

ENERGY STAR FOR ANNUAL SPONSOR MEETING
APRIL 27, 2011



ENERGY STAR Qualified Homes Version 3: What Sponsors Need to Know

WHAT IS ENERGY STAR FOR HOMES?



A voluntary labeling program that:

Defines Energy Efficient

Whole-House Building Science

At Least 15% > Code

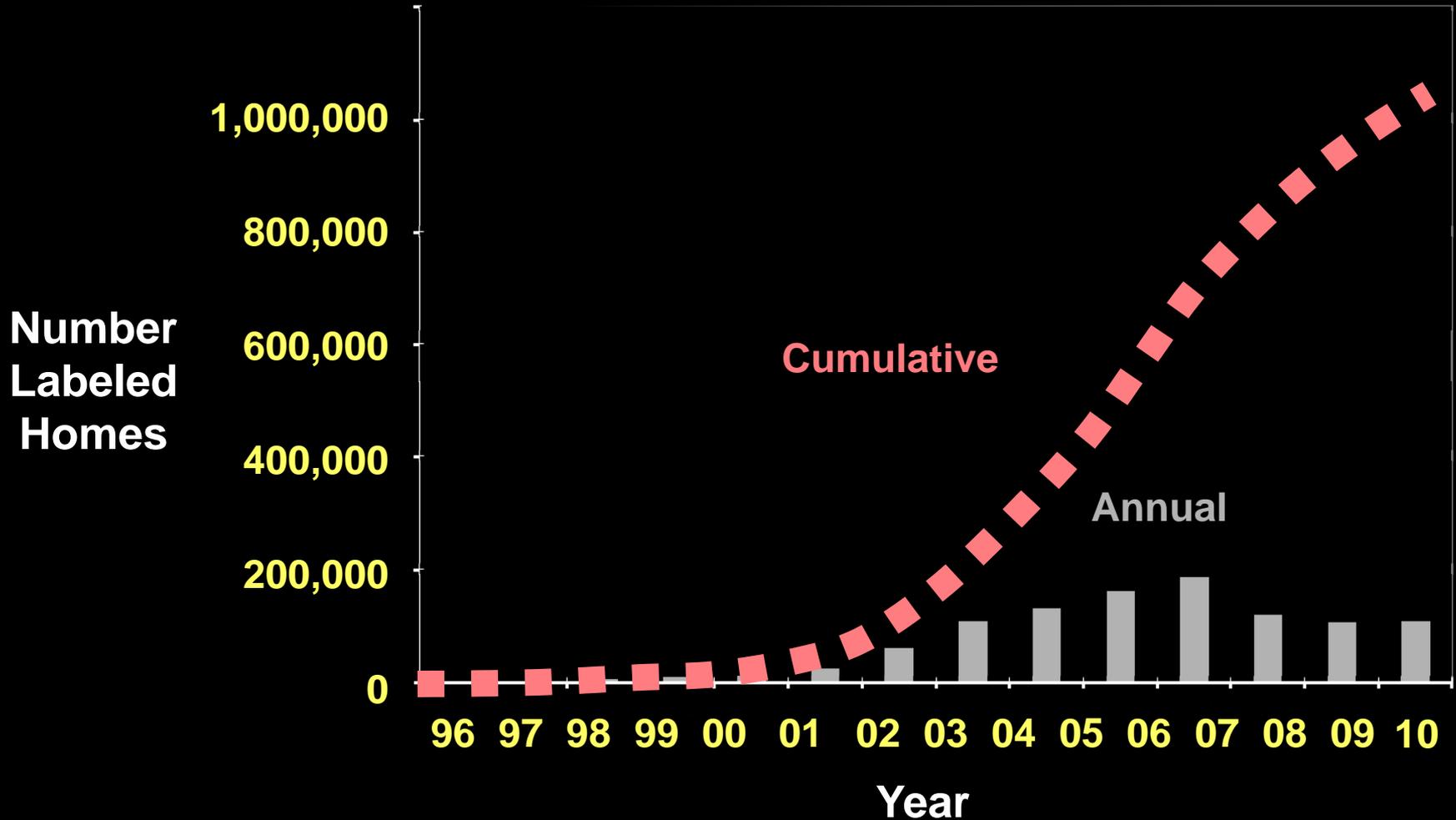
Third-Party Verified

Recognizes Builders

Recognized, Trusted Brand

Web Site, Marketing, Awards

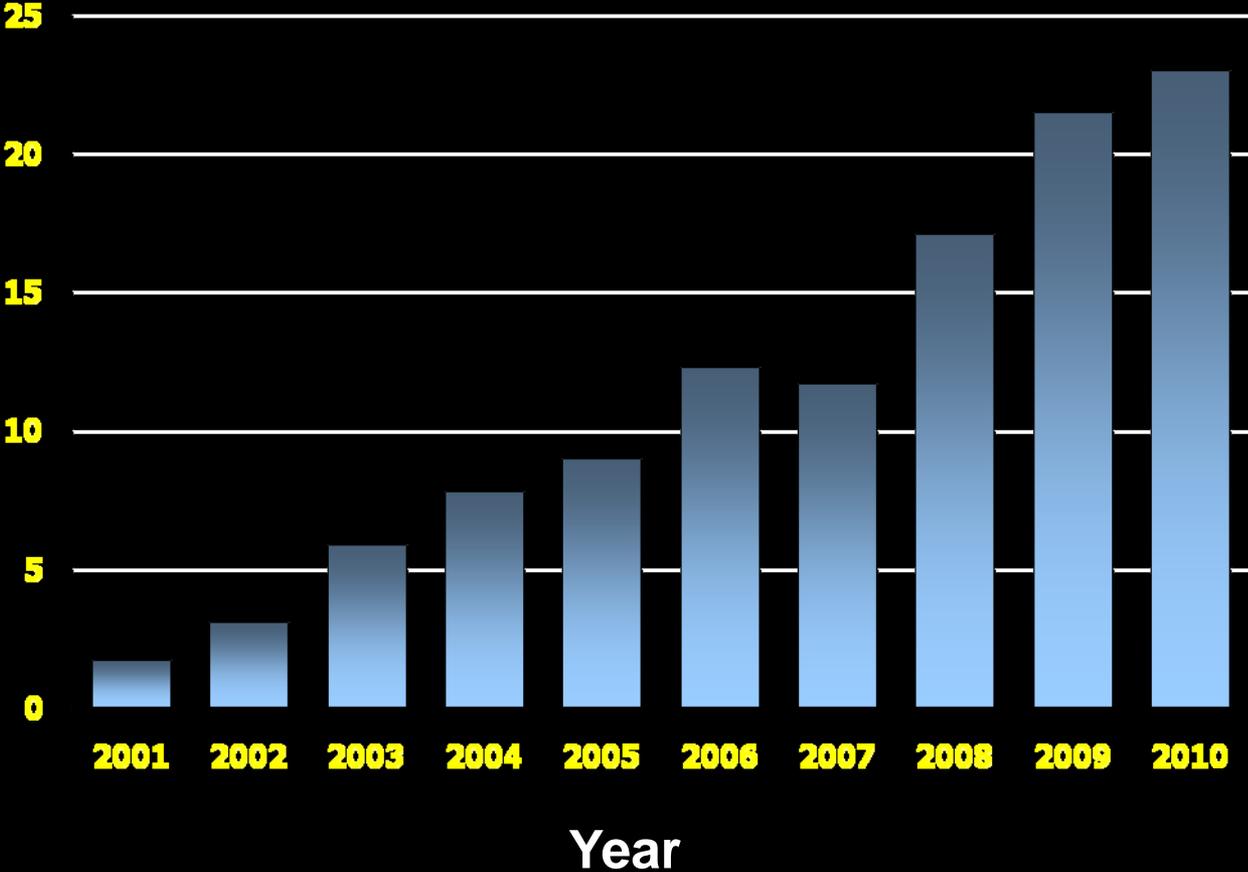
ENERGY STAR FOR HOMES REVIEW GROWTH



ENERGY STAR FOR HOMES REVIEW GROWTH



**% Market
Penetration**



ENERGY STAR FOR HOMES METRICS:
RETURN ON TAX PAYER INVESTMENT



15-Year Investment:

~ \$40 Million

[total program costs]

Return:

> \$1.5 Billion

[consumer energy savings]

> \$1 Billion

[non-participant savings]

~ \$3 Billion

[local govt. tax revenue]

> 450,000 Cars

[GHGC emission savings]

BUILDER PARTICIPATION



VERSION 3 BUSINESS CASE



Homebuyers want:

- “Green”.
- Good Value.

Builders want:

- Competitive Adv.
- More Referrals
- Fewer Callbacks.

