

RESNET 2008 ANNUAL CONFERENCE

ENERGY STAR QUALIFIED HOMES:

WHERE HEADED?

Presented by:

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Distant Past: 1995 Observations

- Very Leaky Ducts
- Inconsistent Air Tightness
- Minimal Use of Low-E Windows
- Spotty Use of Efficient Equipment
- Poor Quality Control Systems

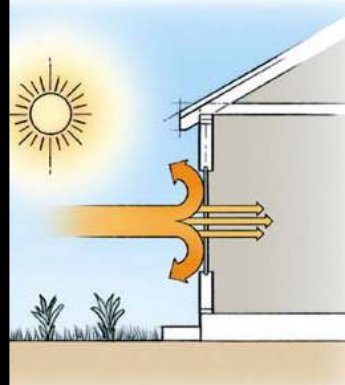
Distant Past: Old ENERGY STAR Spec



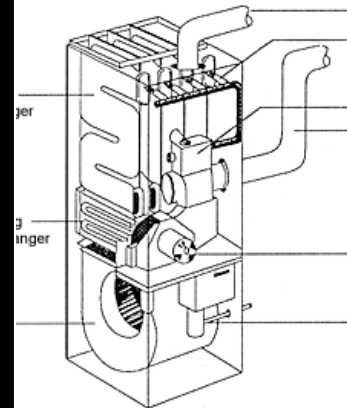
Tight
Ducts



Air
Sealing



Advanced
Windows



Efficient
Equipment



Field
Verified

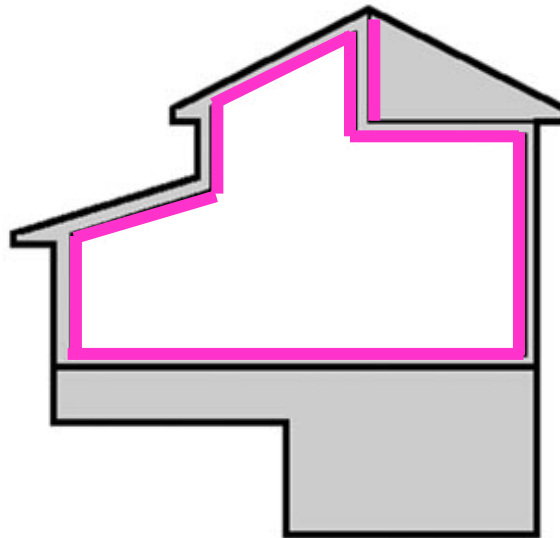
Recent Past: 2005 Observations

- Stronger Energy Codes
- Thermal Envelopes Failing
- Bigger is Better

Present: New ENERGY STAR Spec



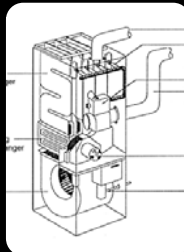
Insulation
Installation



Thermal Bypass



Right Sizing



Reference to
2004 IRC

Present: 2007 Observations



In the world of energy efficient homes...
metrics are flawed...

Myth does not match Reality

Flawed Metrics

- ASHRAE 62.2
- Insulation R-Value
- SEER
- AFUE
- Water Heater Energy Factor
- Lighting Watts
- Square Feet
- Code

Flawed Metrics: ASHRAE 62.2

Myth:

Build Tight, Ventilate Right

Reality:

Build Tight, Maximize Source Control,
than Ventilate as Needed Effectively



This HRV fresh air
intake grill has been
plugged for over
2 years!
Apparently no one
notices the difference!

Maintenance required



Leaves can get sucked into grilles

Ah, another stuck damper,
The saga continues !



Testing findings

Screw pinning damper closed- No airflow



Only testing will find these things

2 problem: Very restrictive ductwork



Poor ducting installation

Soffitt guy doesn't do pipe



Any problem with a **little extra** ?

