



# Home Performance with ENERGY STAR

## and ENERGY STAR for New Homes

Marc Milin, ICF International

# ENERGY STAR Brand



- Voluntary, EPA and DOE backed program aimed at protecting the environment through superior energy efficiency
- **64%** of American households recognize the ENERGY STAR logo
- **54%** of Americans that purchased an ENERGY STAR product said that the logo influenced their decision



# Home Performance with ENERGY STAR

A whole-house program with contractor participation and quality assurance.



# A Whole-house Approach...



- Enormous potential for savings in existing homes (recently built or 100 years old!)
- Capture synergies between multiple measures
- Deliver additional customer benefits
  - ✓ Affordability
  - ✓ Comfort
  - ✓ Health and safety,
  - ✓ Improved durability of the home
- House is a system

# Home Performance with ENERGY STAR



- Complete visual and diagnostic inspection
  - ✓ Contractor trained in building science
- Diagnostic testing
  - ✓ Air infiltration, Duct leakage, Combustion safety testing
- Summary report
  - ✓ Results, Recommendations, Estimated costs/savings
- Complete energy saving improvements
- Test out to demonstrate performance improvements & safety
- Quality Assurance essential to unbiased recommendations and best practice installation





HOME  
PERFORMANCE  
WITH  
ENERGY STAR

# Common locations of air infiltration





# Home Performance with ENERGY STAR



- No new label for existing homes
  - ✓ Label applies if a home meets the new homes criteria
  - ✓ Possible for some homes, but not always cost-effective
- Not an energy audit
  - ✓ But requires a whole-house evaluation that includes energy efficiency and related health and safety factors
- Not contractor training and certification
  - ✓ But many programs require training and certification of participating contractors
- Not just a process for improving home energy efficiency
  - ✓ But the goal is to improve whole-house energy performance
    - Heating and cooling equipment
    - Insulation
    - Air Sealing & Duct Sealing
    - Lighting & Appliances
    - Solar or other renewable energy



# Why Home Performance is the Answer



- Focuses attention on cost-effective home improvement options
- Big opportunity for savings - many homes have performance problems
  - ✓ fixing problems improves comfort, health and safety, and energy efficiency
  - ✓ product standards increasing - less saving potential from product rebate strategy
- Homeowners with high bills (and comfort problems) get real help
  - ✓ customer satisfaction
  - ✓ energy audits alone don't work
- Helps your local economy
  - ✓ local contractors receive training and deliver improvements
- Good for environment
  - ✓ improving energy efficiency reduces air pollution and greenhouse gas emissions
  - ✓ start at home - change a light - then improve your whole house

# Regional Program Accomplishments



- **Since 2001, *NYSERDA's* HPwES Program**
  - ✓ Improved the energy efficiency of more than 11,000 homes
  - ✓ Saved over 10,000 MWh/year of electricity
  - ✓ Net annual on-peak demand savings of 1.7 MW
  - ✓ Over 420,000 MMBtu of fossil fuels, primarily natural gas
  - ✓ Average monthly savings to homeowners of \$630.
- **In 2005, *Austin Energy* HPwES Program**
  - ✓ Over 70 participating contractors
  - ✓ 1400 projects
  - ✓ Peak demand savings of over 3000 kW.
- ***Wisconsin Focus on Energy* HPwES Program**
  - ✓ Estimated savings of 1100 kWh of electricity and 500 therms of natural gas per home.

# Cost Effectiveness



- Mature Home Performance with ENERGY STAR programs achieve an estimated levelized cost of conserved energy (CCE) of 0.05 \$/kWh.
- NYSERDA Cost Effectiveness Evaluations
  - ✓ MET 1 (true TRC, all costs some benefits)  
2005 HPwES = 1.4
  - ✓ MET 2 (all costs, plus market based pricing in benefits)  
2005 HPwES = 1.4
  - ✓ MET 3 (true B/C evaluation; includes non-energy environmental benefits)  
2005 HPwES = 2.7

# Building Blocks To National Home Performance



EPA, DOE and HUD funding grant to help develop national certification and accreditation infrastructure for contractors

## Building Performance Institute (BPI)

- Established Standards
- Certifications for Contractor Staff
  - Building Analyst, Shell Specialist, and HVAC Specialist
- Accreditation Procedures for Building Performance Companies
  - Commitment to Whole House Approach
- Expanding to Deliver Nationally
  - Growing Network of BPI Affiliates
  - Partnership with RESNET to Create National Quality Assurance