Challenges

- Buyers don't know what “green” is and may not trust builders
- Buyers are trained to look at price, not value
- Buyers don't value what they can't see – construction quality
- Transaction process doesn't value what can't be seen

ENERGY STAR 'BRAND' PROMISE

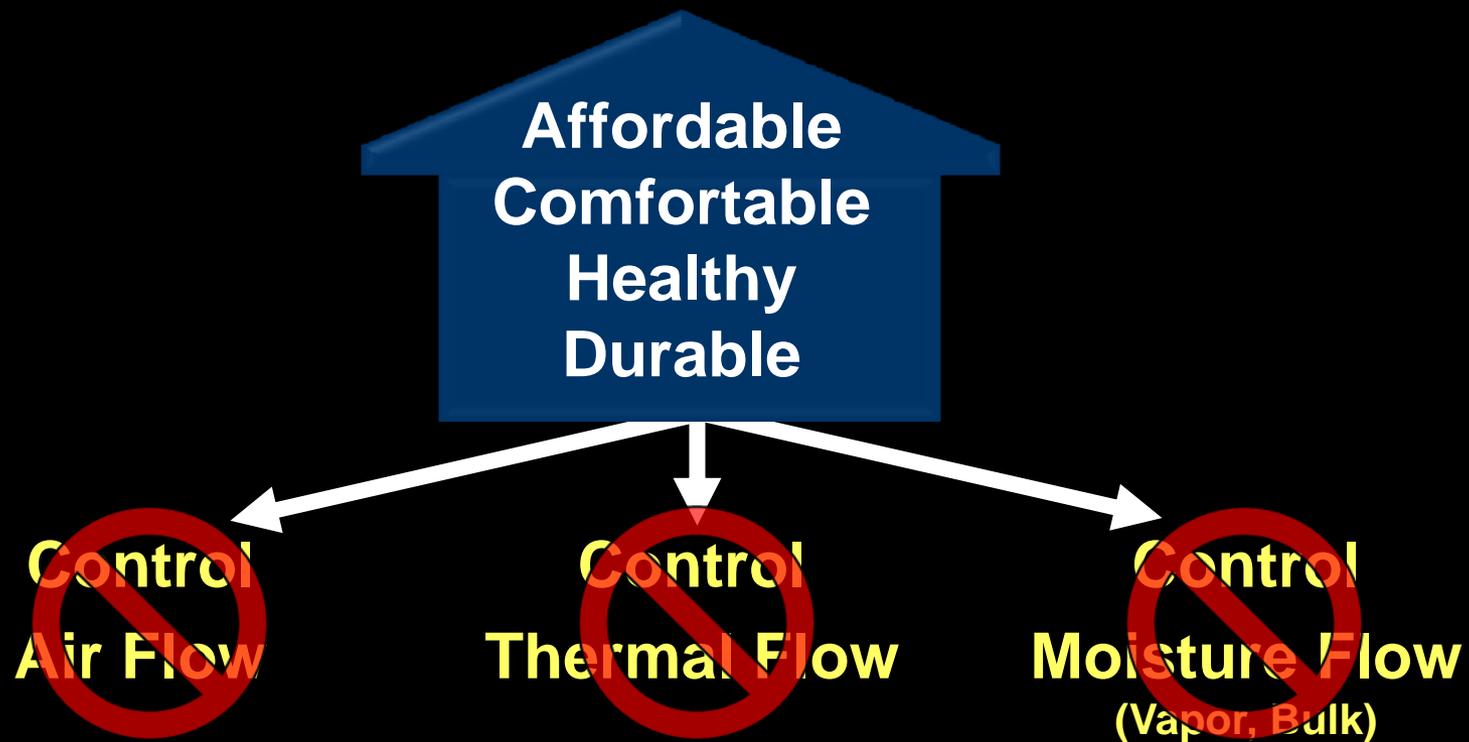
- Environmental Responsibility
- Cost-Effective Energy Savings
- Performance Meets/Exceeds Expectations

WHAT PERFORMANCE?

