ENERGY STAR

ENERGY STAR Qualified Homes:

Thermal Bypass Checklist

The Science Behind
Thermal Bypass

THE SCIENCE BEHIND HOME PERFORMANCE

DRIVING FORCES

ENERGY STAR

Driving Forces move air in predictable directions:

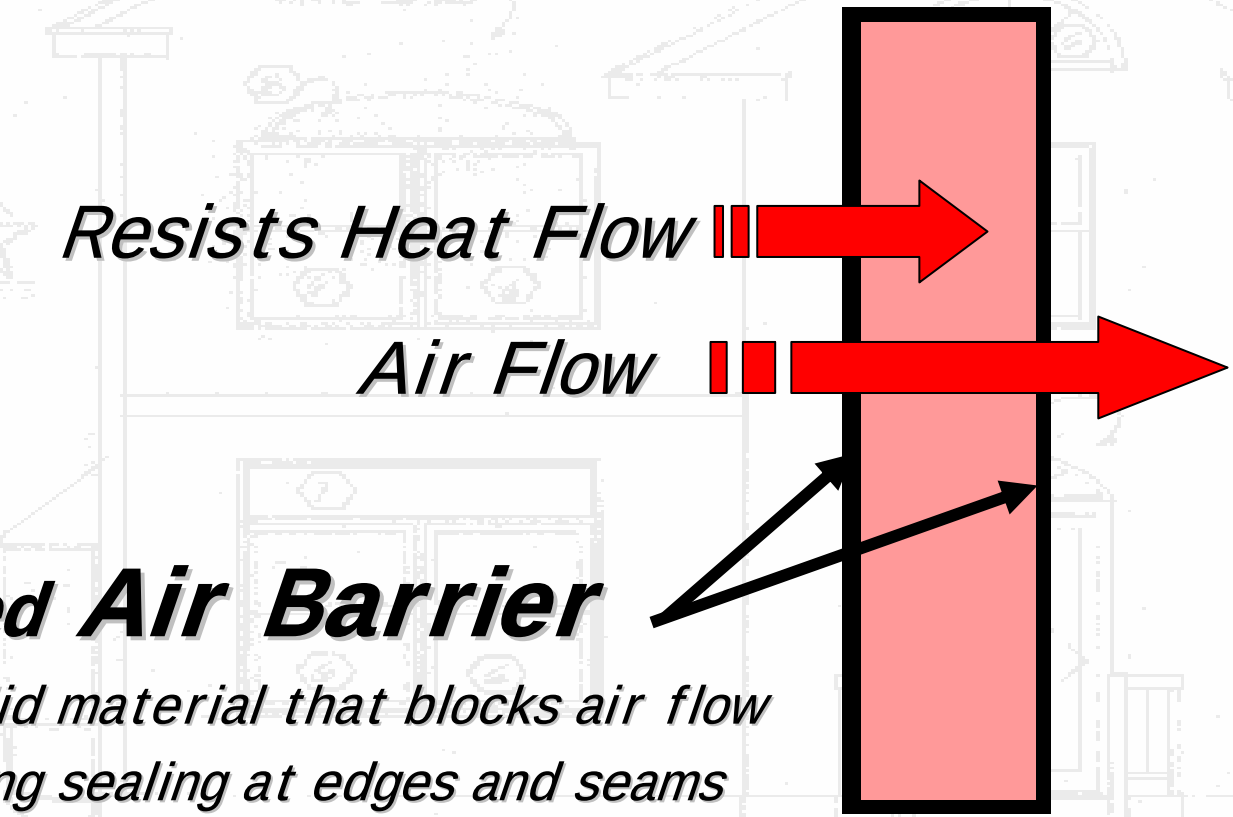
More ***to*** ***Less***

Pressure
Moisture
Hot

Pressure
Moisture
Hot

THE SCIENCE BEHIND HOME PERFORMANCE

INSULATION IS NOT AN AIR BARRIER



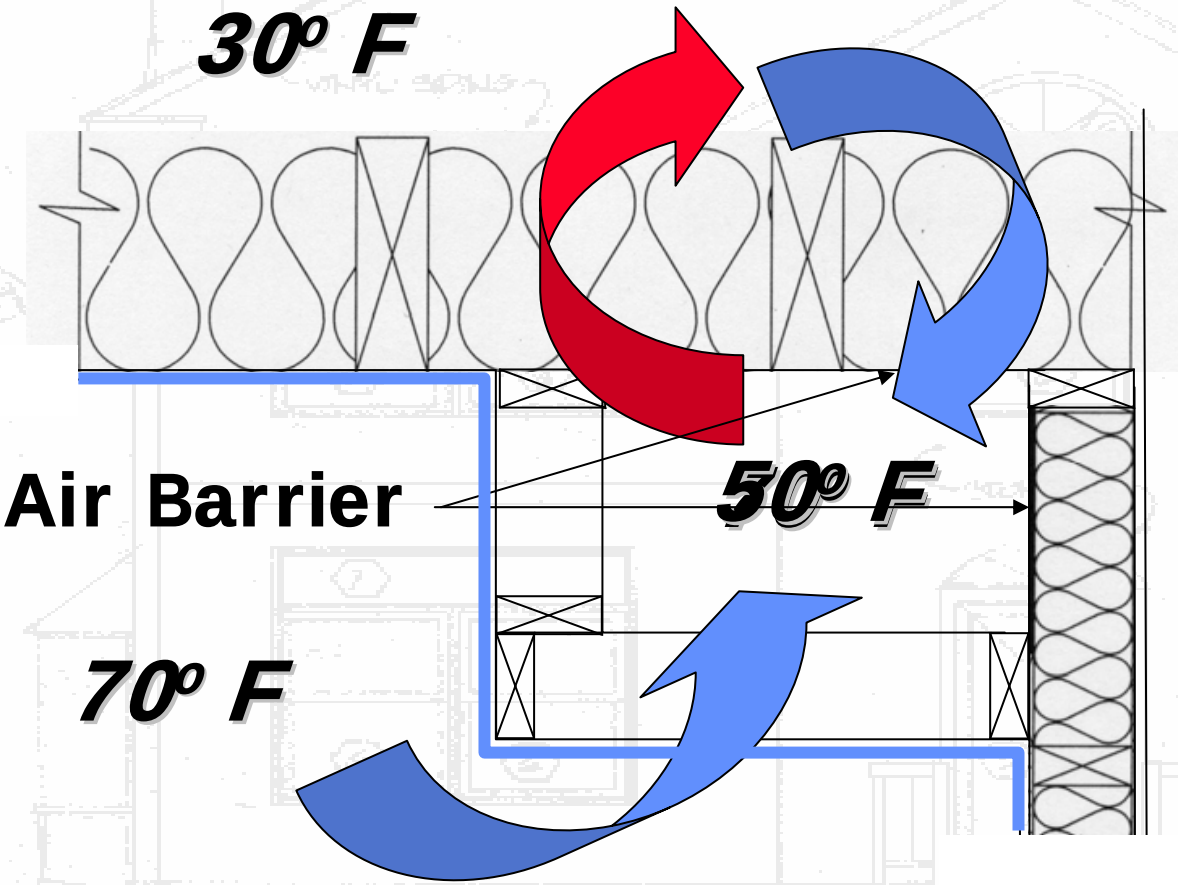
...need Air Barrier

any solid material that blocks air flow

including sealing at edges and seams

THE SCIENCE BEHIND HOME PERFORMANCE

WHY COMPLETE AIR BARRIER



THE SCIENCE BEHIND HOME PERFORMANCE