This is the reading from a 110 cfm fan: *OUCH!*



Testing tells the story

Source Control

- Moisture [Bulk, Vapor]
- Radon
- Combustion Emissions
- Chemicals [Toxic Building Materials]
- Biological Pollutants

...plus Educate Home Owners!

Flawed Metrics: R-Value

Myth:

Insulation R-Value

Reality:

Insulation 'System'

Insulation 'System'

Inherent:

- Thermal Bridging
- Zero-Tolerance (Gaps, Voids, Compression)
- Air Tightness
- Air Barrier Assembly

A photograph showing the interior of a building under construction or renovation. The wall is composed of vertical wooden studs. On the left, there is a window with a white frame. The wall is made of light-colored wood. The window looks out onto a bright, overexposed outdoor area. The text "Thermal Bridging" is overlaid in white at the bottom right.

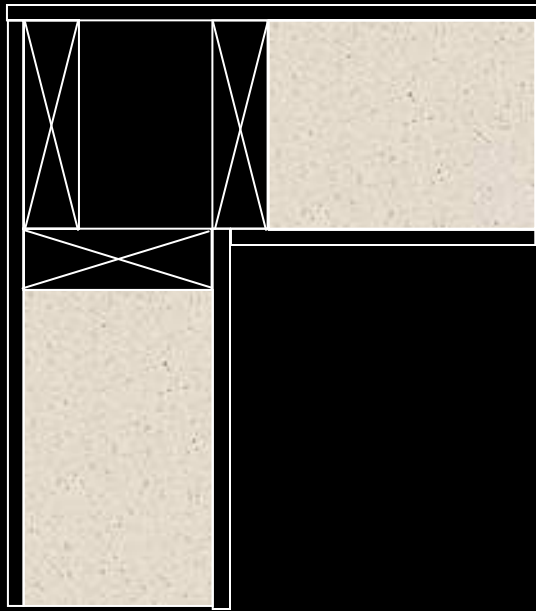
Thermal Bridging



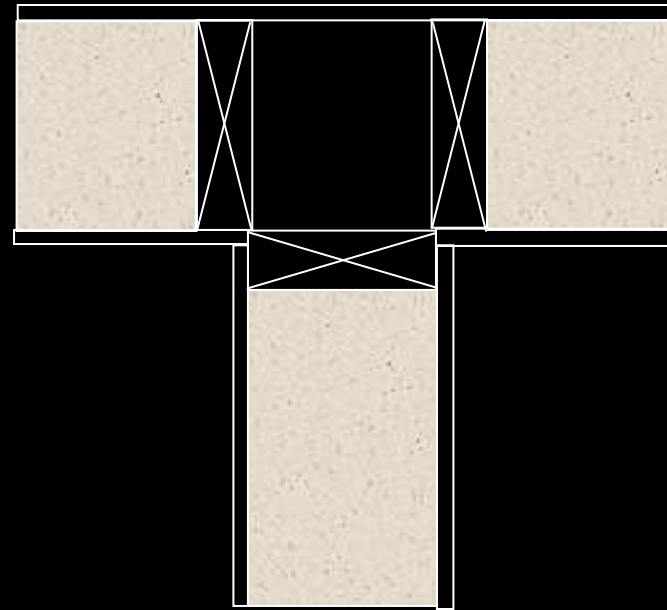
Thermal Bridging on Steroids

Zero Tolerance: Inherent Gaps at Corners/Intersections

uninsulated corner



uninsulated wall intersection





Thermal Bridging + Gaps

~48 wall corners and intersections
along with boxed out framing
= ~ 80 feet Uninsulated Wall!