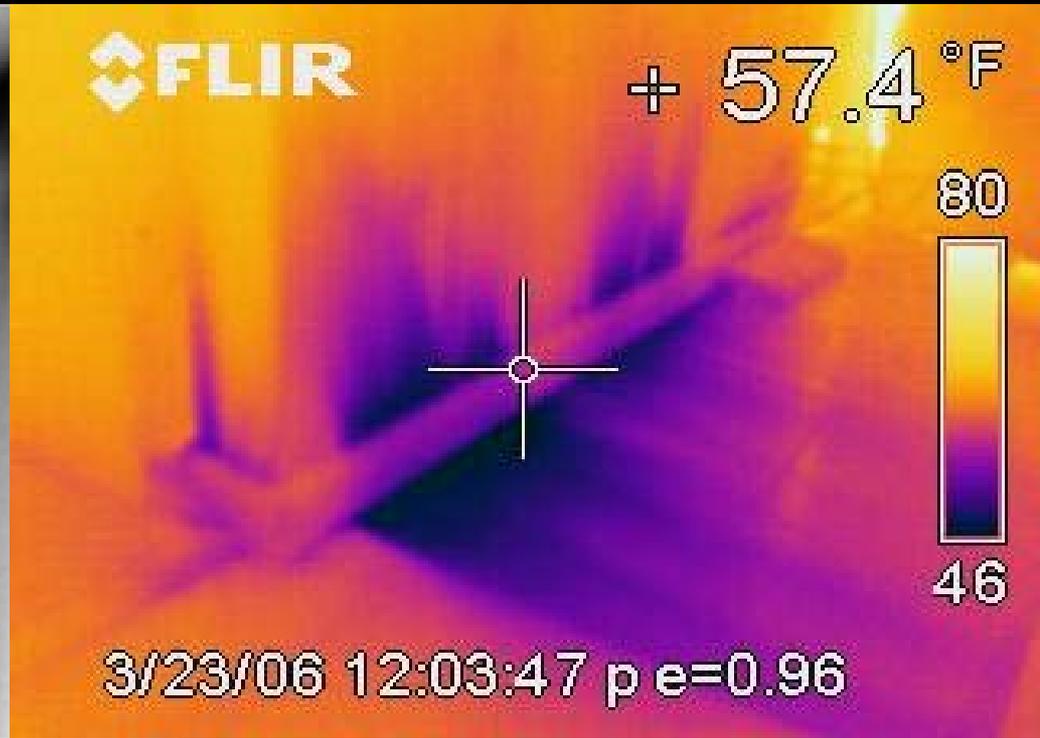


Affordable
Comfortable
Healthy
Durable

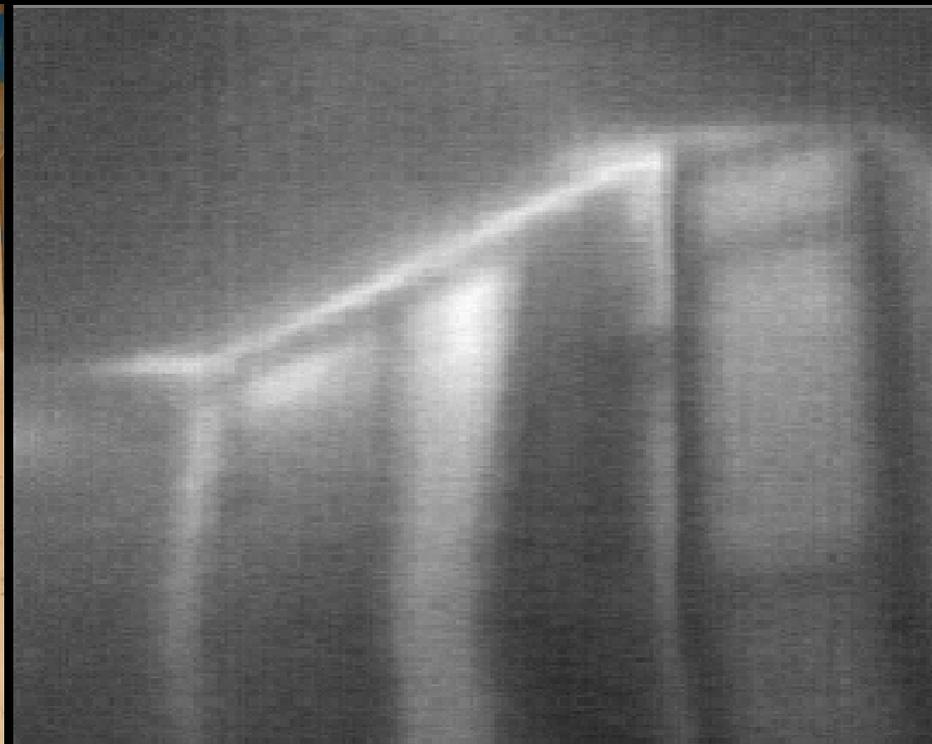
PERFORMANCE PROBLEM: BUILDING SCIENCE 'PARTS' = FAILURES



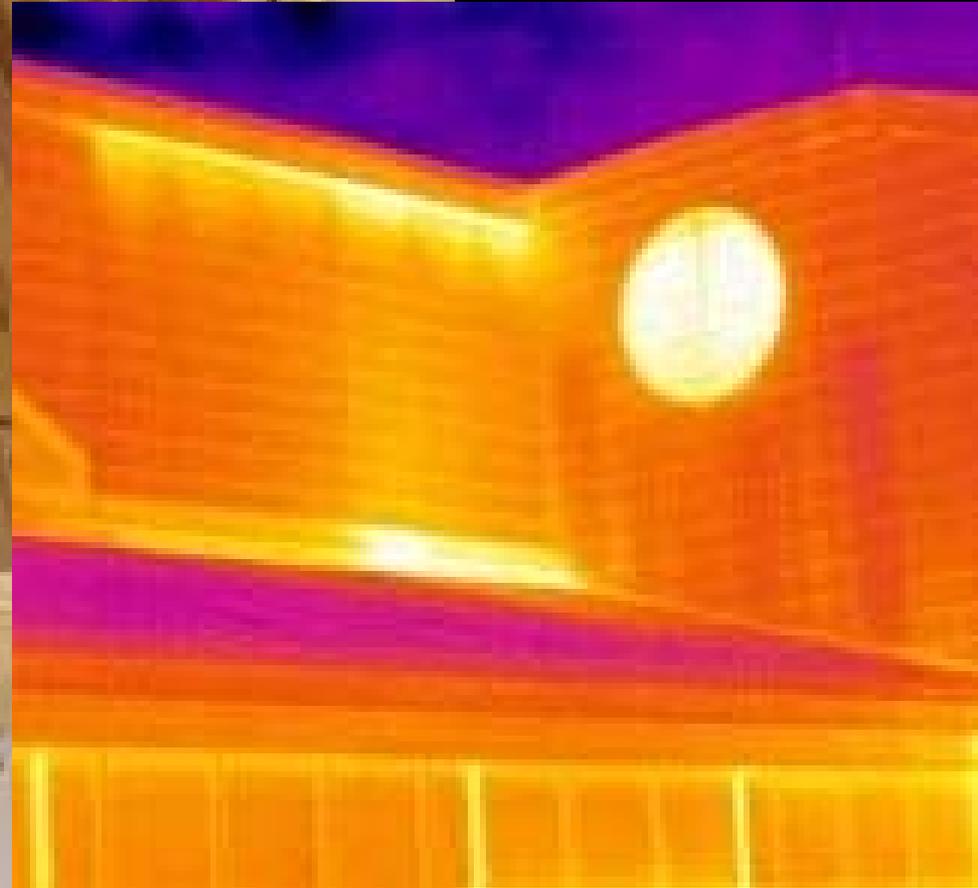
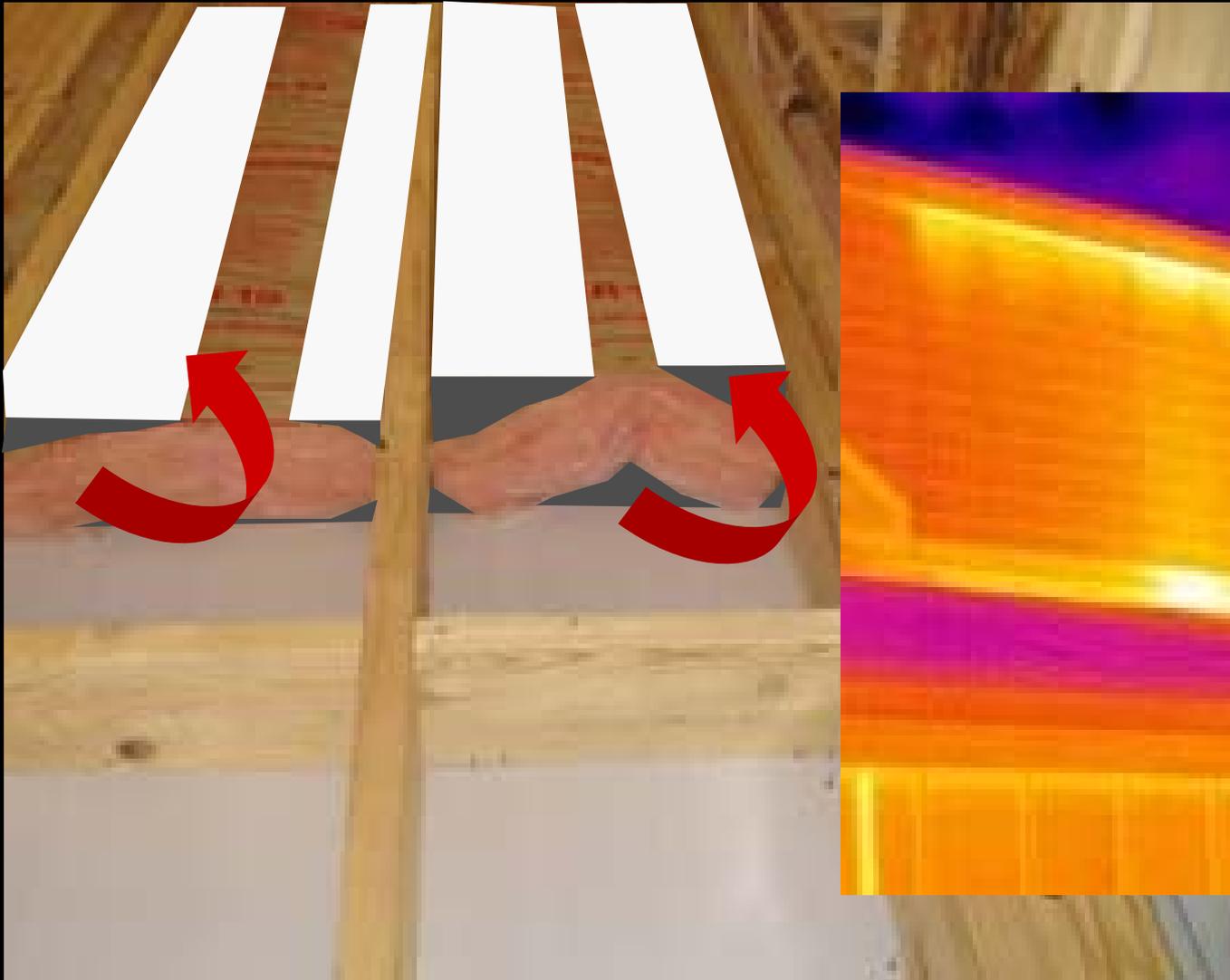
AIR LEAKAGE PROBLEM



