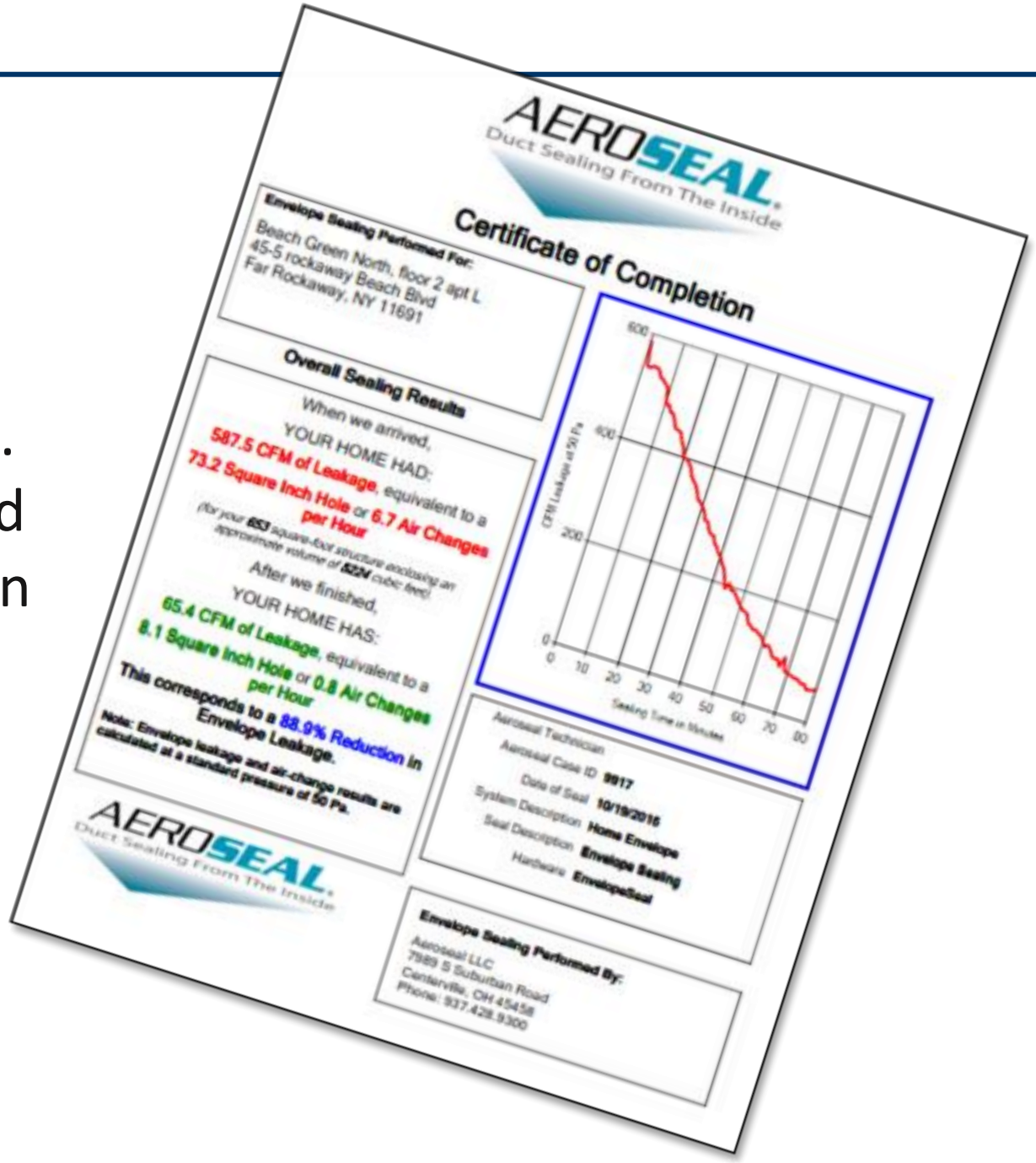
The software regulates the entire process; controlling all parameters, monitoring the sealing, recording all data, and verifying air-tightness target is achieved.