WHY COMPLETE AIR BARRIER

THE SCIENCE BEHIND HOME PERFORMANCE

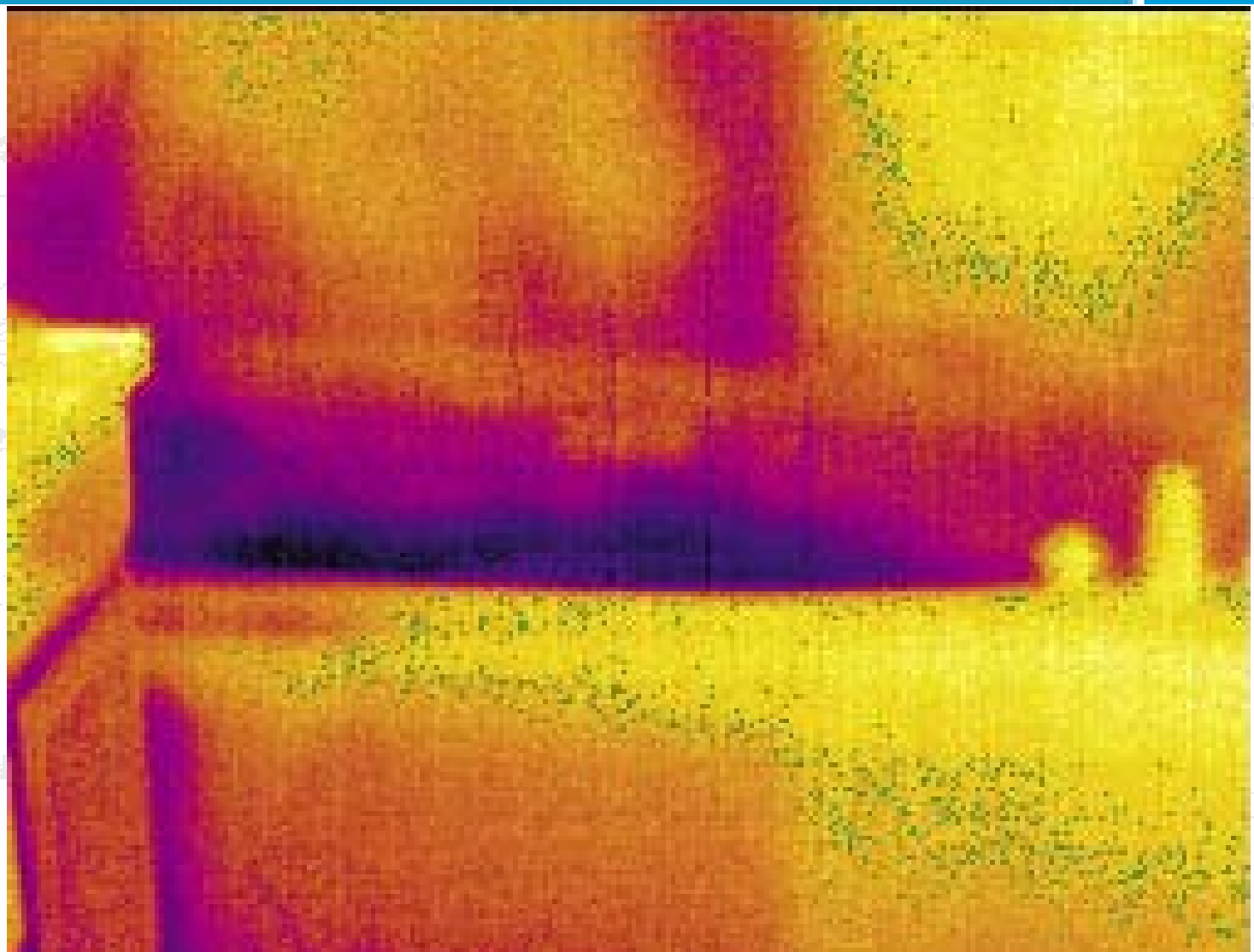
WHY COMPLETE AIR BARRIER

Courtesy of Building Science Corp.

THE SCIENCE BEHIND HOME PERFORMANCE

WHY COMPLETE AIR BARRIER

ENERGY STAR



THE SCIENCE BEHIND HOME PERFORMANCE

BUILDING SCIENCE RULE #4

ENERGY STAR

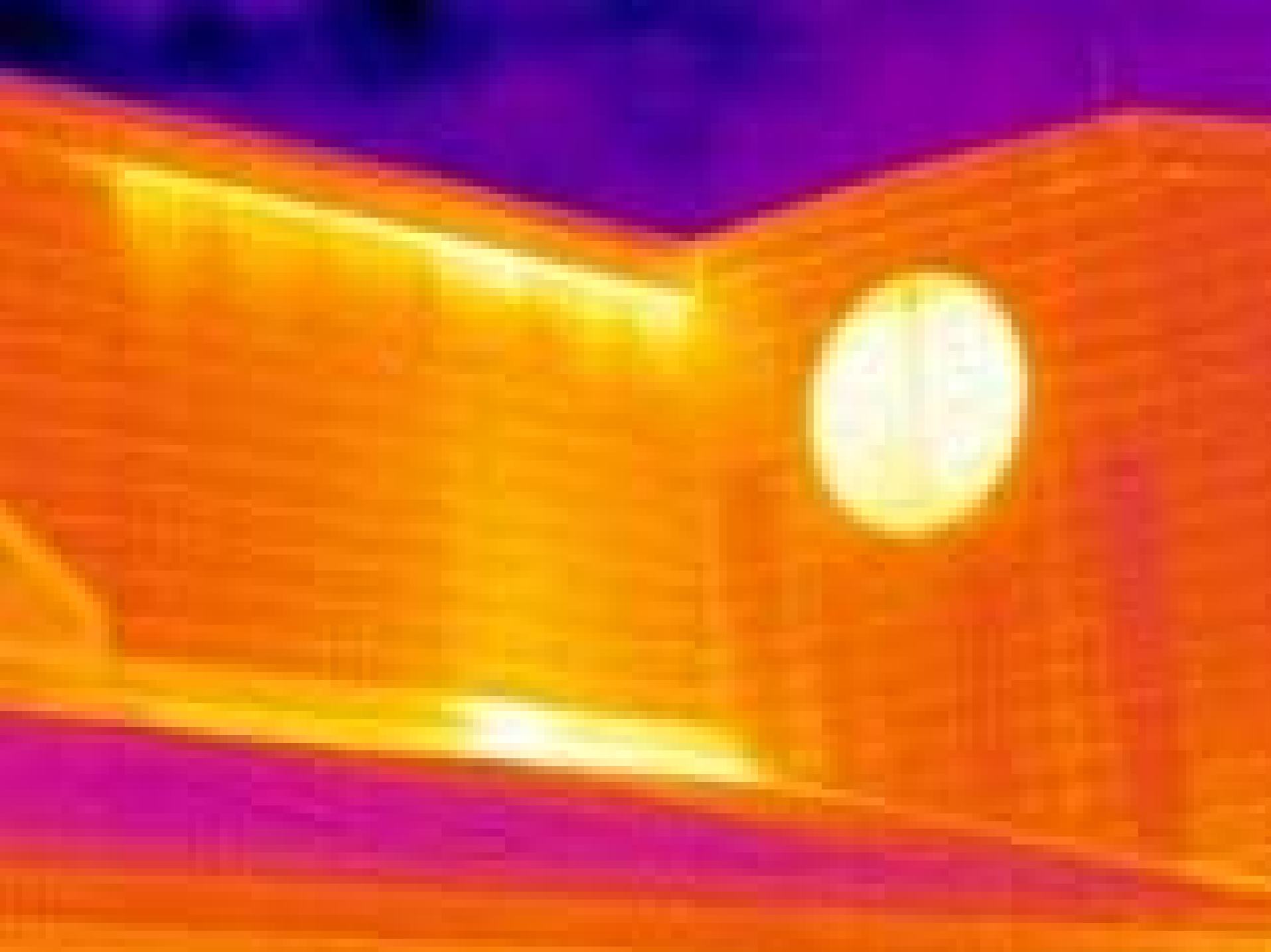
Insulation must be installed without gaps, voids, and compression, and be fully aligned with the air barrier

to be an effective thermal barrier.

THE SCIENCE BEHIND HOME PERFORMANCE

MISALIGNED/COMPRESSED INSULATION

ENERGY STAR



The Rationale Behind

Thermal Bypass

WHAT IS ENERGY STAR BRAND?