INSULATION INSTALLATION PROBLEM



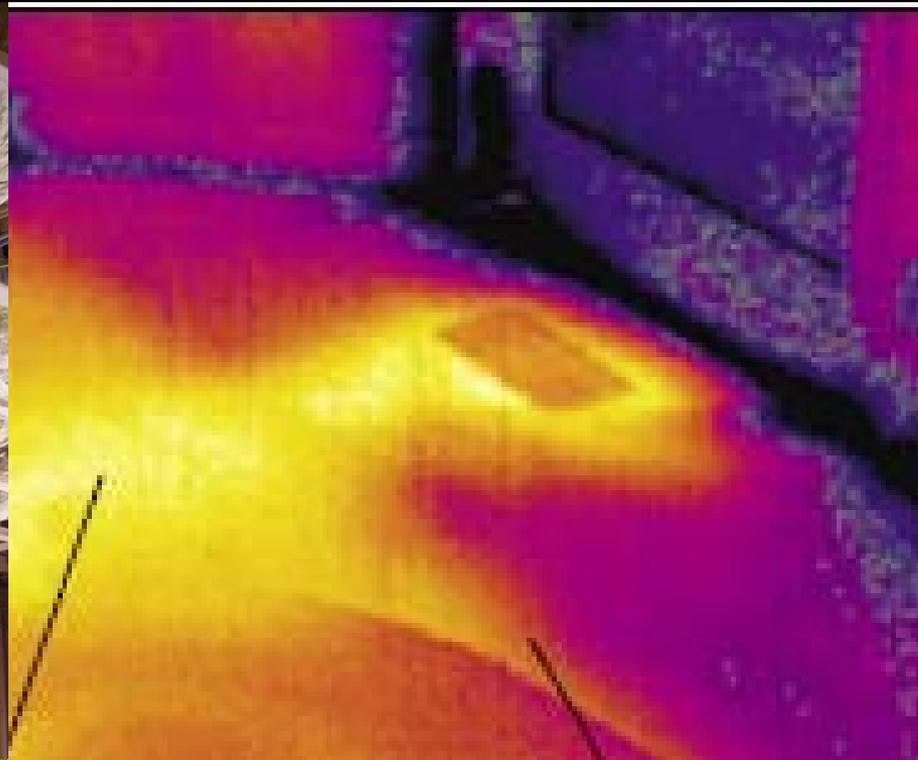
INSULATION INSTALLATION PROBLEM



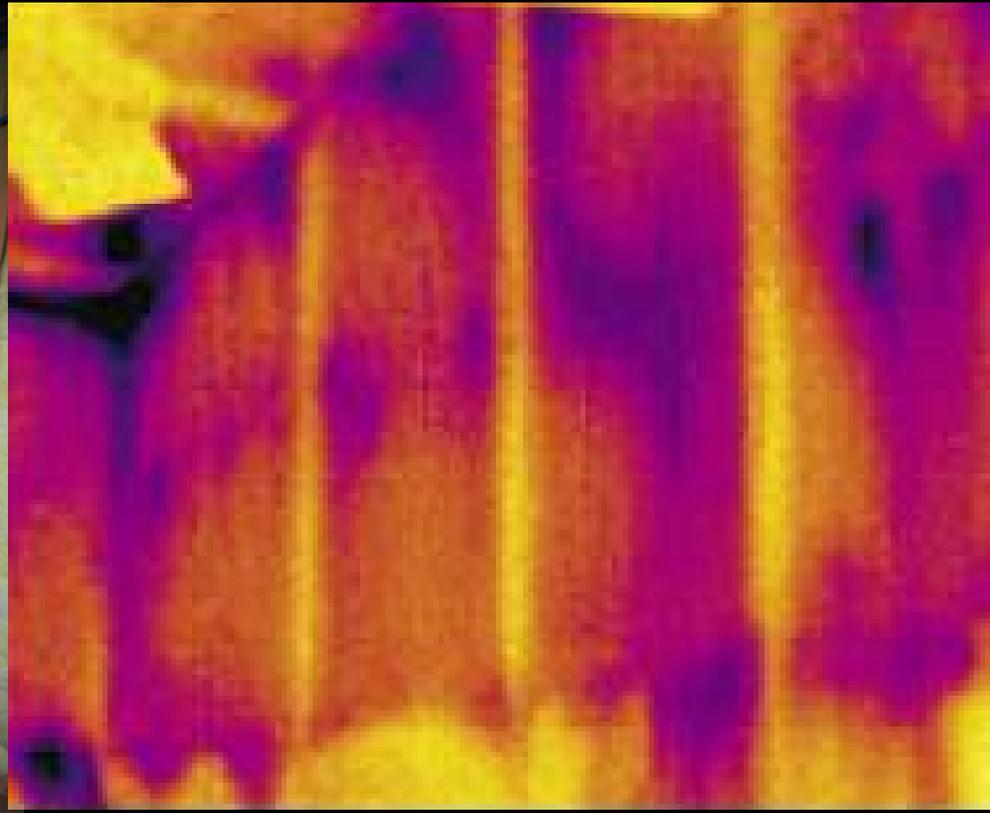
INSULATION INSTALLATION PROBLEM



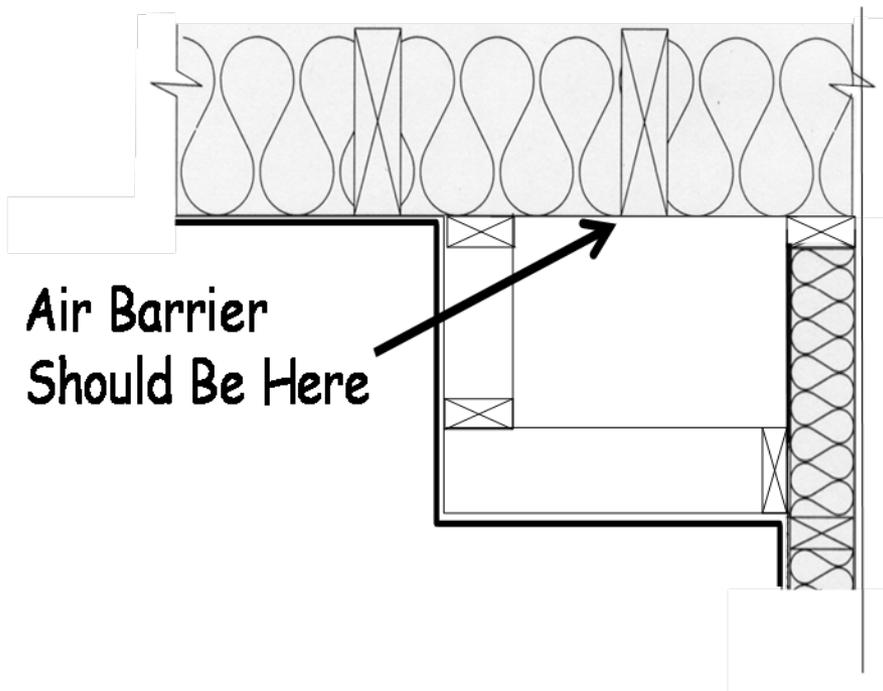
INSULATION INSTALLATION PROBLEM



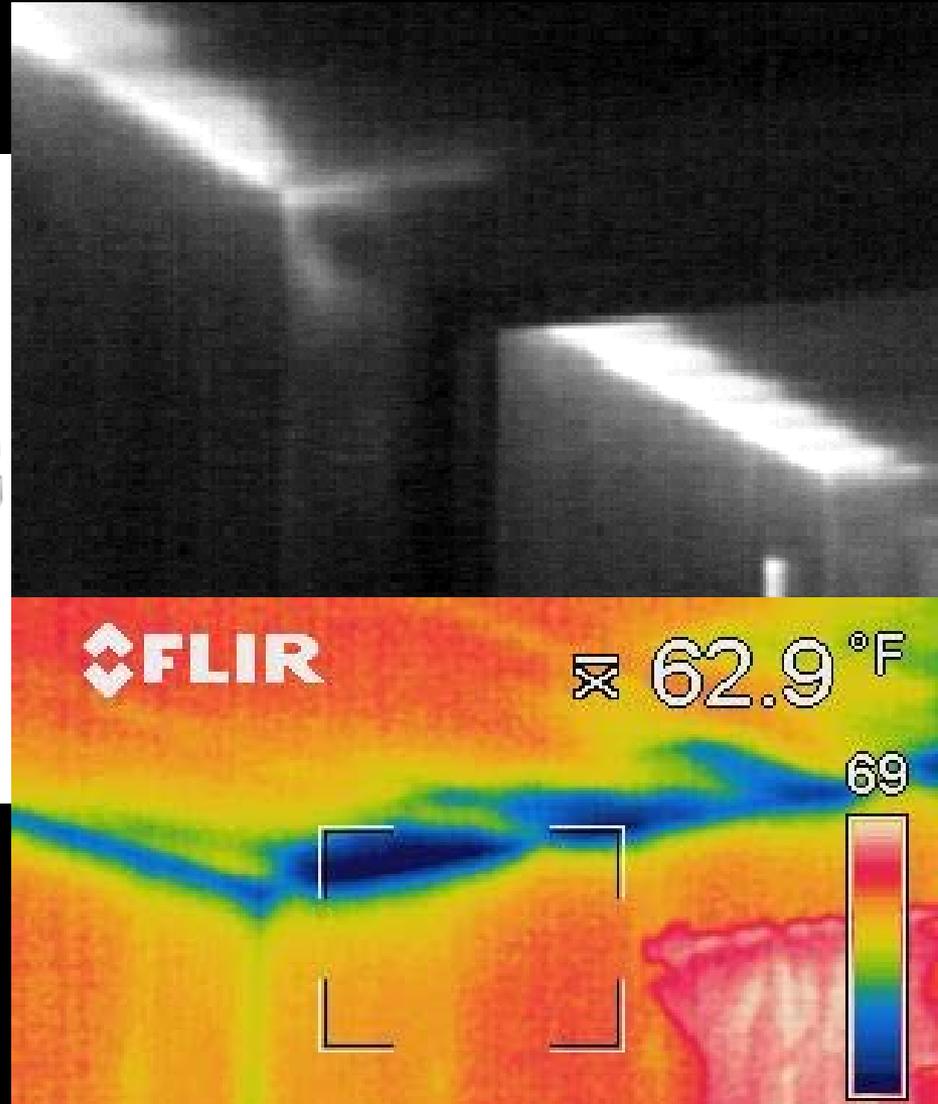
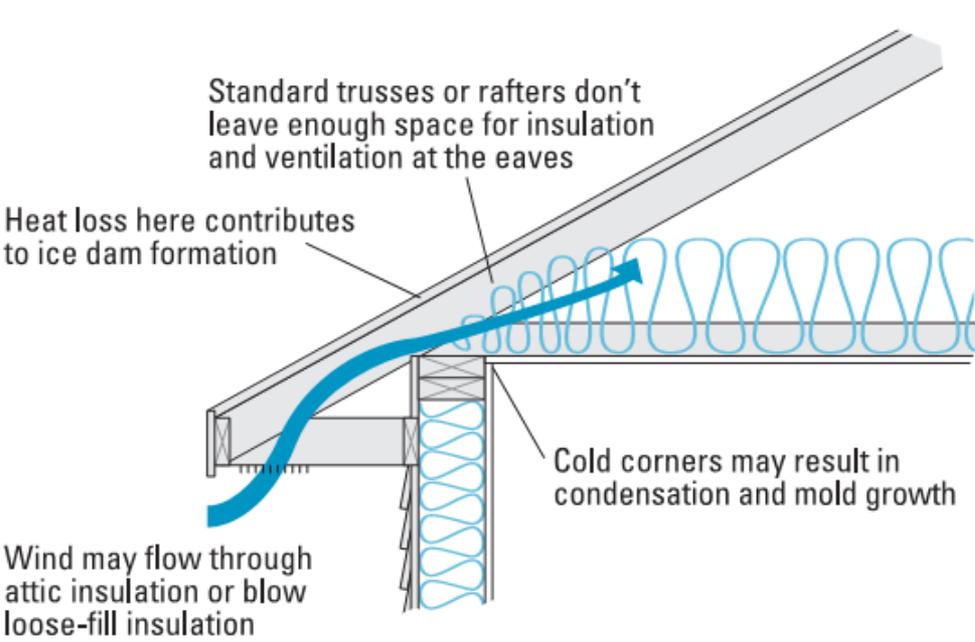
INSULATION AIR BARRIER PROBLEM