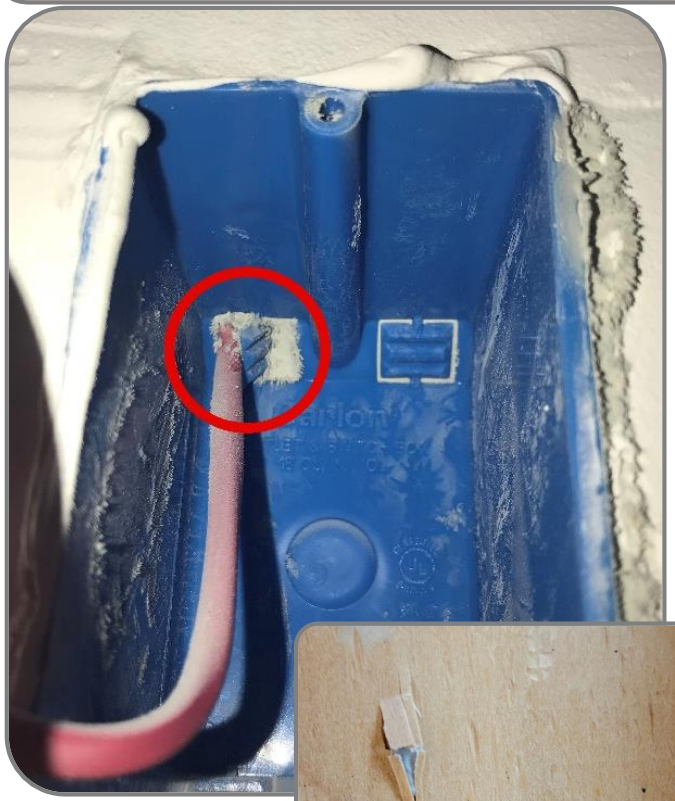
The Process: Step 3

Verified Results!

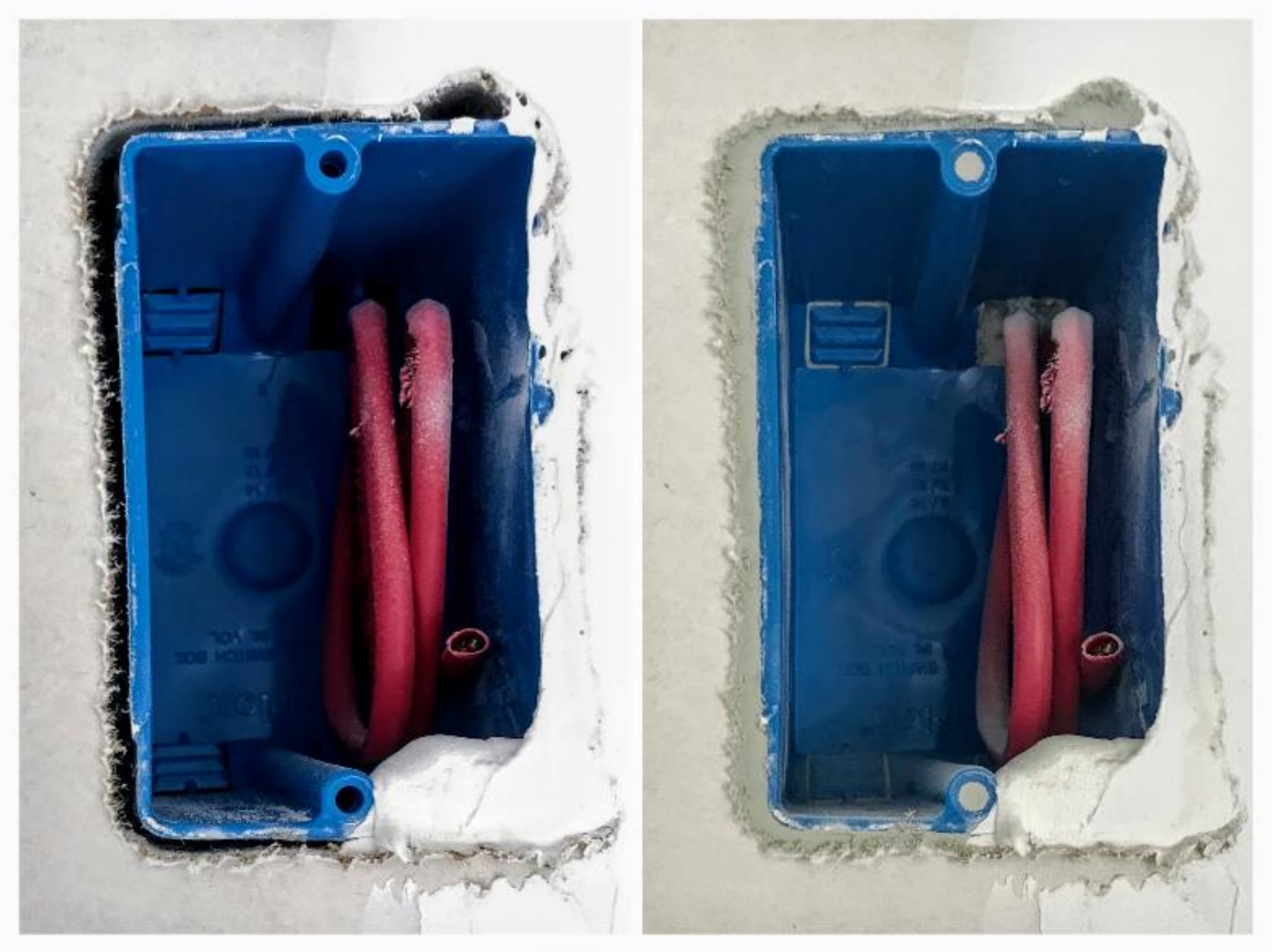
Every seal provides a certificate of completion outlining the sealing work. Pre and post-leakage are captured, and the seal duration and leakage reduction are all displayed on the graph