The national, US government-backed

symbol for

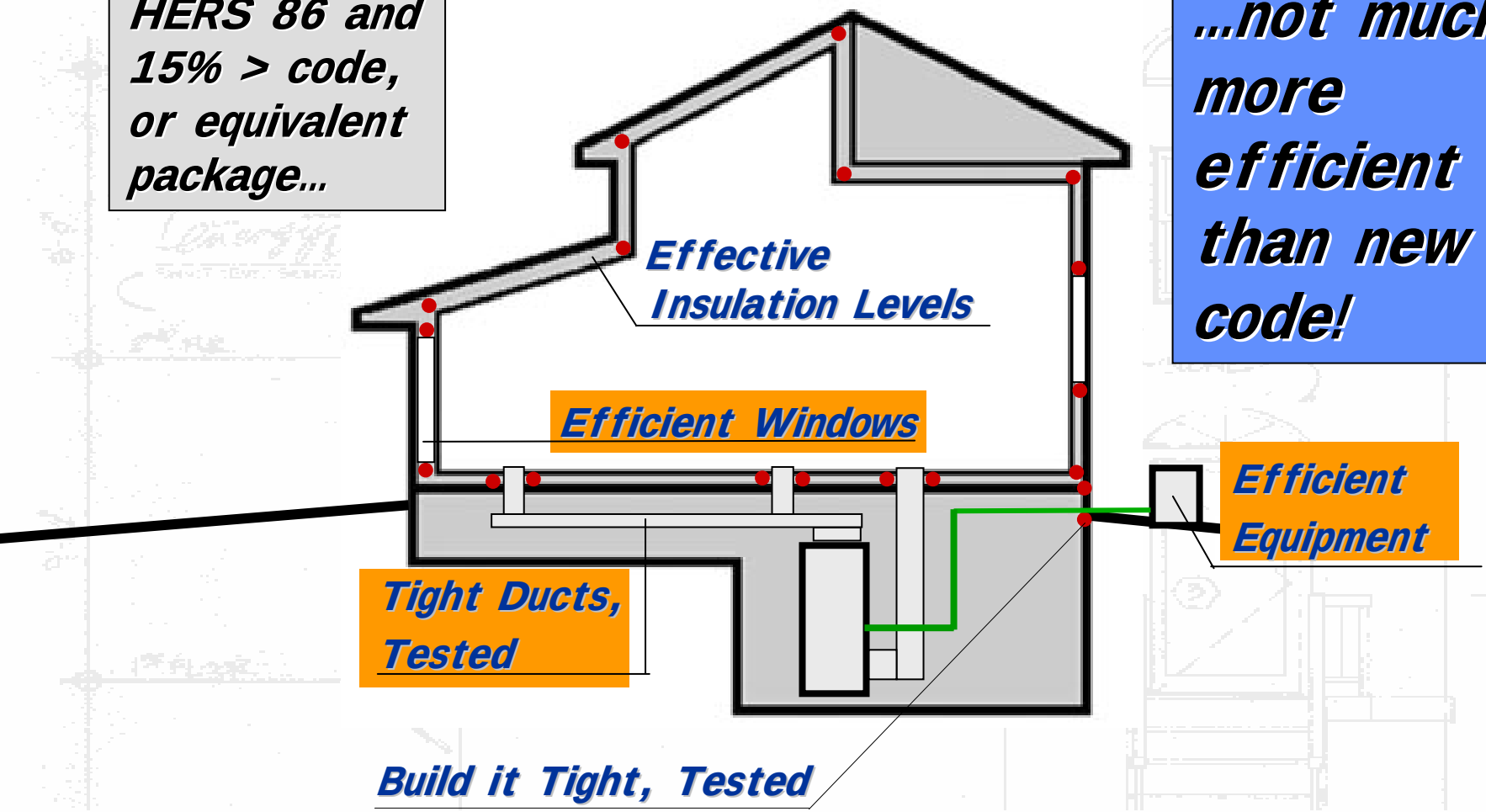
cost-effective

energy efficiency

while assuring same or better performance

WHAT OLD SPEC DELIVERED...

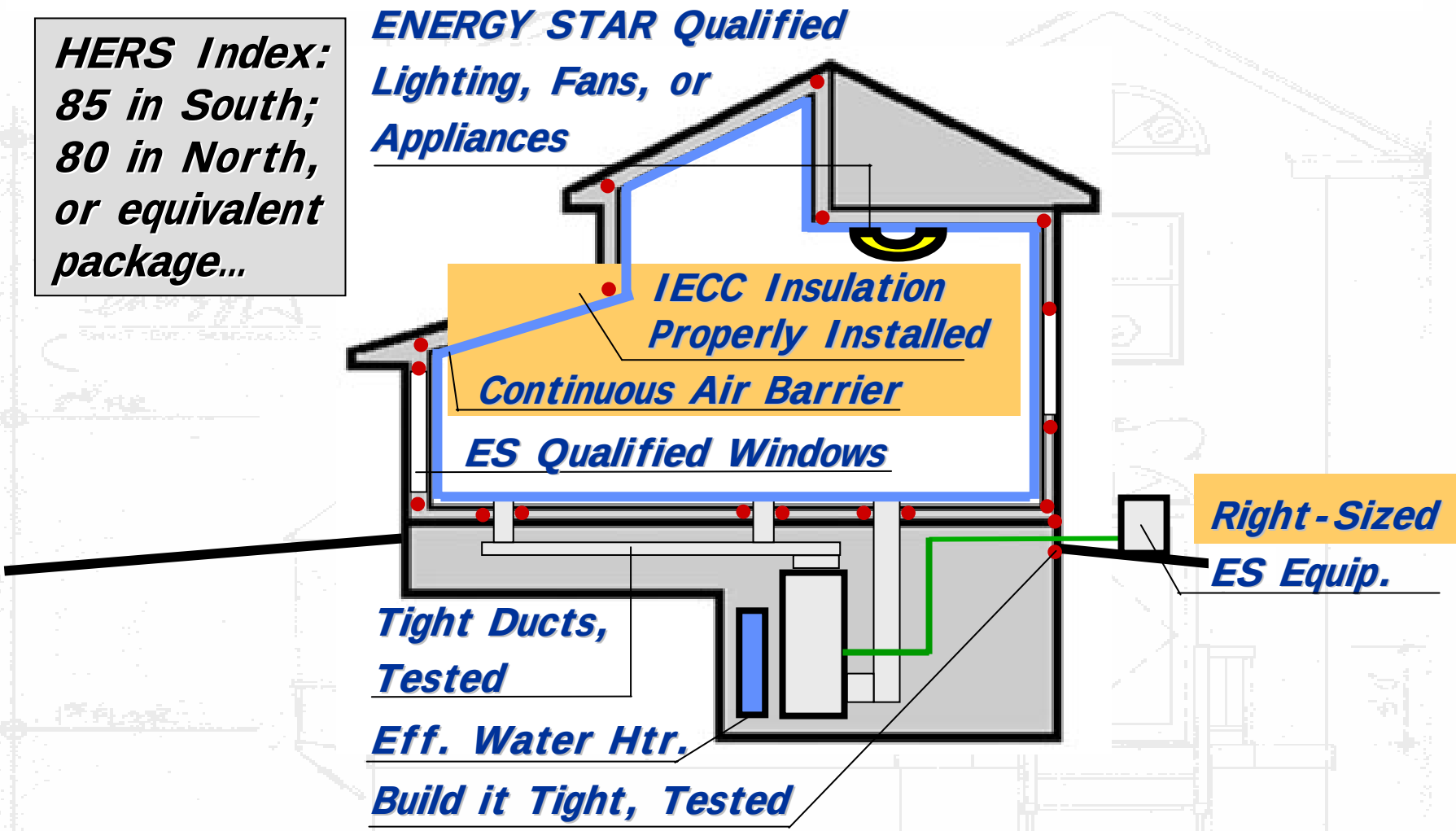
HERS 86 and 15% > code, or equivalent package...



...not much more efficient than new code!

HOW CHANGED: NEW SPEC

HERS Index: 85 in South; 80 in North, or equivalent package…



KEY CHANGES...