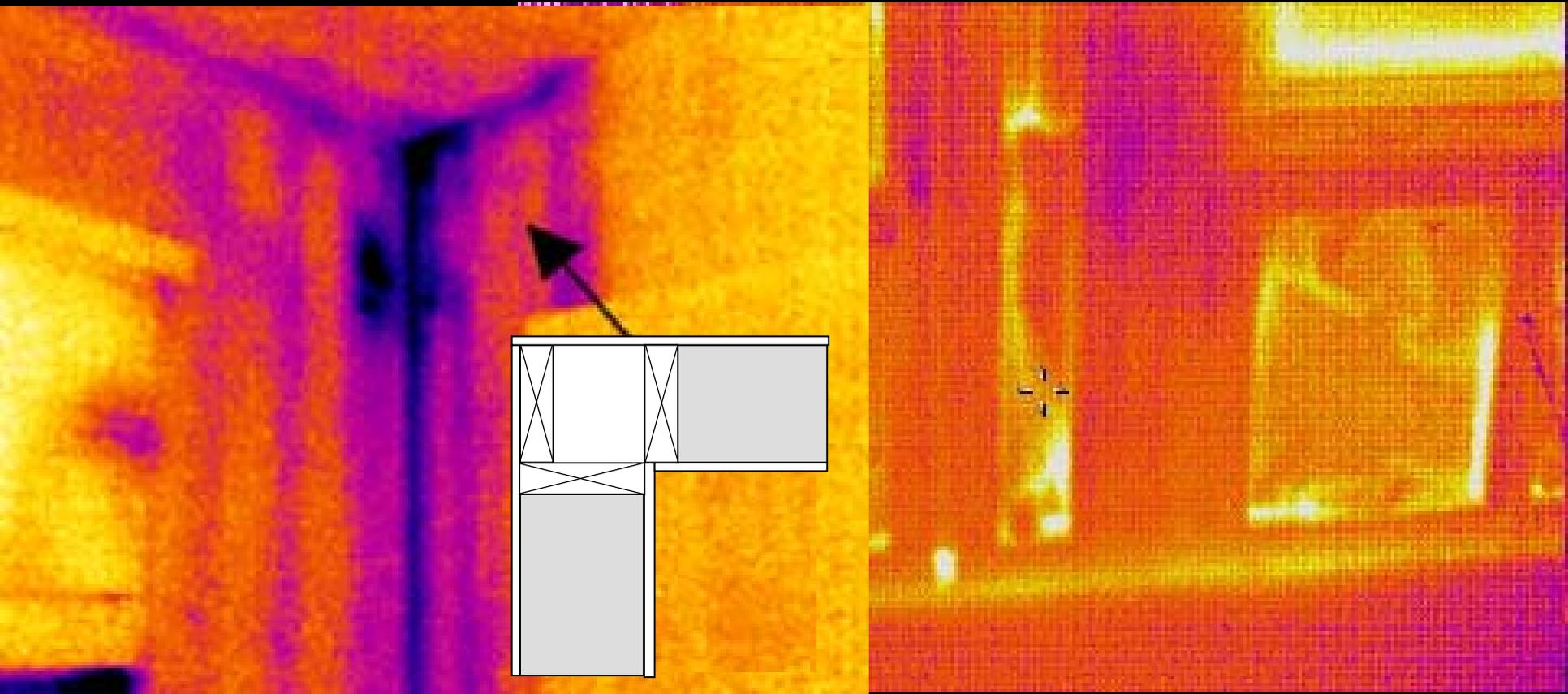
INSULATION AIR BARRIER PROBLEM



INSULATION AIR BARRIER PROBLEM



THERMAL BRIDGING PROBLEM



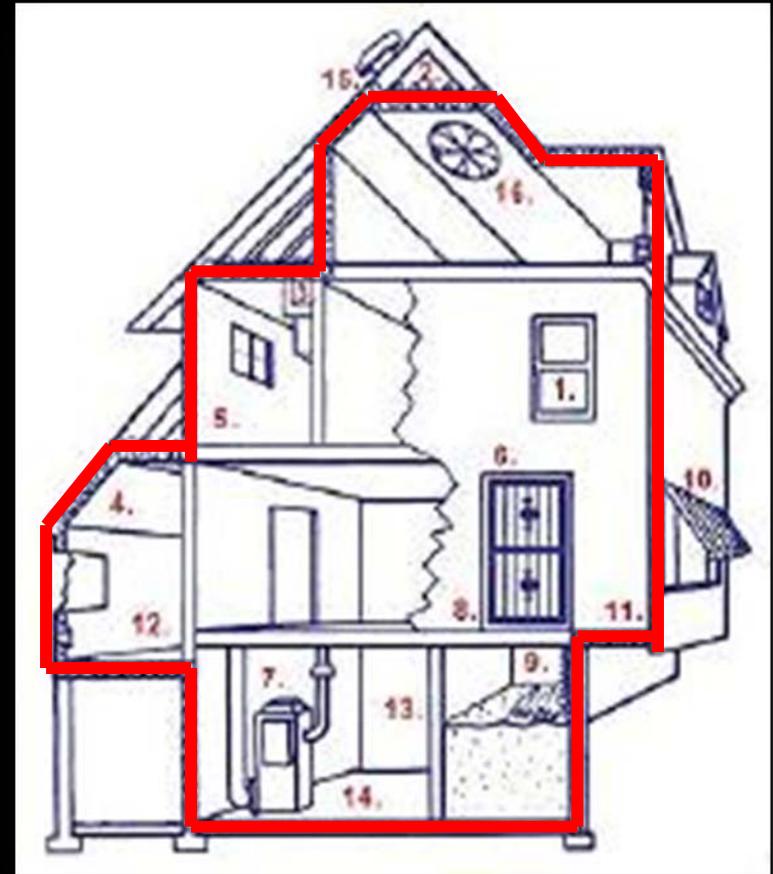
HIGH-PERFORMANCE WINDOW PROBLEM



THERMAL ENCLOSURE PROBLEM = HVAC QUALITY INSTALLATION PROBLEM



What the HVAC
Contractor has
never had?