The Seals



Pictures: Before and After



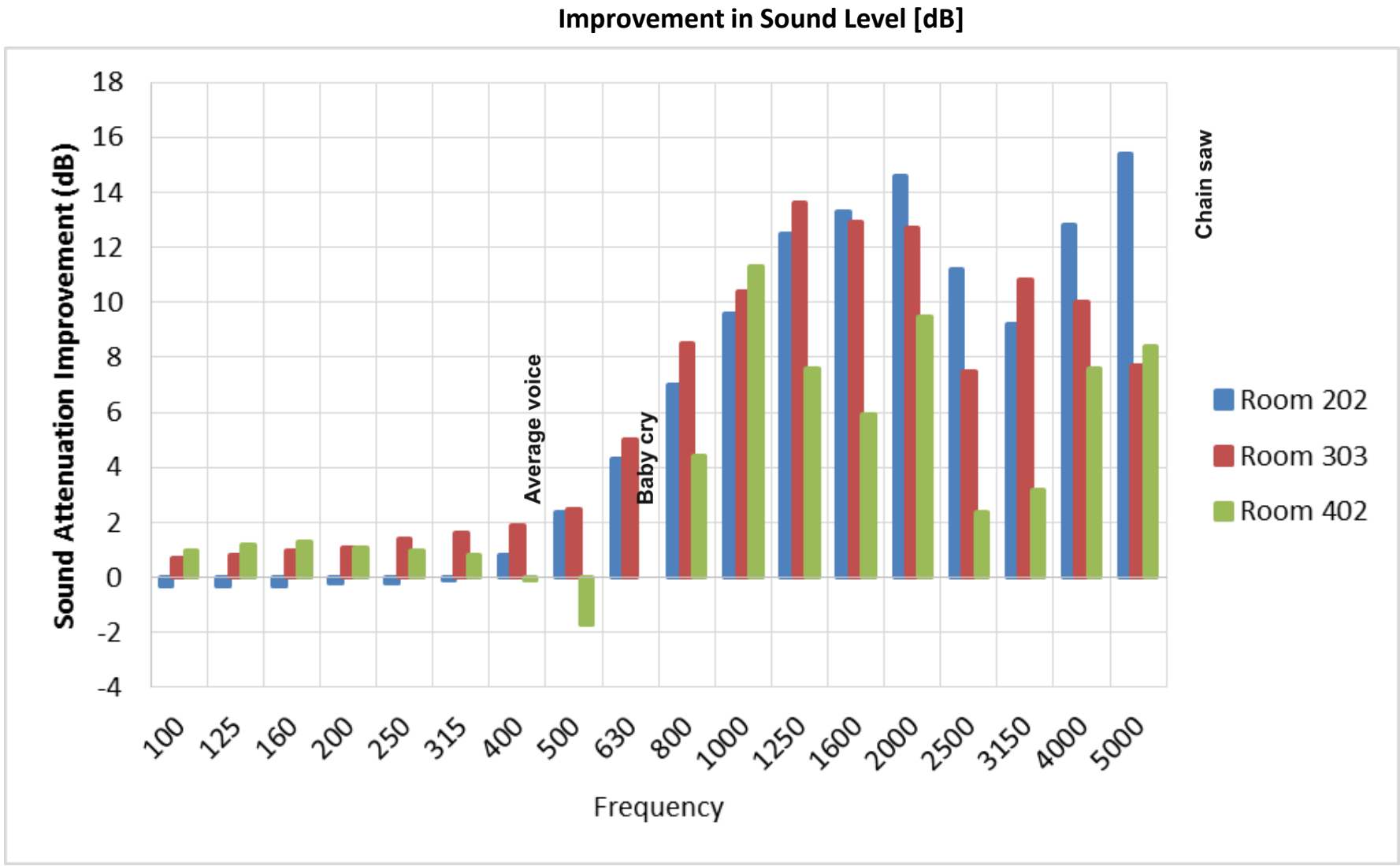
The Sealant

AeroBarrier X1 is based on permeable waterborne acrylic

- GreenGuard Gold Certified
- NGBS Certified Product
- Ultra Low VOC / No Off-Gassing
- No “Red List” Ingredients
- Meets
  - ASTM 2178 air sealing material
  - ASTM E84 flame spread
  - ASTM E84 smoke development