Zero Tolerance/Air Tightness

Air Barrier Assemblies



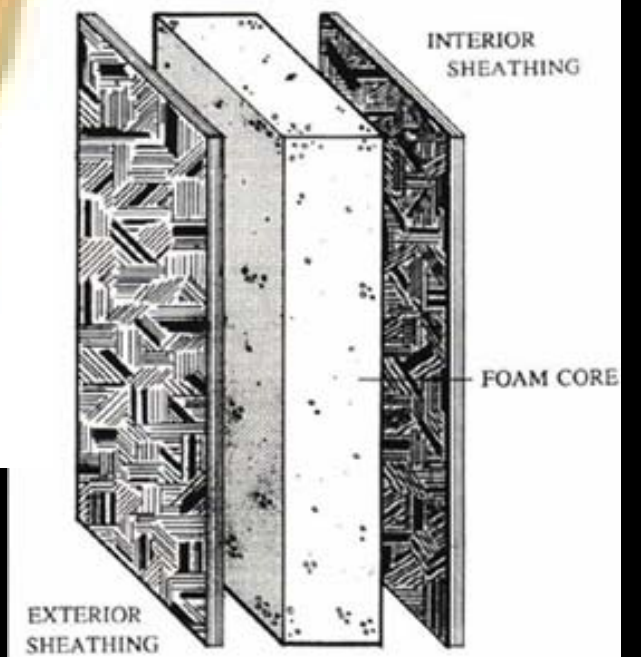
Air Barrier Assemblies

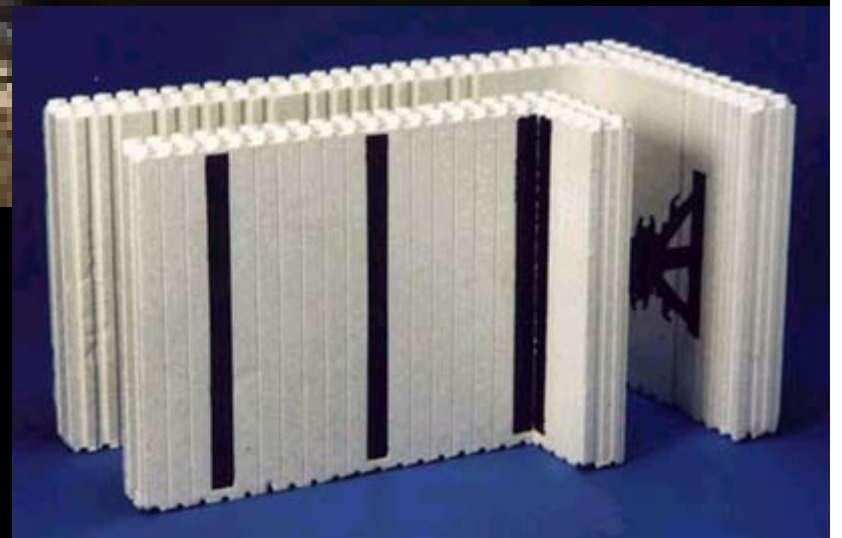




Courtesy of Building Science Corp.







Flawed Metrics: SEER and AFUE

Myth:

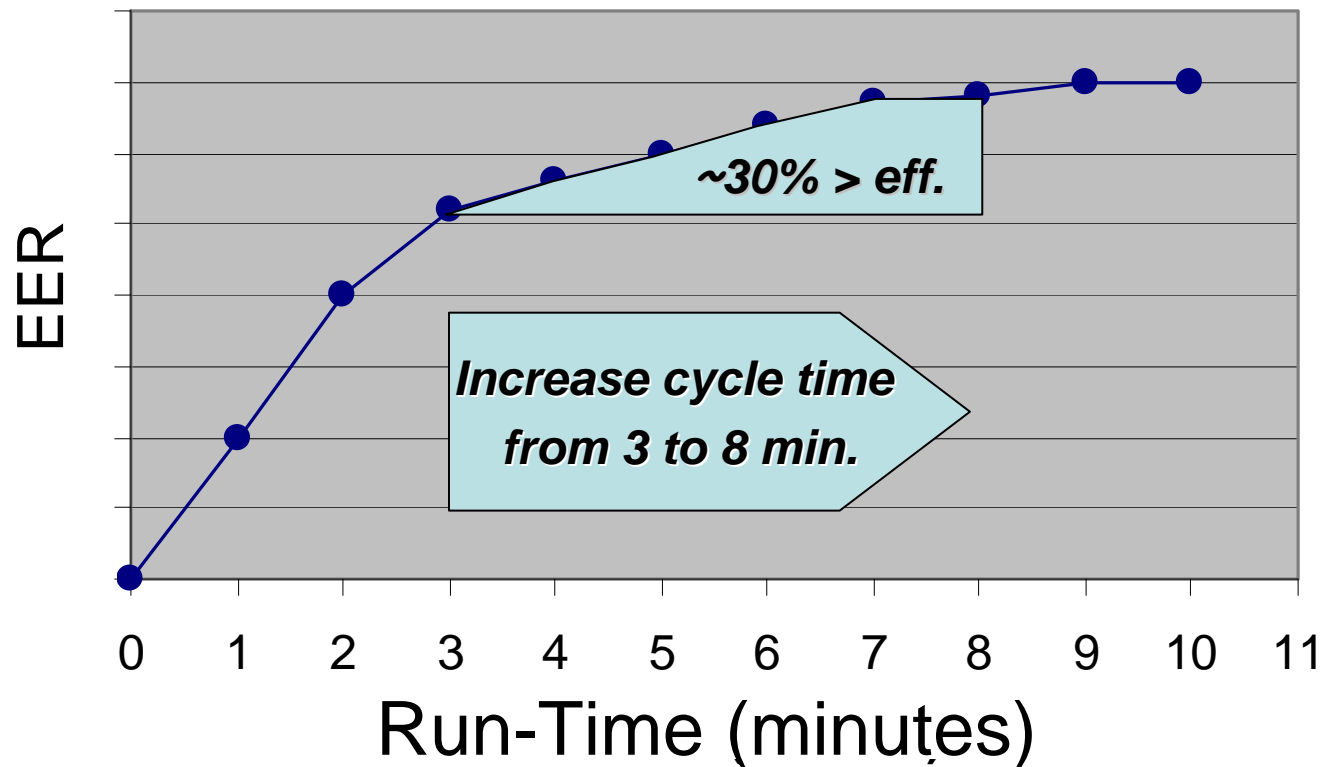
SEER and AFUE = Efficiency

Reality:

Best Practice HVAC = Efficiency

Equipment Right-Sizing

Right-Sized Equipment Lower Operating Cost



Best Practice HVAC

Right-Sizing

Equipment (ACCA Manual J/S)
Ducts (ACCA Manual D)
Terminals (ACCA Manual T)

Air Distribution

Air-Tight/Internal Ducts
Compact Ducts
Static Pressure
Flow Across Coil
Room-by-Room Air Flow
Pressure Balancing
Exhaust Fan Flow Rates

Air Handler

Air-Tight Cabinet
High-Efficiency Fan

Refrigerant Charge

Testing
TXV Valve

Flawed Metrics:

Energy Factor (Water Heaters)

Myth:

Energy Factor = Efficiency

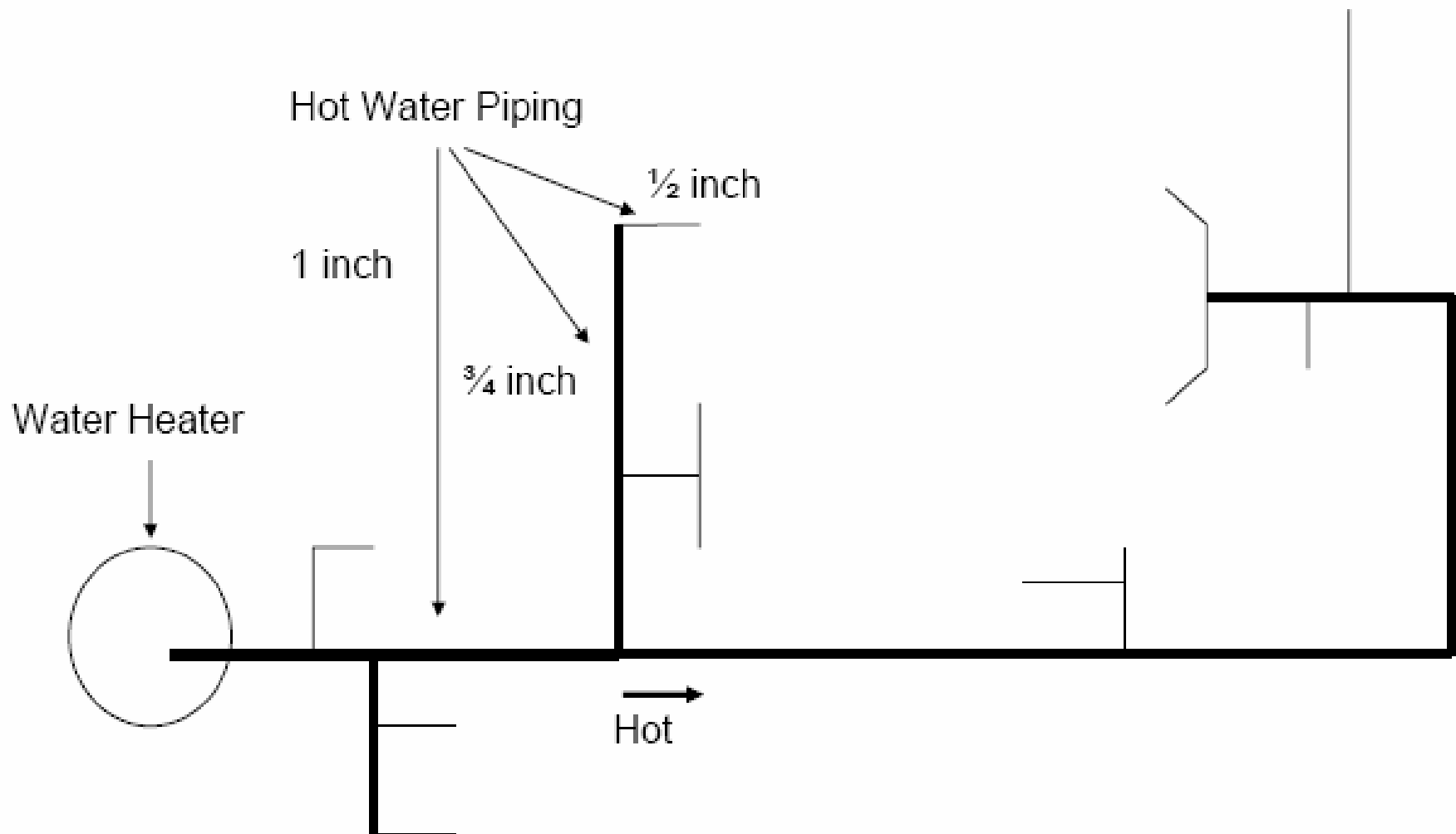
Reality:

Efficient System = Efficiency

Efficient Water Heating System

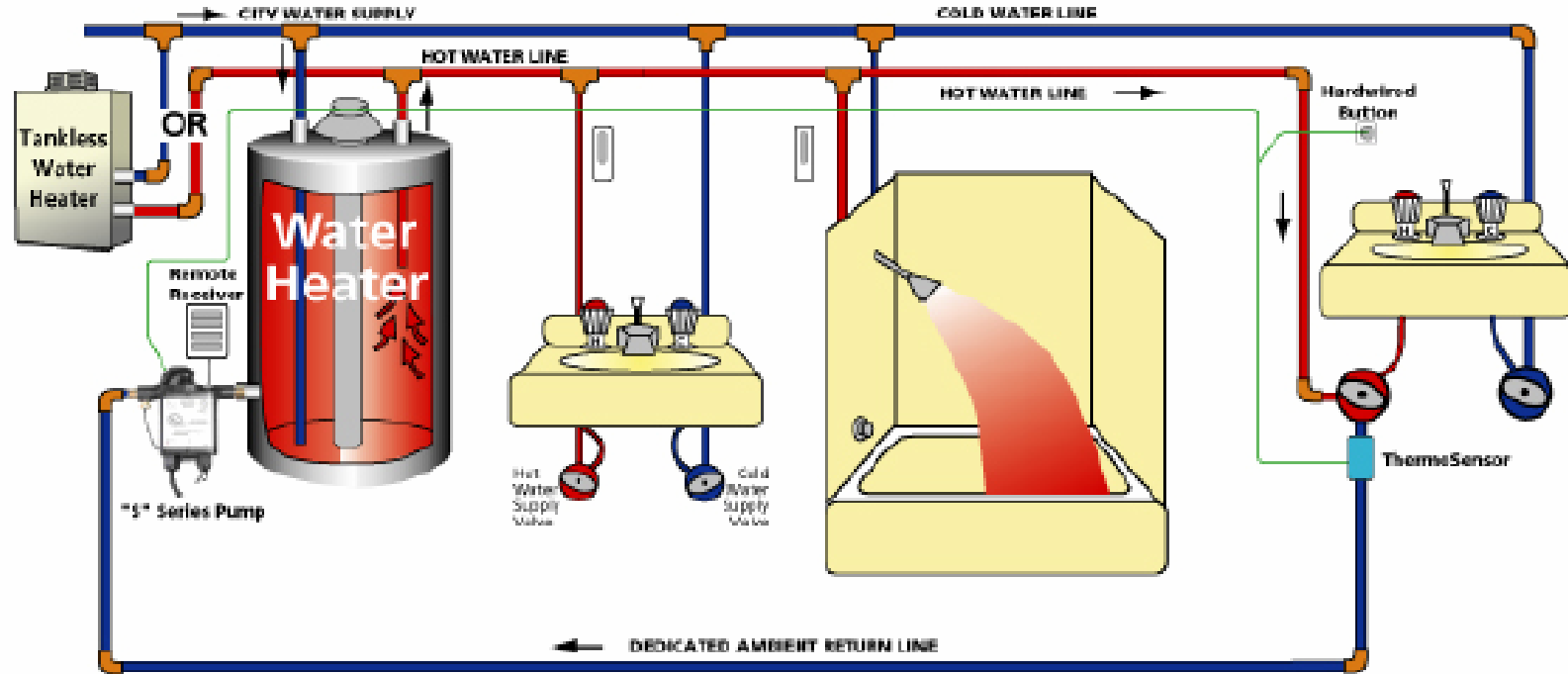
- Energy Factor
- Insulated Piping
- Heat Trap Above Tank/Heater
- Distribution
 - Structured Plumbing
 - Core System (Wet Walls)
 - Manifold System

Single Trunk and Branch



Structured Plumbing

Dedicated Return Line



Flawed Metrics: Lighting

Myth:

Lighting Watts

Reality:

Lighting Lumens/Watt and Design

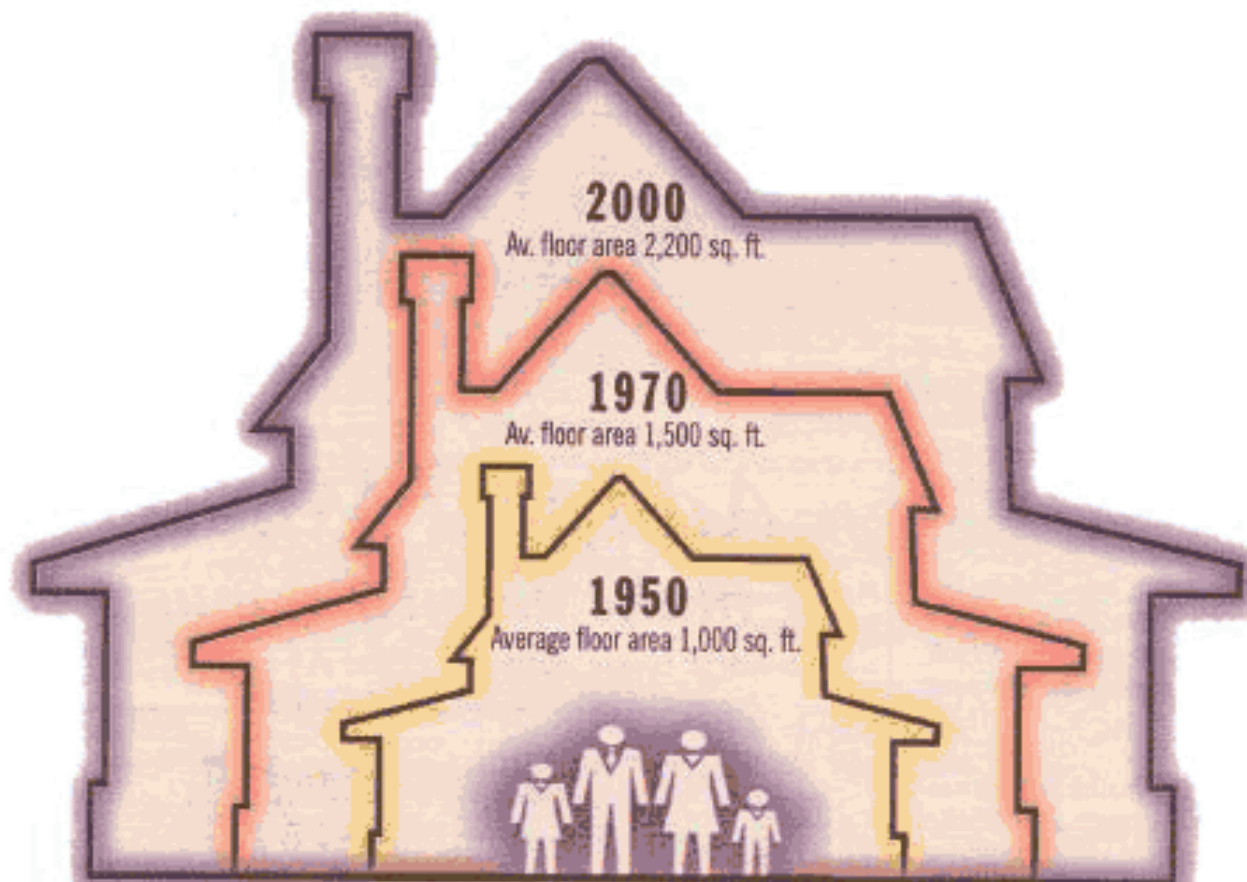




Flawed Metrics:
Square Feet

Myth:
Square Feet

Reality:
Effective Square Feet



Sources: US Census Bureau, National Association of Home Builders

J RHE

Effective Square Feet

- Open Layouts
- Built-in Furniture
- Varying Ceiling Heights
- Outdoor/Indoor Linkages
- Finish and Trim
- Good Design



\$20,000



\$40,000

Flawed Metrics: Code

Myth:

% > Code Defines Efficiency

Reality:

% > Code Misses Low Hanging Fruit

Low Hanging Fruit Missed by Code-Based Programs*

- Moisture Control
- Effective R-Value
- Solar Orientation with Thermal Mass
- Efficient Water Distribution
- Best Practice HVAC Systems
- Advanced Lighting
- Not So Big Homes