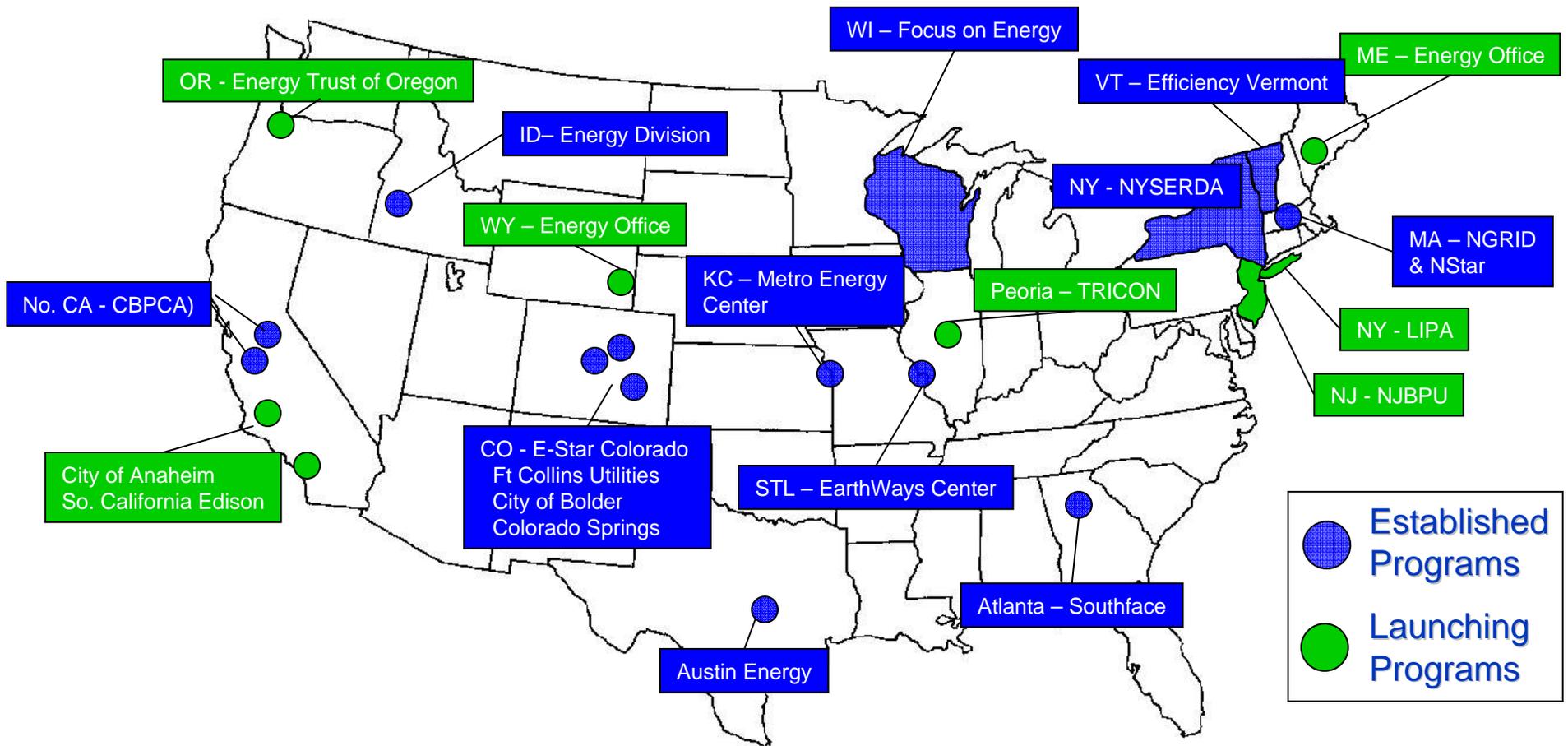


# Regional Programs



- Home performance contracting is happening
- Programs can help by
  - ✓ Contactor Infrastructure Building
    - Providing quality training and mentoring
  - ✓ Serving as a trusted third party messenger to increase market awareness
    - Marketing and promotion of the program and its participants
  - ✓ Helping secure preferred financing
    - Interest rate buy-downs may be more effective than rebates in some cases
  - ✓ Providing **Quality Assurance**

# National Activity





# ENERGY STAR for New Homes

A whole-house program with  
third-party verification.