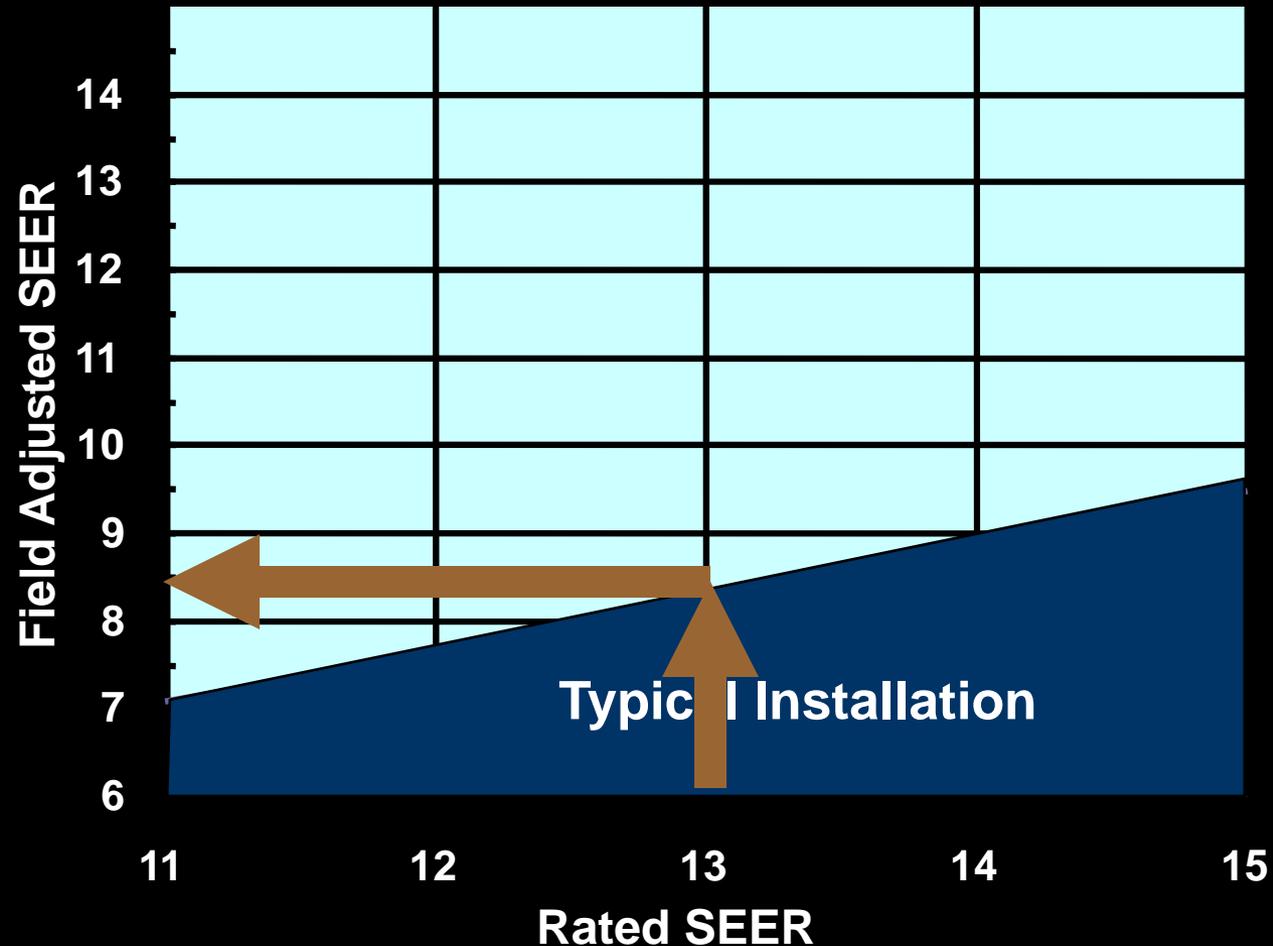


HVAC QUALITY INSTALLATION

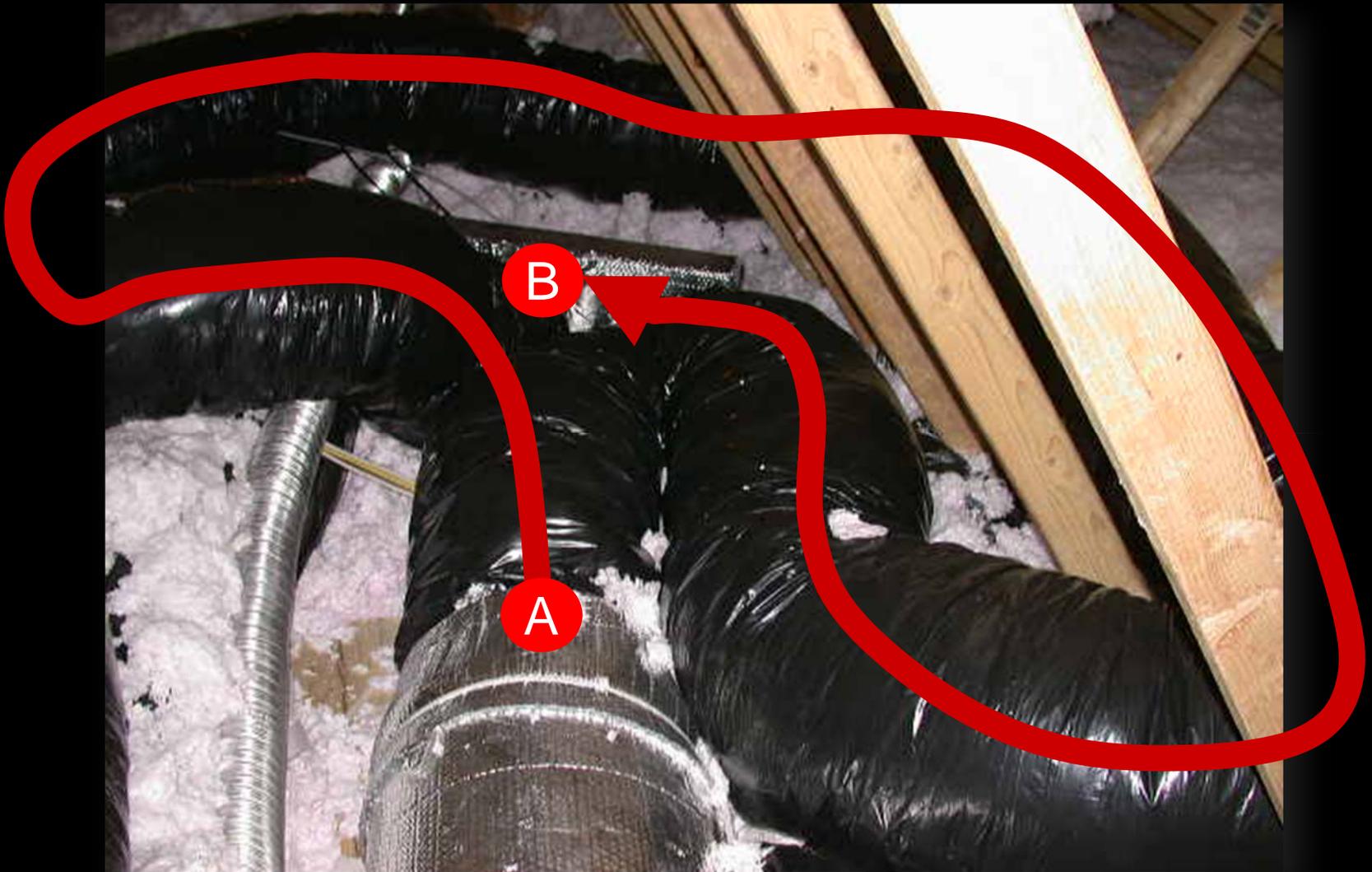


Research Study:

- **47%** AC Over-Sizing
- **70%** Inadequate Air Flow
- **74%** Improper Ref. Charge
- **~20%** Duct Leakage
- **24-35%** Savings w/QI