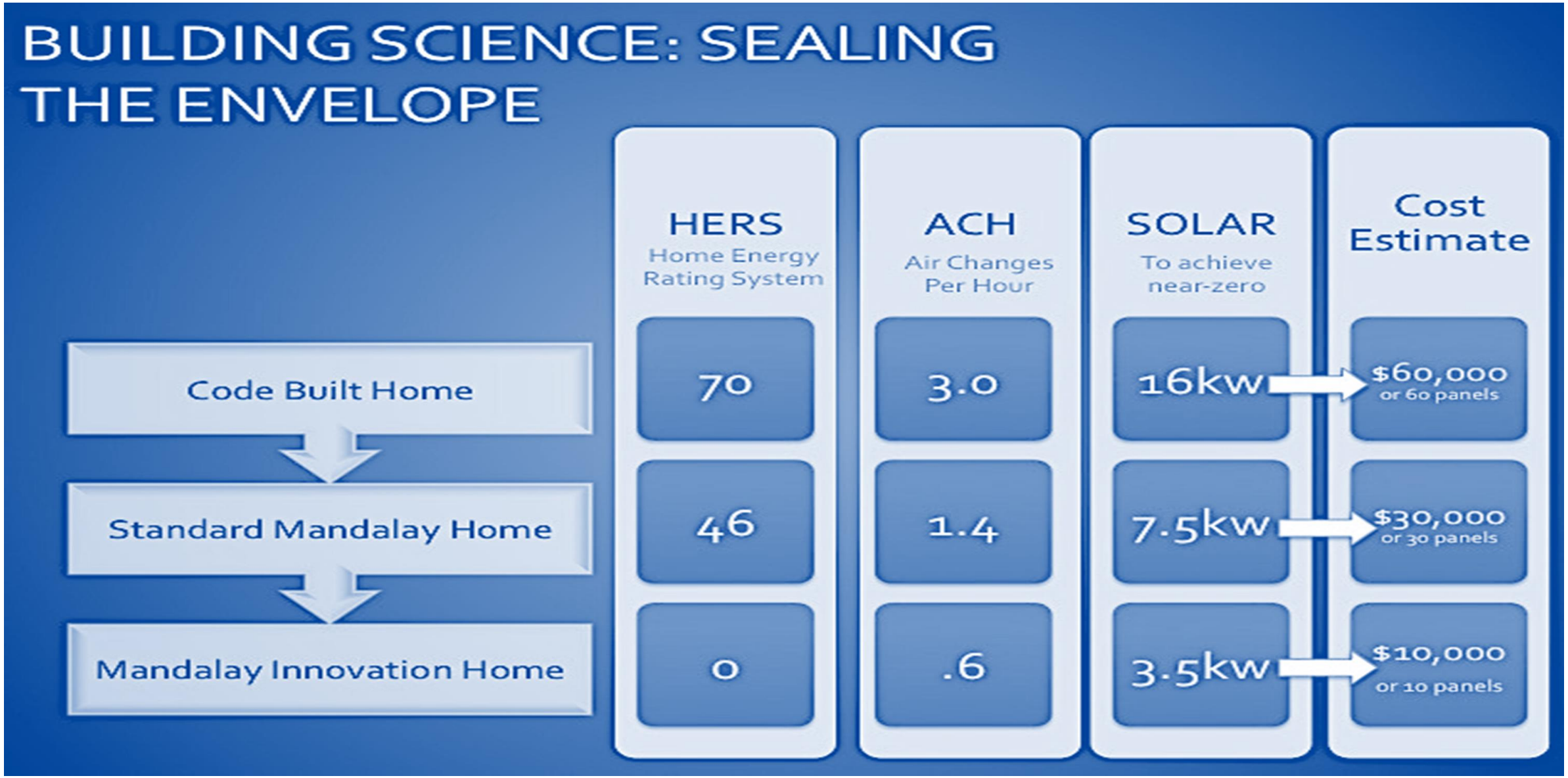
Home Innovation
NGBS GREEN CERTIFIED™

The Benefits: Reduction in Sound Transfer