Address insulation value killers:

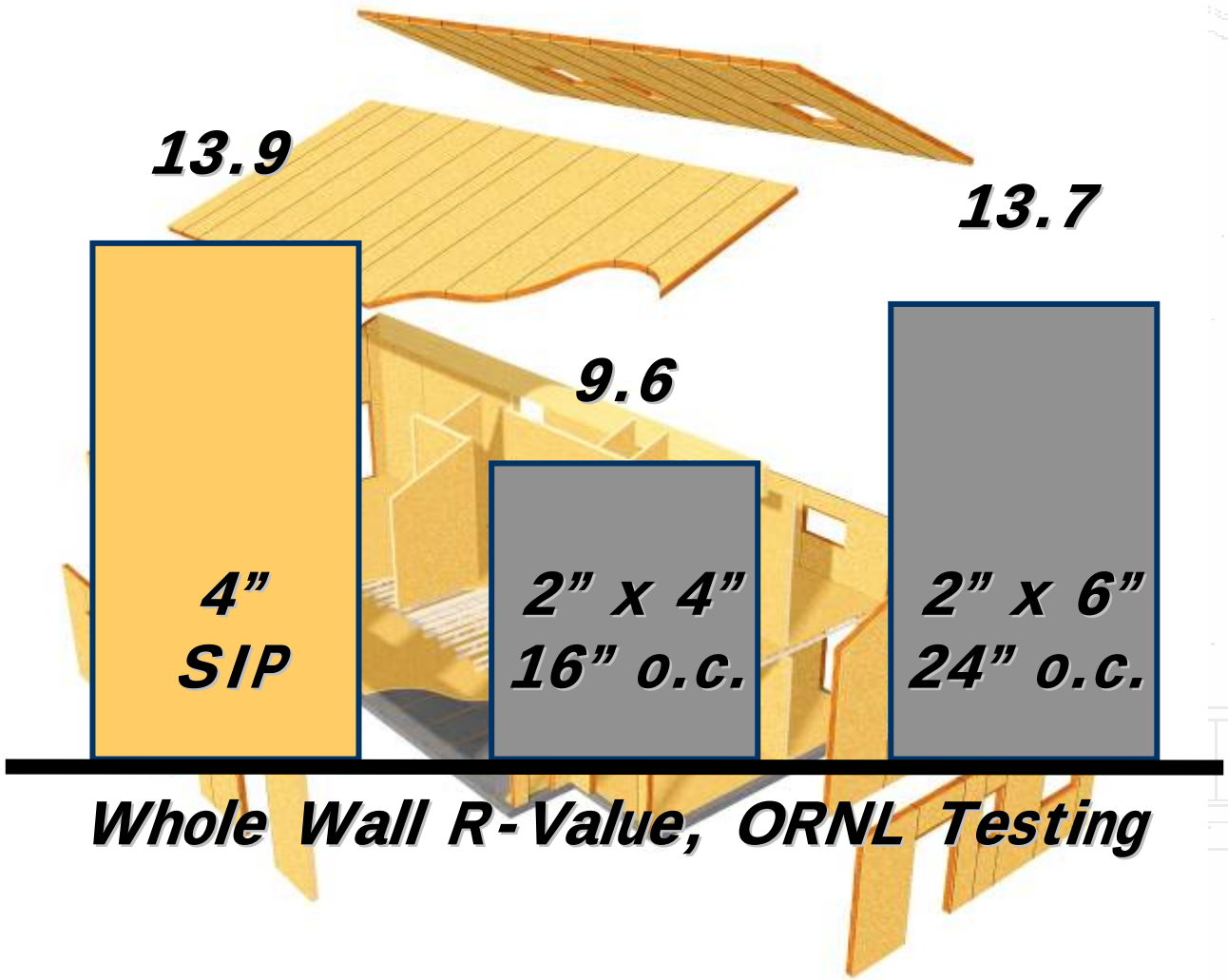
- ***Gaps***
- ***Voids***
- ***Compression***

Insulation Installation Inspection

- ***Incomplete Air Barrier***
- ***Misalignment with Air Barrier***
- ***Wind Intrusion***

Thermal Bypass Checklist

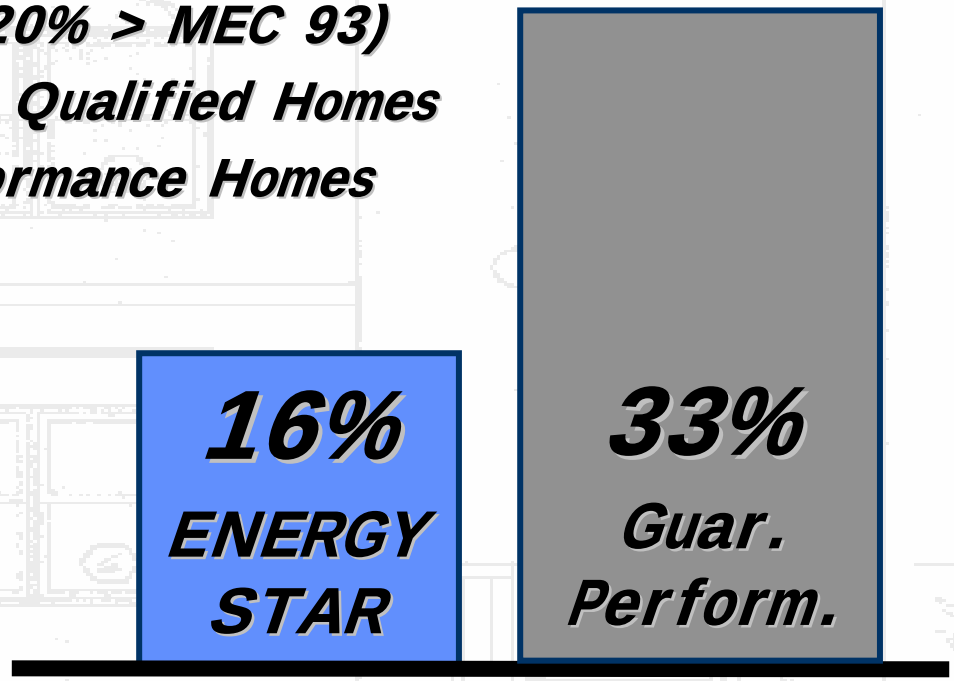
COST ADVANTAGE



COST ADVANTAGE

AEC Study:

- ~7,000 homes (1998 and 2004)
- ~3,300 baseline (est. 20% > MEC 93)
- ~3,000 ENERGY STAR Qualified Homes
- ~800 Guaranteed Performance Homes



Energy Savings Compared to Baseline

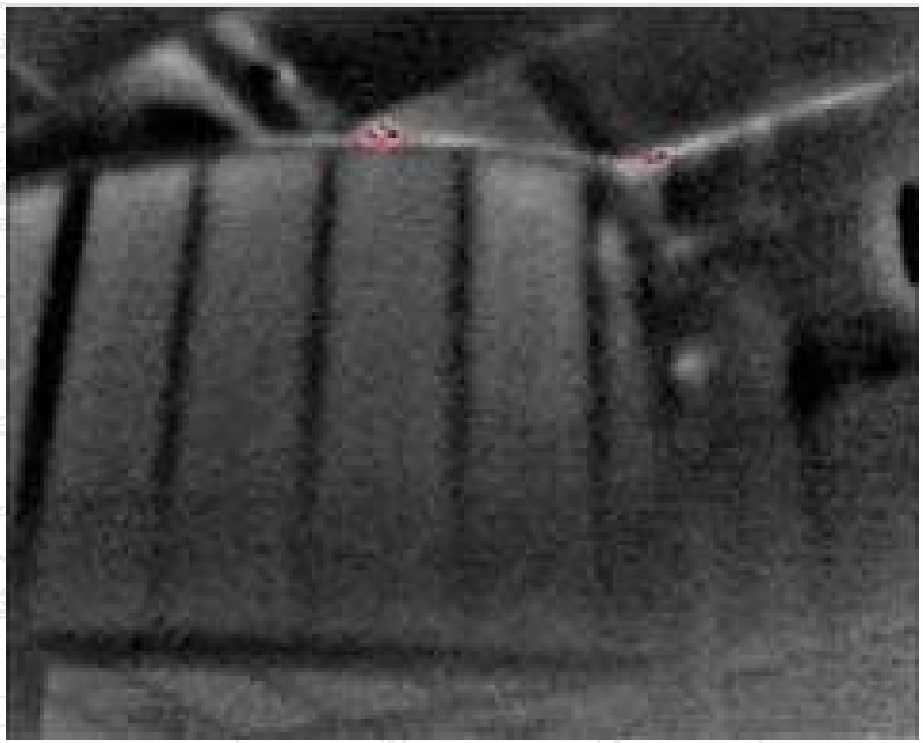
Source: Measuring Public Benefit from Energy Efficient Homes [2005], Advanced Energy Corp.