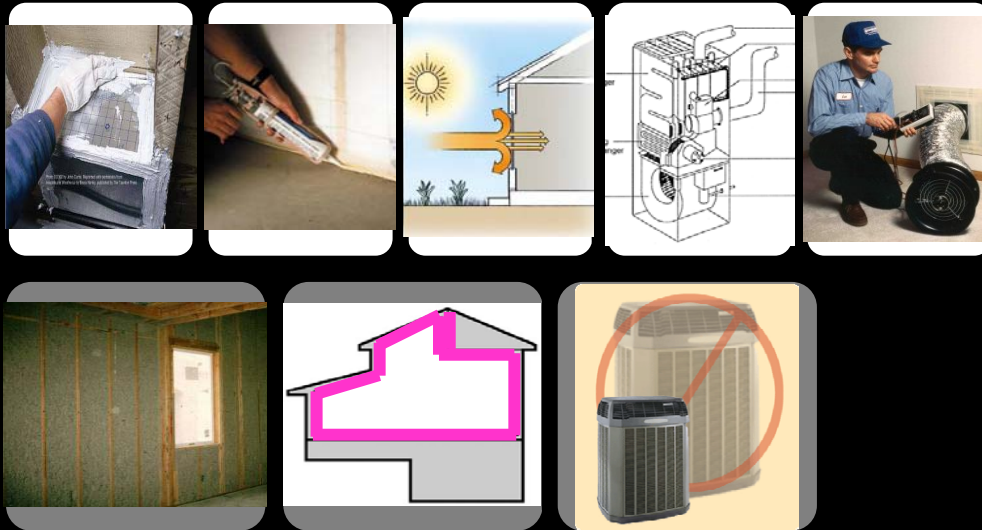
* some exceptions

Future: ENERGY STAR for Homes



Respond to Myths...

ENERGY STAR Indoor Air Package



Source Control

- Moisture
- Radon
- Biological
- Combustion
- Chemical



Ventilation



Filtration



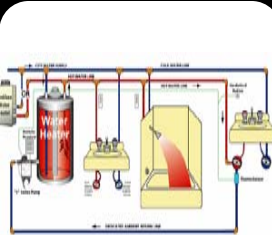
Future: ENERGY STAR Spec



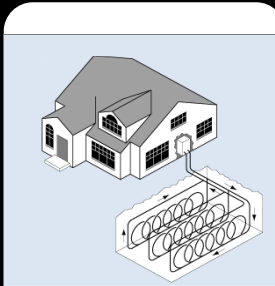
Thermal
Bridging



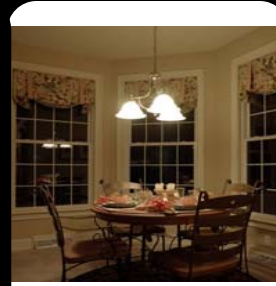
HVAC
System



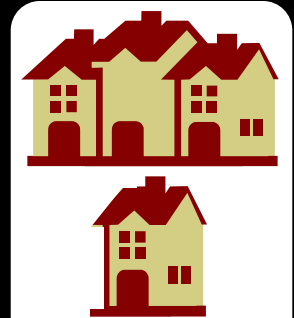
Water
Distrib.



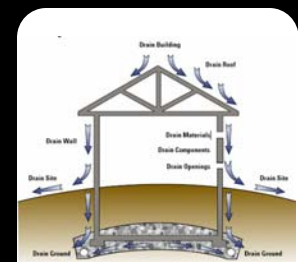
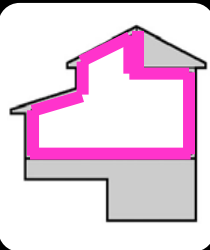
High Eff.
Equip.



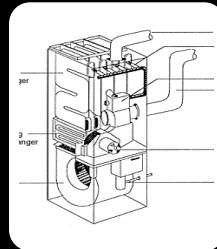
Lighting/
App.



Size



Moisture
Control



For More Information:



On the Web at:

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

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