# What is an ENERGY STAR home?

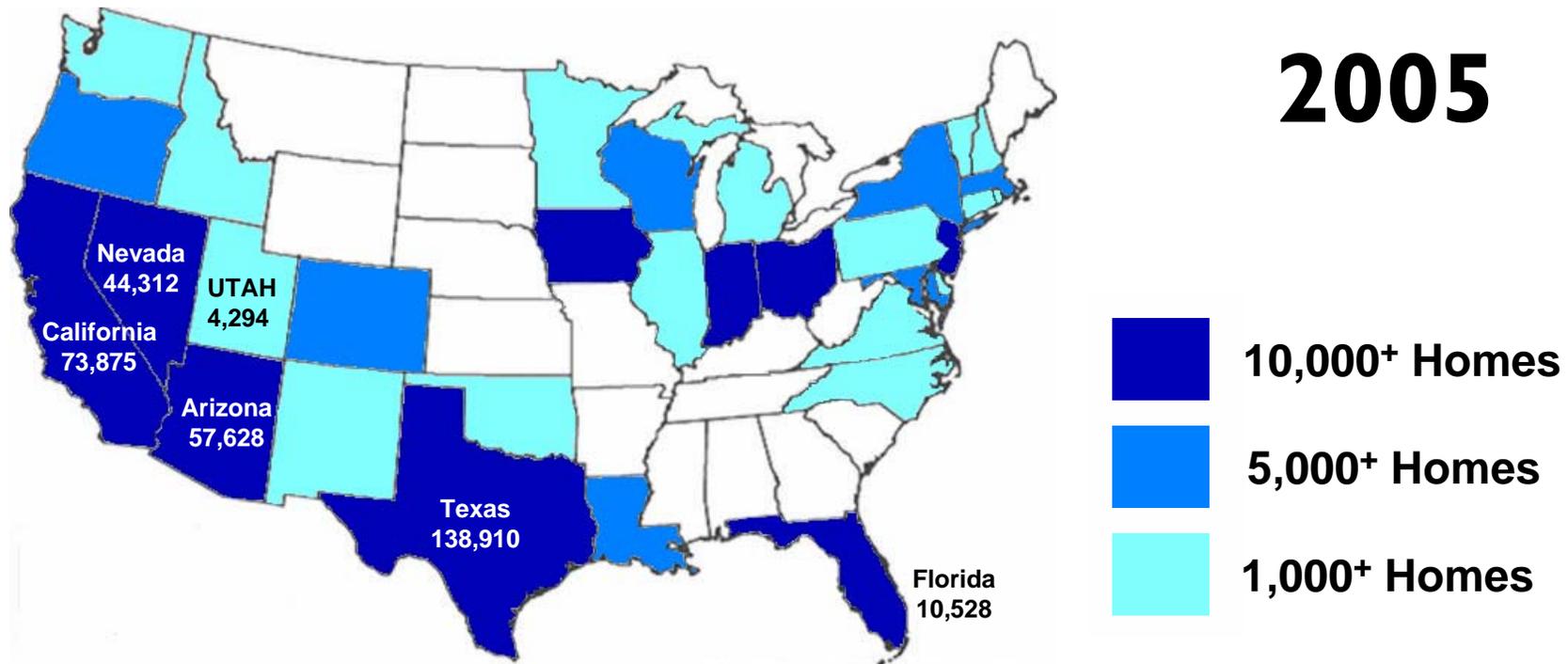


- Minimizes energy needed to control the interior environment while maximizing comfort
- **15-20%** more energy efficient than a standard *new* home
- Passes third party inspection by a certified home energy rater