COST EFFECTIVE?

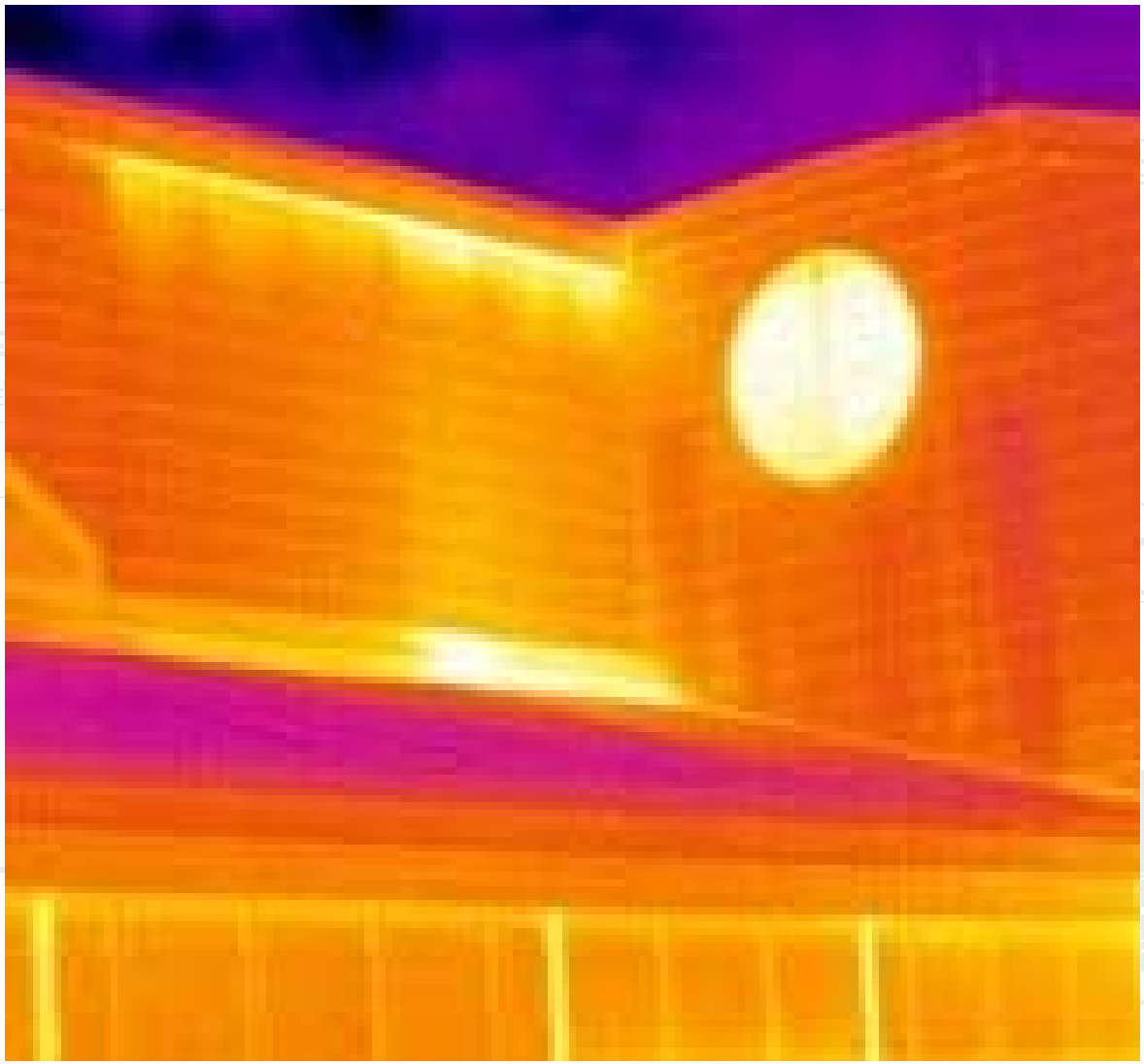
	Monthly	Annual
Utility Savings	**$40**	**$480**
Added Mortgage	**$15**	**$180**
Cost Savings	**$25**	**$300**

= $1,000's *for typical ownership period*

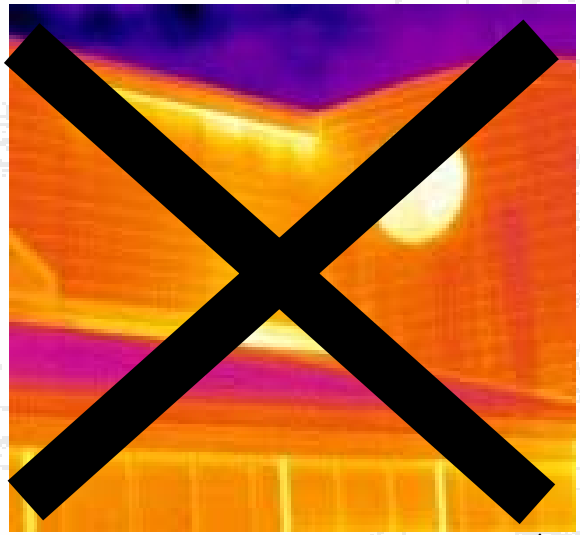
PERFORMANCE ADVANTAGE



PERFORMANCE ADVANTAGE



PERFORMANCE ADVANTAGE



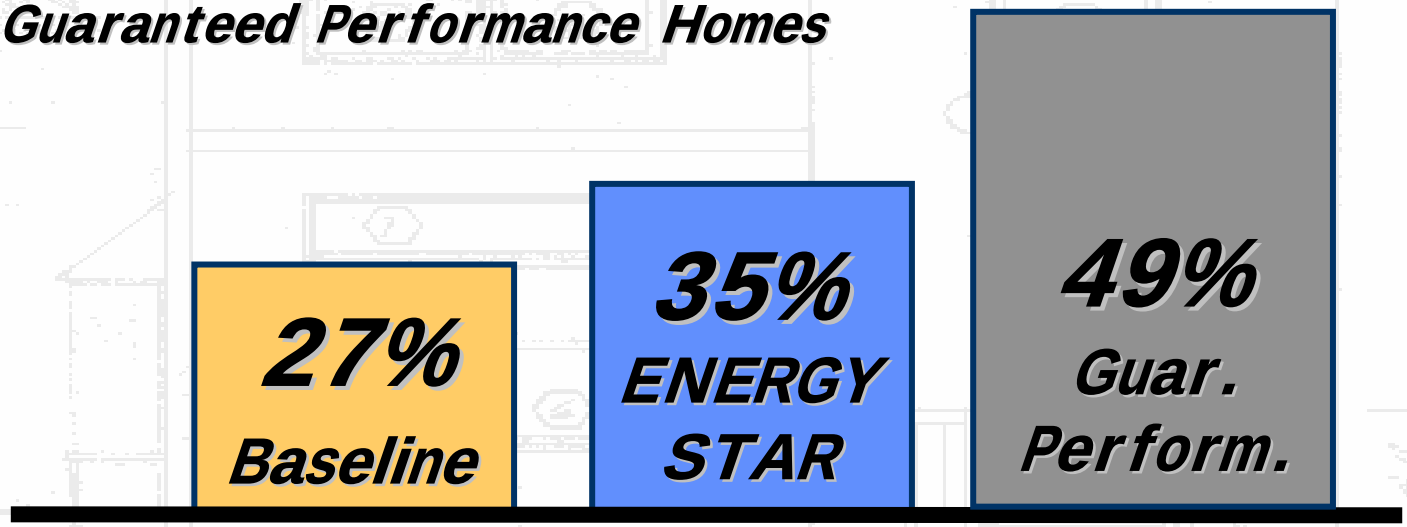
=

- ***Lower Utility Bills***
- ***Improved Comfort***
- ***Improved Quiet***
- ***Improved IAQ***
- ***Improved Durability***

PERFORMANCE ADVANTAGE

AEC Study:

- ~700 new home owners direct-mail survey
- ~200 baseline homes (est. 20% > MEC 93)
- ~250 ENERGY STAR Qualified Homes
- ~235 Guaranteed Performance Homes



% Homeowners Completely Satisfied w/Comfort

Source: Measuring Public Benefit from Energy Efficient Homes [2005], Advanced Energy Corp.