POOR DUCT INSTALLATION



POOR DUCT INSTALLATION

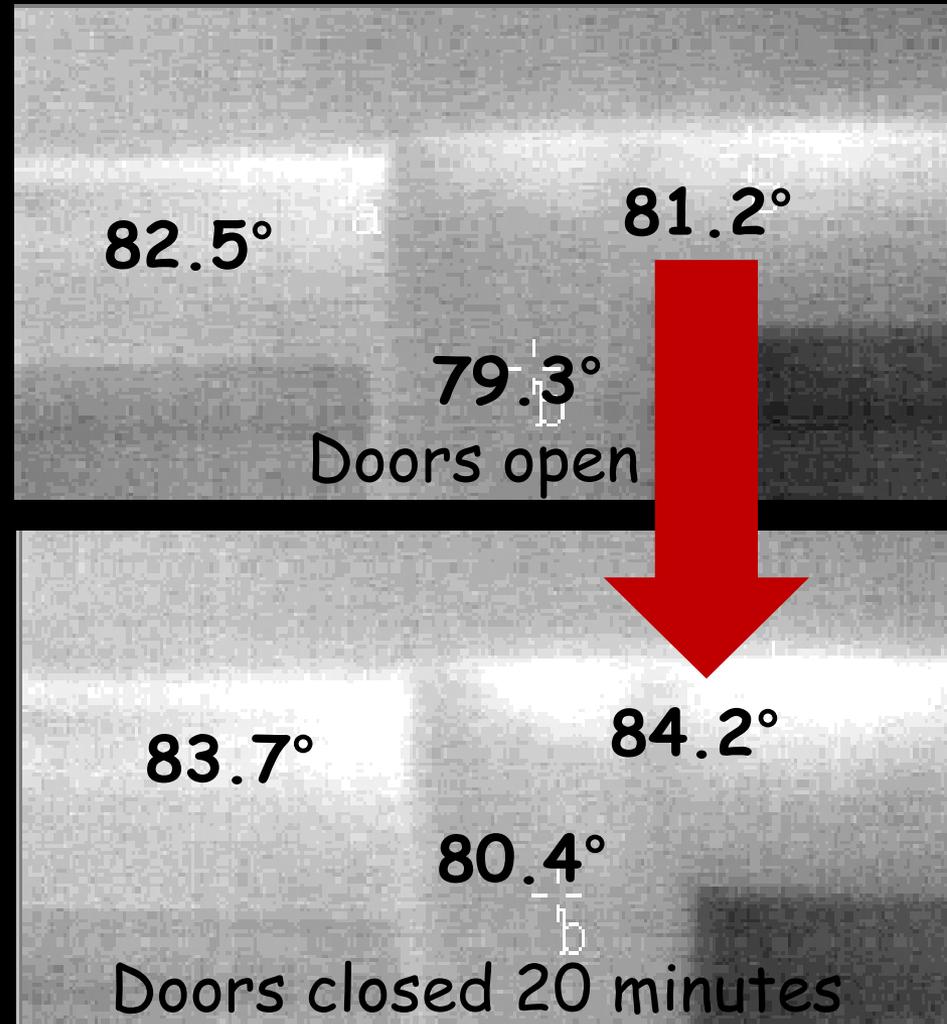




PRESSURE BALANCING PROBLEM



Performance = Heat Flow,
not R-value



PRESSURE BALANCING PROBLEM



**Big
Remaining
Hole!**



**Flame
Roll-Out**

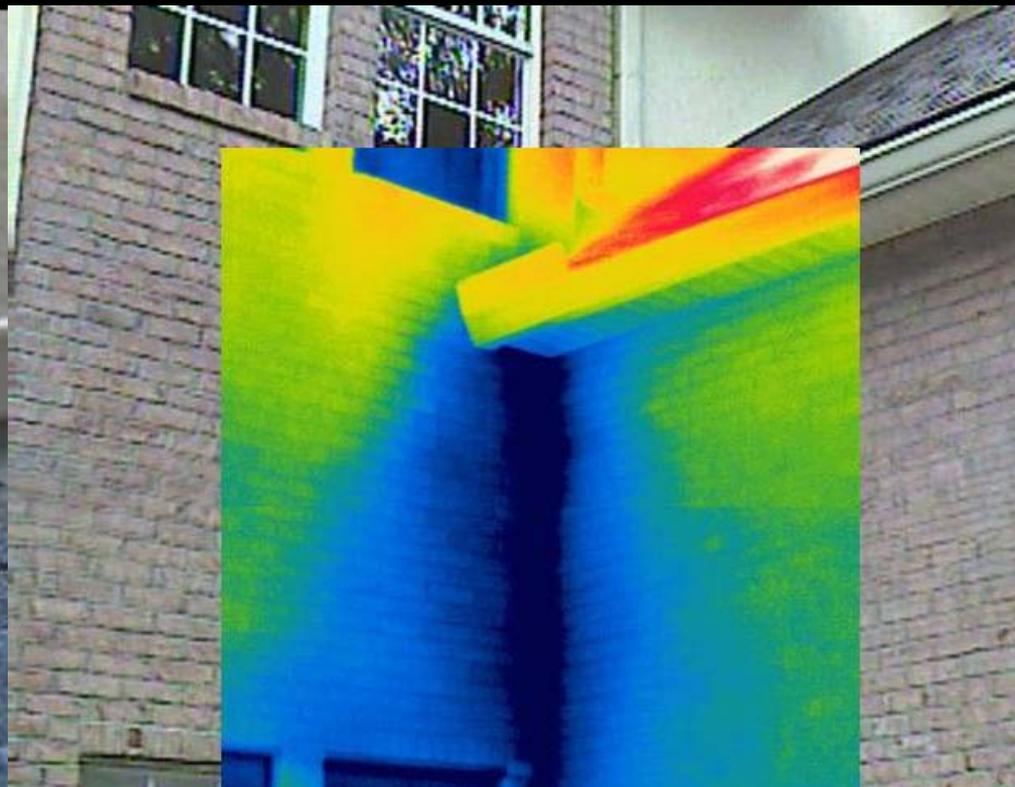
WHY WATER MANAGEMENT SYSTEM INEXTRICABLY LINKED TO ENERGY



WATER MANAGED ROOF PROBLEM



WATER MANAGED WALL PROBLEM



WATER MANAGED WALL PROBLEM



WATER MANAGED OPENING PROBLEM



WATER MANAGED FOUNDATION PROBLEM



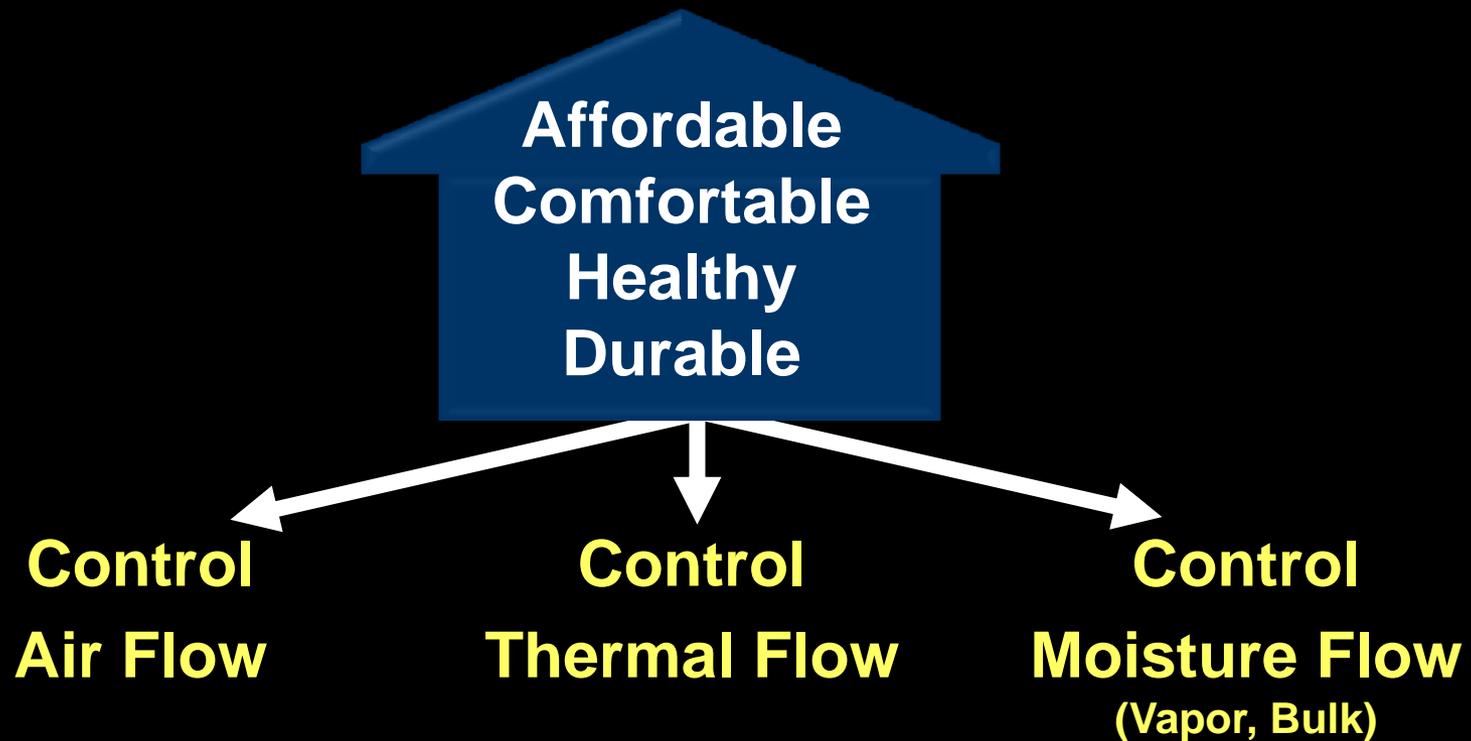
WATER MANAGED MATERIALS PROBLEM



PERFORMANCE SOLUTION: **NOT PARTS...**

- Maximum HERS Score
- % Above Code
- Minimum 'Green' Points

PERFORMANCE SOLUTION: BUILDING SCIENCE '**SYSTEM**'



Defining Energy Efficient



Affordable
Comfortable
Healthy
Durable

Control
Air Flow

Control
Thermal Flow

Control Moisture Flow
Vapor Bulk

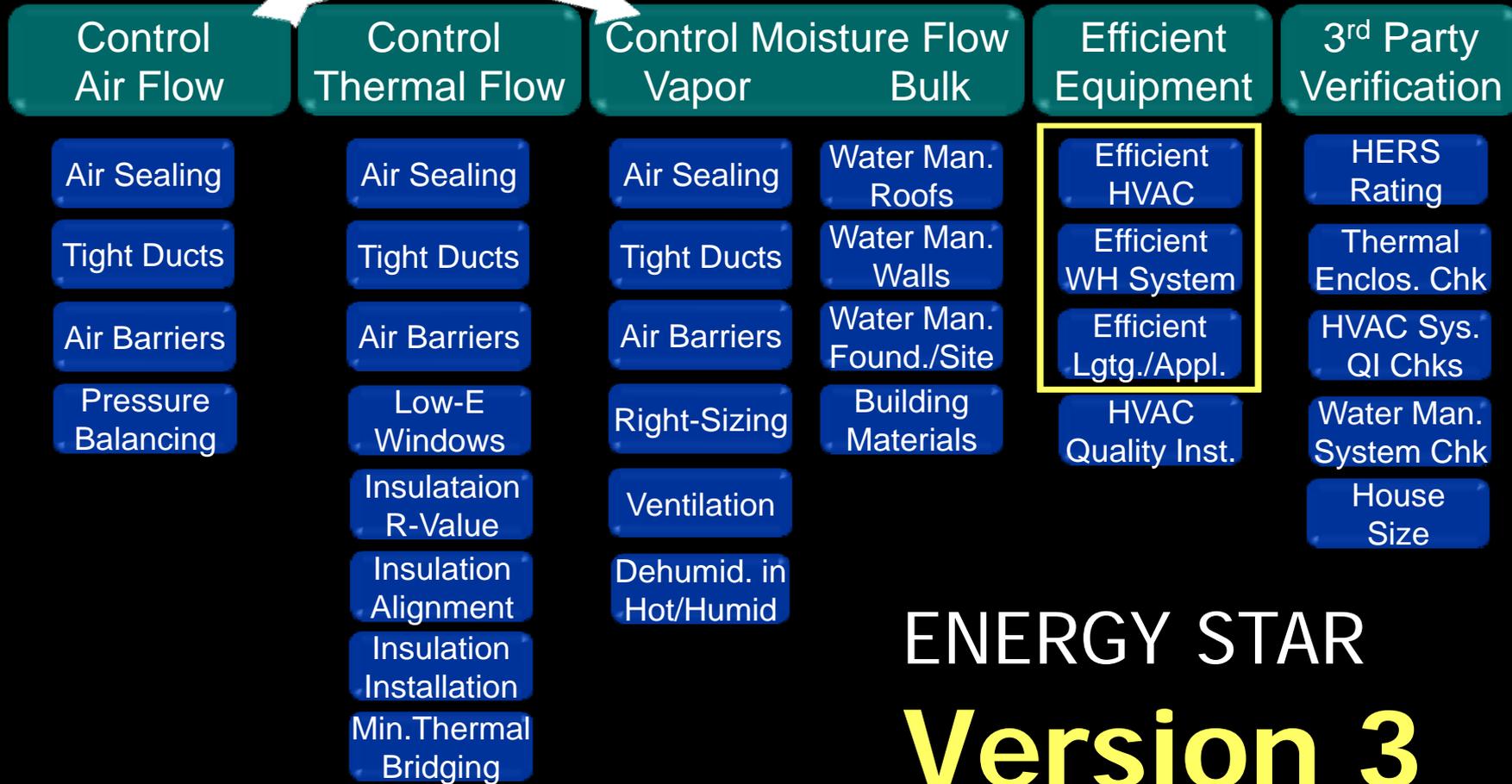
Efficient
Equipment

3rd Party
Verification

Defining Energy Efficient



Affordable
Comfortable
Healthy
Durable



ENERGY STAR
Version 3

ENERGY STAR QUALIFIED HOMES VERSION 3 SPECIFICATIONS



Baseline:
Reference Design

- Efficient Htg./Cooling
- Efficient Envelope
- Efficient Components

+

Mandatory Checklists:

- Thermal Enclosure
- HVAC QI Contractor
- HVAC QI HERS Rater
- Water Managed Construction

or

Prescriptive

Performance

Reference Design

Variable HERS Index

≤ Benchmark Home Only

Size Adjust. Factor

Renewable Energy
Not Allowed for Points

Renewable Energy Allowed
Only for Incremental Points

PROJECTED SAVINGS



Baseline:
Reference Design

15% > 2009 IECC



Mandatory Checklists:

5% – 15% > IECC:

- Additional Air Sealing Details
- Air Barriers
- Thermal Bridging Details
- Proper Insulation Installation
- HVAC Quality Installation

MANDATORY CHECKLISTS

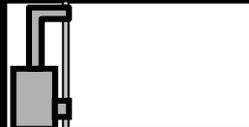


Thermal Enclosure System:



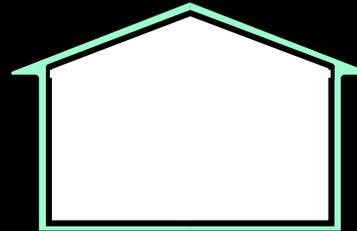
+

HVAC Quality Installation System:



+

Water Man. System:



=

Building Science System:



Features:

- Comprehensive air sealing/barriers
- Properly installed insulation
- High-performance windows

Features:

- Engineered design
- In-field quality diagnostics
- Fresh-air system
- Effective filtration

Features:

- Heavy membranes
- Complete flashing/drainage details
- Site and foundation details
- Materials

Benefits:

- Lower Bills
- Improved Comfort
- Better IAQ
- Less Maintenance
- Higher Value

VERSION 2 TO 3.0 MAJOR CHANGES



- **Variable vs. Fixed HERS Index Threshold**
- **Size Adjustment Factor**
- **New Inspection Checklists**

REVISION 02 HIGHLIGHTS: NATIONAL PROGRAM REQUIREMENTS



- Single-family revised to include quad-plexes
- “Building Completion Date” has been revised to “Date of Final Inspection”
- “Permit Date’ is permit issue or contract date
- All low-income projects (SF and MF) financed through low-income housing agencies may earn the ENERGY STAR under Version 2 until January 1, 2013 as long as the application received before April 1, 2011

Implementation timeline



Permit Date ¹	Date of Final Inspection ²	
	4/1/2011	1/1/2012
Before 4/1/2011 ^{3, 4}	v2	v3
Between 4/1/2011 and 12/31/2011 ⁴	v2.5	v3
On or After 1/1/2012 ⁵		v3

Version 2	Version 2: 2006 Guidelines
Version 2.5	Version 2.5: Core Version 3 energy efficiency measures with Air Barriers and Air Sealing sections of Thermal Enclosure System Rater Checklist; Other checklists completed but not enforced
Version 3	Version 3: Core Version 3 energy efficiency measures with all checklists completed and enforced

OVERLAPPING REQUIRMENTS



- Where overlapping requirements, more stringent requirements must be met.
- Where overlapping requirements conflict , the conflicting ENERGY STAR requirement are waived. The home can still be qualified if the Rater determines that there is no equivalent way to meet the intent of the ENERGY STAR.