# Visible success

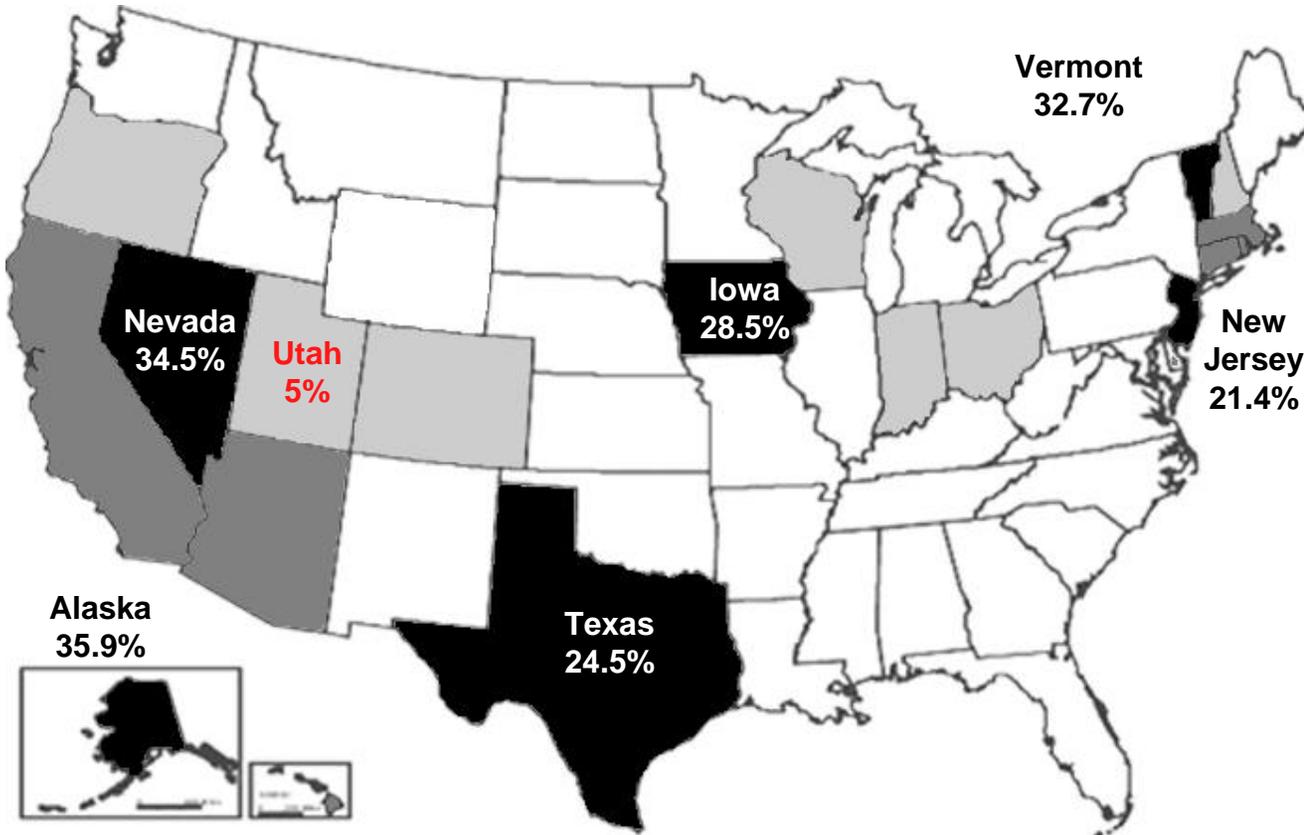


## 2005



Over **560,000** families live in ENERGY STAR qualified homes.