WHY NEW SPEC CHANGED?

ENERGY STAR

Change to ensure:

- *greater energy efficiency than standard*
- *cost advantage*
- *performance advantage*

…in other words,

protect the brand!

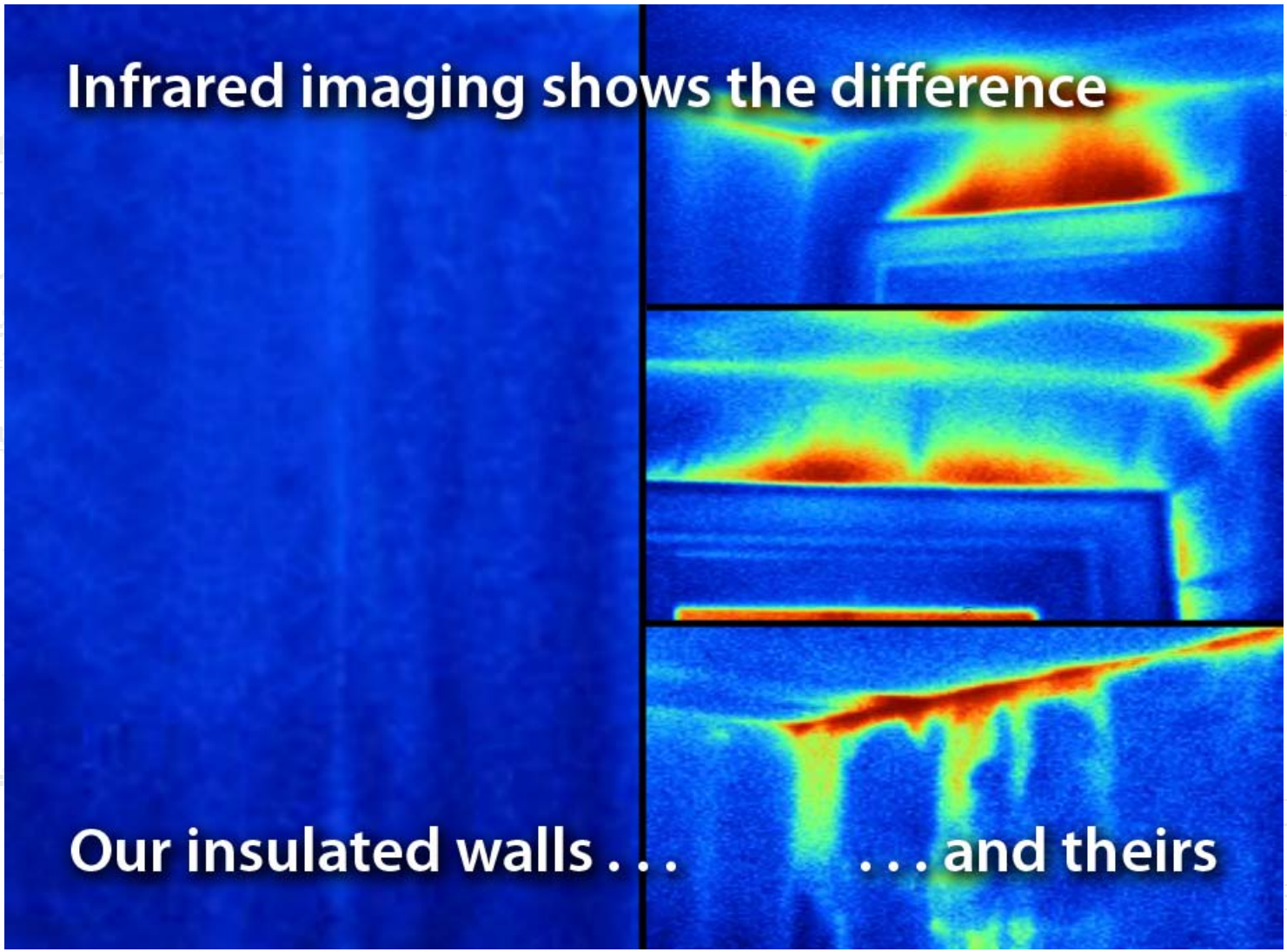
The Builder Value Behind

Thermal Bypass

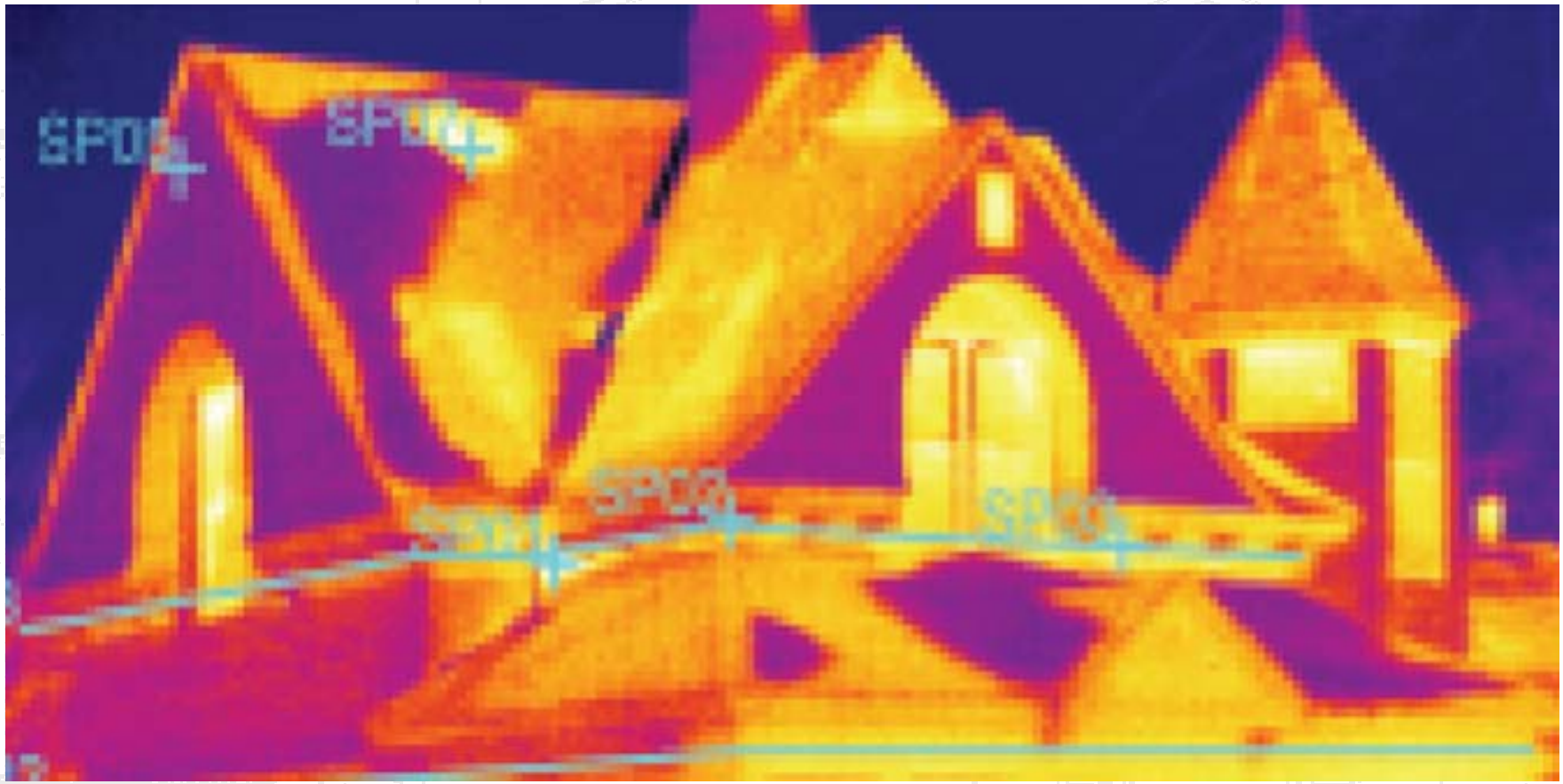
BUILDER VALUE

- ***Visible Quality***
- ***Obsolete Competition***
- ***Reduced Risk***
- ***Customer Satisfaction***
- ***Added Recognition***