Aerosol sealing dramatically reduces sound transmission above 800 Hz

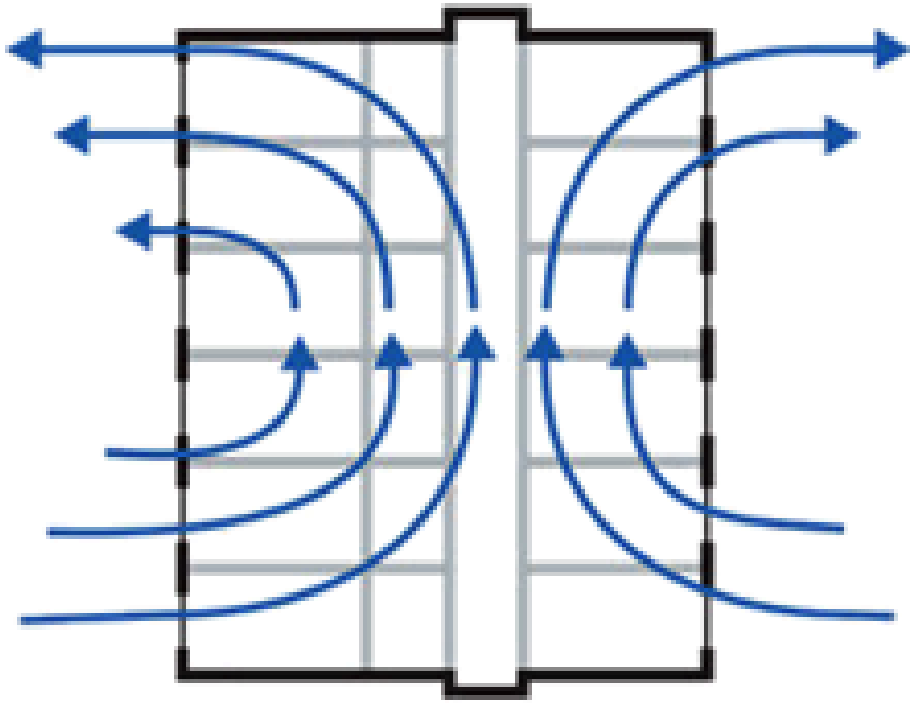
The Benefits: Reduction in Solar for Net Zero