# Market differentiation



1% of the homes built in Pennsylvania in 2005 were ENERGY STAR qualified



ENERGY STAR Market Penetration 2005

# Recent Changes to ENERGY STAR New Homes

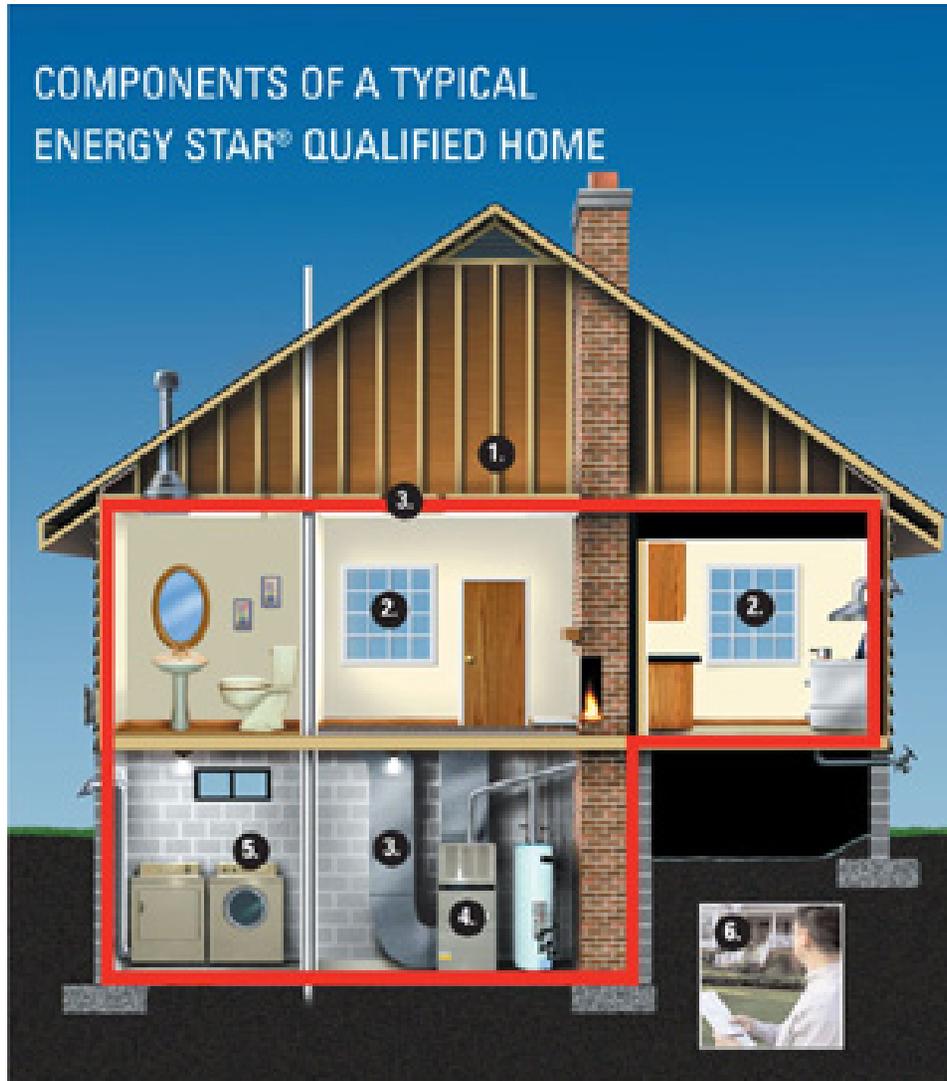


- *Increased adoption of IECC*
  - ✓ *34 states have adopted 1998 IECC or higher*
  - ✓ *Pennsylvania has mandated 2006 IECC*
- *HERS Guidelines Reference Home to IECC*
- *NAECA increase to 13 SEER*
- *Lack of quality control:*
  - *insulation installation*
  - *air barrier details*
  - *HVAC best practices (e.g., sizing, balancing)*
  - *moisture control*