VISIBLE QUALITY

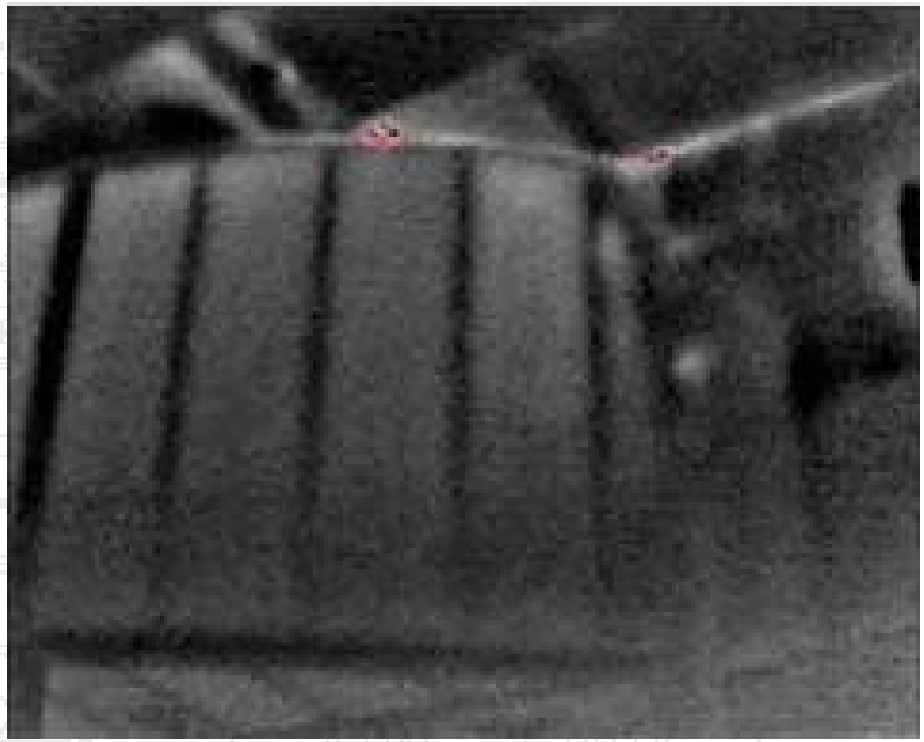


OBSOLETE COMPETITION



Used Homes

OBSOLETE COMPETITION



New Code Homes

REDUCED RISK

FLIR IN FOCUS | COST JUSTIFICATION SERIES

Infrared Energy Auditing – How Home Inspectors Gain a Competitive Edge

According to the U.S. Department of Energy, the typical family spends close to $2,200 a year on their home's utility bills and unfortunately, a large portion of that energy is wasted due to insufficient insulation and a lack of weather stripping around doors and windows. Professional home inspectors and energy auditors have been using leading-edge infrared technology to perform energy auditing of homes and buildings to improve energy efficiency, thus leading to savings on energy costs.

Howard Vics of Building Performance Consulting in Schenectady, NY and Gary Goodman of Energy Construction, LLC in Ravena, NY rely on their FLIR Systems EX320 infrared camera for home energy auditing assessments. Built for harsh environments, the EX320 is a rugged yet flexible infrared solution featuring interchangeable optics, high-resolution imaging and extreme thermal sensitivity. Feature-rich and affordable, the EX320 is the smallest, smartest infrared camera on the market today.

"We are thrilled to have this instrument," said Vics. "We use the EX320 on every job, whether it's for a comprehensive home energy audit, heat loss analysis, or for a quality assurance check of installed insulation. As I complete the assessment, I can easily detect missing insulation in walls and ceilings, or air leakage around doors, windows and along the foundation. We can then develop an insulation and air-sealing strategy to address the problem. By using an infrared camera, I am able to instantly see and diagnose the problem, via a nondestructive method, which is a definite competitive edge for our business."

Both Vics and Goodman work with the New York State Energy Research and Development Authority (NYSERDA), and have been certified by the Building Performance Institute. The New York Energy $martSM Program and Energy Star® have partnered together to develop a program to assist homeowners to make energy efficiency improvements. Having a qualified home performance inspector, who has been trained in Building Science, perform a comprehensive energy audit will reveal where there is energy being wasted, so improvements can be made to enhance safety and comfort.

"We also use our FLIR infrared camera for the Energy STAR® new homes program as well," Vics explains. "First, I do an evaluation of the building plans, followed by two or three on-site inspections during critical stages of construction and heating system configuration. It is at the final stages (before and after drywall installations) that the ThermaCAM thermal imaging camera is key, because I can "see" duct leakage and inconsistencies of insulation." The final energy audit takes place when the construction is complete, just before the owner gets their certificate. "We have found that the IR camera is an invaluable tool when doing building diagnostics of newer homes."

Goodman, who specializes in the application and installation of insulation and air sealing techniques, uses the infrared camera before starting a job and after installation of insulation as a final quality assurance check, to make sure he hasn't missed a bay or some other source of cold air.

Infrared thermography is a well-accepted method of imaging and evaluating the thermal efficiency of home and building insulation, doors, windows, and other penetrations, along with the efficiency of heating and cooling systems. Home energy auditors have been able to proactively address the issue of wasted energy by using infrared cameras, and in turn help to make homes more energy efficient, saving money and natural resources.

About FLIR Systems, Inc.

FLIR Systems, Inc. (NASDAQ: FLIR) designs, manufactures and markets infrared imaging systems worldwide. Commercial product applications include non-destructive testing, research and development, manufacturing process control, predictive maintenance/condition monitoring, and broadcast imaging. With over 30 years experience and more than 20,000 of its IR systems in use, FLIR is the global leader in infrared cameras, software, service, training and support. FLIR ThermaCAM thermal imaging cameras are the most widely used IR non-contact temperature measurement systems worldwide. FLIR products also play pivotal roles in such diverse applications as public safety, defense, navigation, and search and rescue. For more information, please visit our website at: www.flirthermography.com or call 1-800-464-6372.

Howard Vics is certified by the Building Performance Institute in Building Analysis and is a Certified Thermographer with a specialty in Building Science. He formed Building Performance Consulting in 2004 and serves the greater Capital region performing home energy audits, infrared thermography and building diagnostics. Gary Goodman is "triple certified" by the Building Performance Institute with specialties in Building Analysis, Shell, and Heating Systems and has been insulating and air sealing homes in the Capital region for over 25 years. For more information, you can reach Howard Vics at (518) 355-4546 and Gary Goodman can be reached at (518) 756-6303.

FLIR
The Global Leader in Infrared Cameras

REDUCED RISK

Thermal Bypass Checklist and Code:

- *insulation "substantial contact"*
- *vapor retarder on warm side in CZ ≥5*
- *insulation per manufacturer specs*
- *fire-blocking and draft-stopping*
- *ICAT fixtures to unconditioned attic*