CONSISTENT REVISION PROCESS

- **Purpose:**
 - be responsive to partner questions
 - consistently disseminate and enforce policy changes
 - adapt program as needed for success.
- **Schedule:**
 - 2011 once per quarter
 - 2012 and beyond once every 6 months
- **Source of Changes:**
 - Majority Rev 02 from training provider clarification requests
 - Ongoing implementation from builders and raters



Revision 02 Overview



REVISION 02 MATERIALS

- Revision 02 Tracking Document
- Version 2.5 & 3 National Program Requirements
- County-Level Reference Designs
- Inspection Checklists
- HERS Index Target Procedure
- Guidebooks:
 - Thermal Enclosure System Rater Checklist
 - HVAC System Quality Installation Rater Checklist
 - Water Management System Builder Checklist

REVISION 02 HIGHLIGHTS: MAJOR CHANGES



- **Extends timeline:**
Version 2.5 mandatory for most homes permitted after April 1, 2011 instead of January 1, 2011
- **Excludes most basements from SAF**
- **Better aligns to 2009 IECC**
exceptions to the window performance and insulation requirements align with the exceptions included in the 2009 IECC.
- **Better Insulation Compliance Explanation**
process for using the equivalent U-factor and UA alternative compliance paths.

REVISION 02 HIGHLIGHTS: GENERAL CHANGES CHECKLISTS



- **Clarified Rater's role:**

Determine whether the intent of each checklist item has been met;

First the Provider, and then EPA, should be contacted if unclear;

If EPA believes guidelines are sufficiently clear, then this guidance will be provided to the partner and enforced.

If EPA believes revisions, required then guidance will be provided to the partner but only enforced for homes permitted after the release of the revised guidelines, typically 60 days transition period.

- **Per Rev 01, the Rater must verify credentials:**

- Builder is a partner
- HVAC contractor is credentialed

REVISION 02 HIGHLIGHTS: THERMAL ENCLOSURE SYSTEM CHECKLIST



- **Area –weighted average of fenestration permitted**
- **U-factor and SHGC requirement exemptions:**
 - 15 square feet of glazed fenestration per dwelling;
 - One side-hinged opaque door assembly up to 24 sf in area; and
 - Fenestration utilized as part of a passive solar design
- **Exceptions to 2009 IECC insulation requirements:**
 - Steel Framing
 - Ceiling with Full-Height Insulation over Top Plate
 - Ceilings without attic spaces
 - Alternative equivalent U-factor or total UA calculation
 - Reduced Thermal Bridging at Attic Eave and Platforms
 - Mandatory slab edge insulation CZ 4 and higher
 - Post-tensioned slab insulation at integrated garages/porches

REVISION 02 HIGHLIGHTS: THERMAL ENCLOSURE SYSTEM CHECKLIST



- **Extended allowance to use Grade II insulation**
when coupled with insulated sheathing extended to all surfaces (e.g., insulated floors, rim joists or ceilings).
- **≤10% of ext. wall exempt from thermal bridging**
accommodate fins, wing walls, masonry fireplaces or similar details.
- **Batts that completely fill floor cavity w/o supports**
as long as the compressed value meets or exceeds the required insulation level.
- **Wind baffles not required every bay**
as long as the tabbed baffle can prevent wind washing of insulation in adjacent bays.

REVISION 02 HIGHLIGHTS: HVAC QI CONTRACTOR CHECKLIST



- **Record # of occupants rather than # of bedrooms.**

The number of occupants among all HVAC systems in the home must be equal to the number of bedrooms, plus one.

Exemption for cooling systems that are for temporary occupant loads.

- **Cooling systems for temporary occupant loads:**

shall be handled by a supplemental cooling system (e.g., a small, single-package unit or split-coil unit) or by a system that can shift capacity from zone to zone (e.g., a variable volume system).

REVISION 02 HIGHLIGHTS: HVAC QI CONTRACTOR CHECKLIST



- **ACCA Manual J design temperatures required**
unless otherwise specified by code.
- **ECM/ICM fan supply-side ventilation exemption:**
'Smart Cyclers' is allowed.
- **Worst-case orientation equipment size selection:**
For home plans built in multiple orientations in some cases:
 - If the loads across all orientations vary by $\leq 25\%$,
 - Otherwise, group the load into a set with $< 25\%$.
- **Alternate OEM test procedure:**
may be used in place of a standard sub-cooling or super-heat process if documentation has been attached defining procedure.

REVISION 02 HIGHLIGHTS: HVAC QI RATER CHECKLIST



- **Rater sizing verification changes:**

Confirm ACCA Manual J design temperatures have been used unless otherwise required by code.

Confirm that the contractor either selected the geographically closest available location or collect from the contractor a justification for the selected location. The Rater need not evaluate the legitimacy of the justification to qualify the home.

Verify that the proper number of occupants, rather than bedrooms, has been reported on the contractor checklist.

- **Additional options to verify HVAC boiler plate data:**

When condenser is installed after inspection, HVAC manufacturer and serial # can be verified using photographs and exemption provided for testing the thermostat controls.

REVISION 02 HIGHLIGHTS: HVAC QI RATER CHECKLIST



- **Sizing cooling systems:**

Next largest nominal piece of equipment may be used that is available to satisfy the latent and sensible requirements. Single-speed systems generally increments of ½ ton vs. one ton for multi-speed/multi-stage. Therefore, extra flexibility to meet the equipment sizing requirements.

- **Balancing dampers:**

When used, located at the trunk to limit noise unless the trunk not accessible . In such cases, Opposable Blade Dampers (OBD) or dampers located in the duct boot are permitted.

- **Bedroom pressure balancing verification**

Net-free area for grills can be verified using contractor-reported airflow from registers, rather than the Rater measuring airflow from registers.

EPA has clarified that for the pressure balancing test, pressure is to be measured relative to the house rather than to the outside.

REVISION 02 HIGHLIGHTS: HVAC QI RATER CHECKLIST



- **Duct leakage testing**

Inadvertent exemption from total duct leakage testing where ducts in conditioned space removed.

Duct leakage testing shall be after air handler and grilles installed.

The net exhaust and net supply flow restrictions have been removed in alignment with anticipated revisions to ASHRAE 62.2-2010.

- **EPA has reiterated required ventilation rates:**

ASHRAE 62.2-2010 must be met (i.e., a humidistat cannot be used to turn off the ventilation system during high-humidity periods).

- **Balance ventilation outlet and inlet locations:**

Spacing requirements of ASHRAE 62.2-2010 required unless manufacturer instructions indicate that a smaller distance may be used (document with manufacturer's instructions).

REVISION 02 HIGHLIGHTS: HVAC QI RATER CHECKLIST



- **Exemption of the kitchen exhaust airflow test:**
Kitchen exhaust fans integrated with microwaves may instead use a higher nominal flow rate must be used.
- **Combustion safety tests:**
Rater may use either BPI's or RESNET's test procedure.
- **Clarified fireplace combustion safety testing:**
A new test option has been added, allowing the Rater to verify that the pressure differential is ≤ 5 Pa using BPI's or RESNET's combustion safety test procedure.
- **Unvented combustion appliance safety Test:**
The Rater must conduct RESNET's or BPI's combustion safety test procedure and determine that the ambient CO test results are less than 35 ppm.

REVISION 02 HIGHLIGHTS: WATER MANAGEMENT CHECKLIST



- **Checkbox column for Rater**
- **Polyethylene in crawl spaces**
secured with furring strips; or perimeter ground stakes
- **Limits on vapor retarders clarified:**
 - Class 1 vapor retarders must not be installed on the interior side of air permeable insulation in exterior below-grade walls.
 - In Warm-Humid climates, Class 1 vapor retarders must not be installed on the interior side of air permeable insulation in above-grade walls, except at shower and tub walls.
 - An exception is provided for ceramic tile at shower and tub walls and for mirrors as long as clips or spacers are used.
- **Gutters and downspouts exemption:**
slab-on-grade foundation and no expansive soils.

Biggest Challenges

- Training
- Quality Assurance
- Marketing New Value Proposition
- Transaction Process

ENERGY STAR FOR HOMES VERSION 3

Sponsor Support: Training

- V3 Field Guide Classes for Builders/Trades
- HVAC Contractor Training
- Additional V3 Rater Training

ENERGY STAR FOR HOMES VERSION 3

Sponsor Support: Quality Assurance

- HVAC Contractors
- Builders
- Raters

ENERGY STAR FOR HOMES VERSION 3

Sponsor Support: Marketing

- Adapt New Value Proposition to Messaging
- Promote Early Adopters
- Leverage Actual Billing Data and Costs

Sponsor Support: Transaction Process

- Support 'SAVE Act'
- EPA/DOE Leader Letter
- Local Realtors/Appraiser Training



HOW TO GET MORE INFORMATION

On the Web at:

<http://www.energystar.gov/homes>