The Benefits: Improved Indoor Air Quality

Aerosol sealing dramatically improves IAQ

- Smoke
- Odor
- Other pollutants



Case Study: Perch in Harlem

AeroBarrier Allows Architects and Engineers to Easily Attain Desired Tightness for Energy Efficiency, Comfort, and Livability.

Project Overview:

Project: 153rd St Apartments
Builder: Synapse Development Group
Architect: Chris Benedict, R.A.
Location: Upper West Side, Manhattan

Results:
Post-manual sealing, AeroBarrier reduced unit leakage by an additional 47%, providing overall compartmentalization levels well within calculated passive house parameters.

Case Study: Perch in Harlem

"It was blowing people's minds – mostly because monitoring compartmentalization in a multi-family building under construction is typically a very difficult, time consuming task. The level of coordination and commitment you need to get from all contractors on the job is as critical as it is nearly impossible to achieve. With aerosol envelope sealing, it's simply not a problem."

- Chris Benedict, R.A.
Architect, CBRA

"I don't know of any other way to get the level of tightness we were looking for. No amount of caulking could get this type of result. Most importantly, with aerosol envelope sealing, you know you're going to get the results you want in the end. It's cost-effective and highly efficient at reducing energy costs and improving livability for our tenants. There's nothing that can compete with that."

- Justin Palmer, Founder
Synapse Development Group

Case Study: Mandalay Homes

Project Overview:

MANDALAY HOMES

Project: DOE Challenge Home
Builder: Mandalay Homes
Location: Prescott, Arizona

Results:
Pre-leakage: 3.1 ACH_{50}
Post-Leakage: 0.4 ACH_{50}
Reduction: 86.4%
Sealing Time: 2.5 hours

Mandalay Homes became the first production builder to incorporate AeroBarrier into all of their homes

"AeroBarrier may be the most important innovation to hit the building community in years…The ability to consistently seal all the small leaks that would otherwise take countless man hours to seek and hand seal, assuming you even find them all, in just 1 automated application is simply amazing. The cost effectiveness is beyond immeasurable when you consider the total sealing solution AeroBarrier provides and all the labor saved by automating the application process. We couldn't be happier with AeroBarrier and the fine folks behind the product."

7X WINNER HOUSING INNOVATION AWARD
ZERO ENERGY READY HOME
U.S. DEPARTMENT OF ENERGY

- Geoff Ferrell
Chief Technology Officer
Mandalay Homes

Case Study: Industrial Buildings

Aerosol sealings versatility has been on display sealing “safe haven” rooms in a coal power plant

If there were ever to be an airborne leak at the power plant employees can close themselves in one of these rooms and fresh air will be pumped into the space. Because of the effectiveness of AeroBarrier and the results we can achieve, the “safe havens” will keep the fresh air in the room and the chemical leak out. Allowing the employees to stay in the room up to 2 hours.

Results:

Pre-Leakage: 10.4 ACH_{50} (1,323.2 CFM)
Post-Leakage: 0.5 ACH_{50} (60.4 CFM)
Sealing Time: 2 hours 20 min

Department of Energy – Building America Study

Goal of the Study:

Determine the best stage(s) of construction to apply aerosol sealing and any current sealing methods that can be eliminated when aerosol sealing is used.

"The [AeroBarrier] process has the potential to be more effective and convenient than conventional sealing methods because it requires less time/effort, and can seal a larger portion of a leakage area more quickly"

cee
Center for Energy and Environment
Building AMERICA
U.S. Department of Energy

73%
Tighter than baseline homes

79%
Average leakage reduction

56%
Greater building tightness using Aerosols versus open-cell spray foam

Most Innovative Building Product of the Year

AEROBARRIER™

Breakthrough Envelope Sealing Technology