At least 50% of TBC required by code but not enforced…

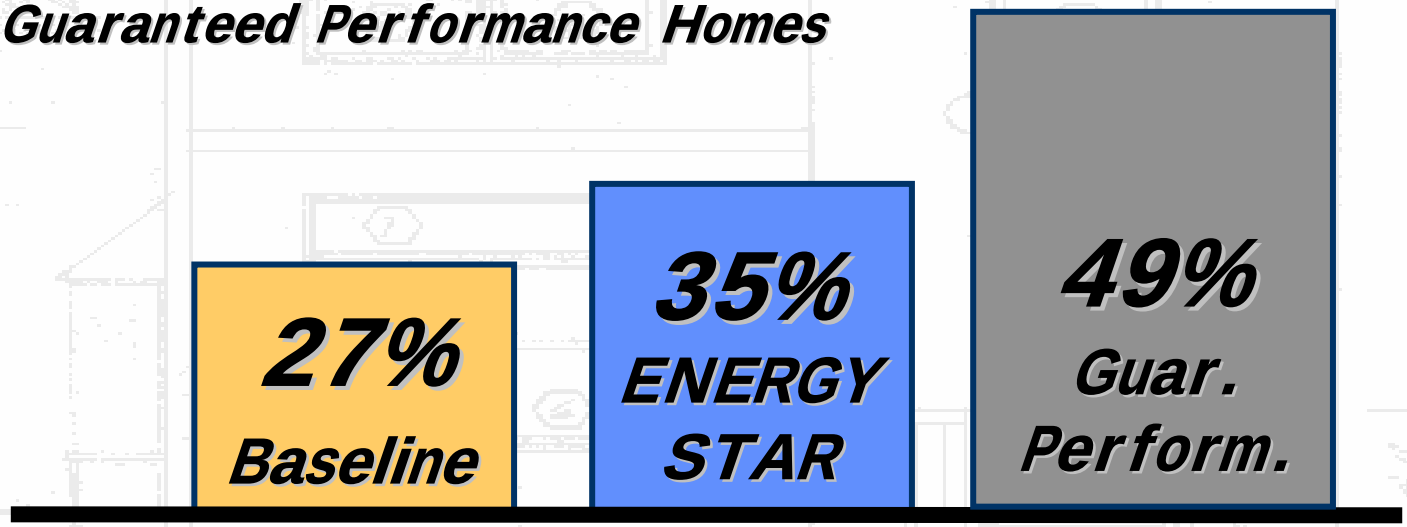
Are builders still liable?

REDUCED RISK

CUSTOMER SATISFACTION

AEC Study:

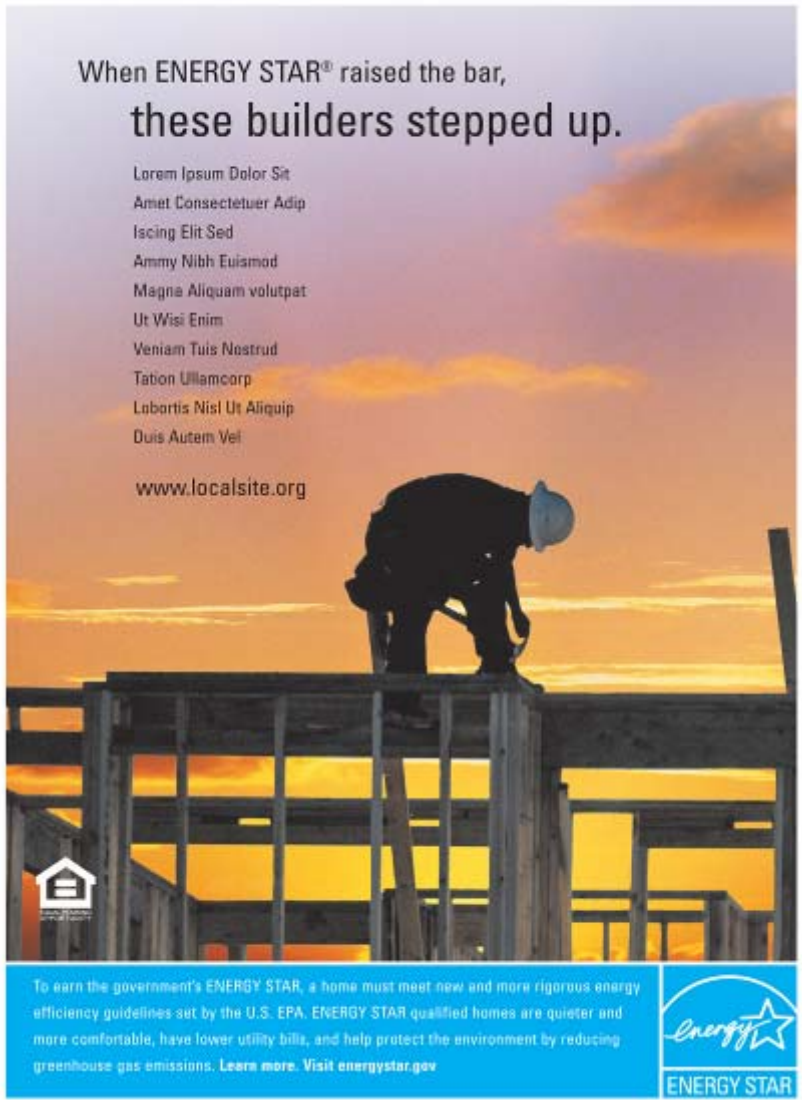
- ~700 new home owners direct-mail survey
- ~200 baseline homes (est. 20% > MEC 93)
- ~250 ENERGY STAR Qualified Homes
- ~235 Guaranteed Performance Homes



% Homeowners Completely Satisfied w/Comfort

Source: Measuring Public Benefit from Energy Efficient Homes [2005], Advanced Energy Corp.

ADDED RECOGNITION



BUILDER VALUE PROPOSITION

ENERGY STAR Avg. Cost: $2,000

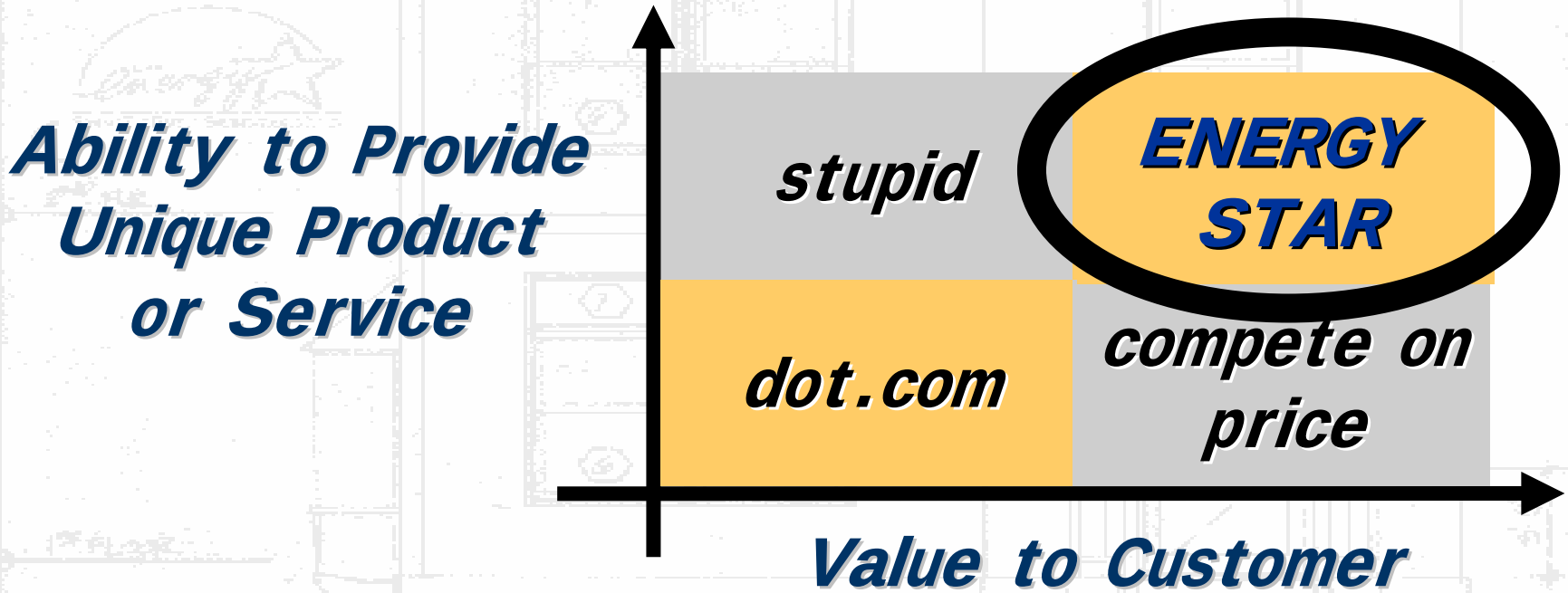
Avg. Cost of New Home: $400,000+

Visible Quality
Obsolete Competition
Reduced Risk
Customer Satisfaction
Added Recognition

<1%

JUMP TO THE NEXT CURVE:

"Be unique and useful"



Guy Kawasaki
The Art of Innovation

HOW TO GET MORE INFORMATION

On the Web at:

http://www.energystar.gov/homes