# What is an ENERGY STAR New Home?



COMPONENTS OF A TYPICAL ENERGY STAR® QUALIFIED HOME

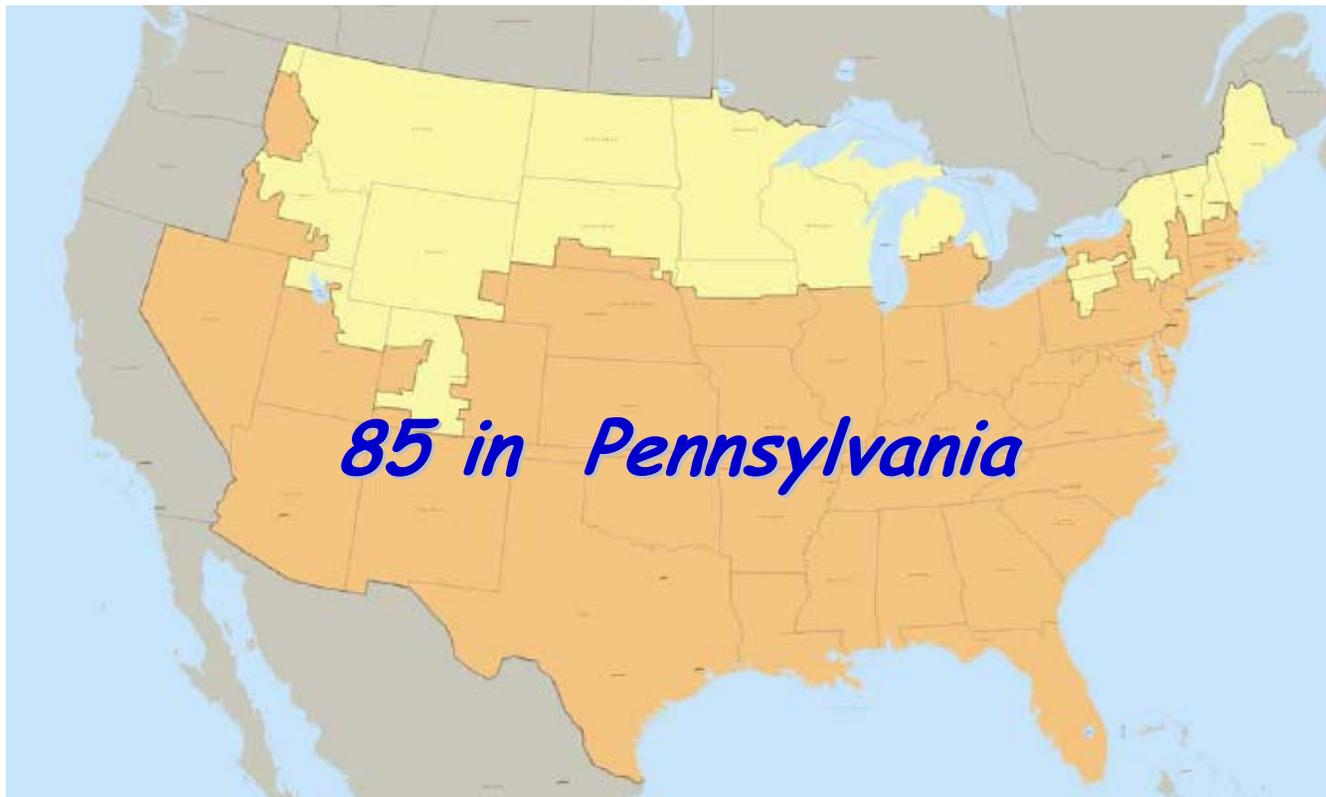


1. Effective insulation
2. High performance windows (Low-E)
3. Tight construction and ducts
4. Efficient heating and cooling equipment
5. Lighting and appliances
6. Third-party verified

# PERFORMANCE PATH



## *HERS Index Threshold*



*Note: Exceptions for Manufactured Housing*

# PERFORMANCE PATH REQ.'S



Envelope	Complete the Insulation Inspection & Thermal Bypass Inspection Checklist
Ductwork	Leakage $\leq$ 6 cfm to Outdoors / 100 sq. ft.
ENERGY STAR Products	Include At Least One ENERGY STAR Product Category: <ul style="list-style-type: none"><li>▪ Heating or Cooling Equipment; OR</li><li>▪ Windows; OR</li><li>▪ Any Combination of 5 or More Light Fixtures, Fans (ceiling or bathroom), and/or Appliances</li></ul>
ENERGY STAR Scoring Exceptions	<ul style="list-style-type: none"><li>▪ Solar Photovoltaic electric generation cannot be used to decrease the HERS Index for ENERGY STAR.</li><li>▪ Maximum of 20% Compact Fluorescent Lights (CFL) to decrease the HERS Index for ENERGY STAR.</li></ul>

# THERMAL BYPASS INSPECTION



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

*Insulation  
Installation  
Inspection*

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

*Thermal  
Bypass  
Checklist*

# THERMAL BYPASS INSPECTION



- Requires visual inspection of the 16 most common areas of air leakage and improperly installed insulation:

- Air barrier & thermal barrier alignment
- Shower/Tub at Exterior Wall
- Insulated Floor above Garage
- Attic Knee Walls
- Attic Access Panel/ Drop-down Stair
- Cantilevered Floor
- Duct & Piping Shafts
- Flue Shaft
- Attic Eaves
- Dropped Ceiling/ Soffit
- Fireplace Wall
- Staircase Framing at Exterior Wall/Attic
- Recessed Lighting
- Porch Roof
- Whole-house Fan Attic Penetration
- Common Walls

# Regional Program Accomplishments



- Since 2001, *NYSERDA's* ENERGY STAR New Homes program
  - ✓ Labeled over 6,500 new homes
  - ✓ Saved over 6,000 MWh of electricity
  - ✓ Saved over 440,000 MMBtu, primarily natural gas
  - ✓ Net annual on-peak demand savings of .09 MW
- In 2006, TXU Electric Delivery's ENERGY STAR New Homes program
  - ✓ Labeled over 13,000 new homes
  - ✓ Saved 27 million kWh of electricity
  - ✓ On-peak demand reduction of 32 MW

# Cost Effectiveness



- Mature ENERGY STAR New Homes programs achieve an estimated levelized cost of conserved energy (CCE) of 0.06 \$/kWh.
- NYSERDA Cost Effectiveness Evaluations
  - ✓ MET 1 (true TRC, all costs some benefits)  
2005 Energy Star New Homes = 2.7
  - ✓ MET 2 (all costs, plus market based pricing in benefits)  
2005 Energy Star New Homes = 2.7
  - ✓ MET 3 (true B/C evaluation; includes non-energy environmental benefits)  
2005 Energy Star New Homes = 3.5

# Questions and Discussion



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***On the Web at:***

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

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