

ENERGY STAR v3

Best Practice for the Future of Environmental Design for Homes and Apartments

Presented by the AIA Residential Knowledge Community

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Submit a question to the moderator via the “questions” box. They will be answered as time allows.



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Course Description

ENERGY STAR is an initiative of the U.S. Environmental Protection Agency and the U.S. Department of Energy and requires homes to meet strict guidelines regarding energy efficiency. Although ENERGY STAR is an important program on its own, most holistic green building programs like LEED for Homes and the ICC 700 use ENERGY STAR as a key benchmark for energy efficiency. Overall, nearly 1.2 million ENERGY STAR qualified homes have been built since the program's inception, including more than 126,000 new homes in 2010. However, in 2011, the U.S. Environmental Protection Agency (EPA) has been phasing in new and more rigorous guidelines for homes that will require ENERGY STAR homes to be approximately 15% more efficient than the 2009 International Energy Conservation Code (IECC). This session will discuss requirements for compliance with ENERGY STAR for Homes Version 3, including both single family and multifamily applications, and will include the perspective of a multifamily owner/developer. Session presenters will highlight design issues in particular, including documentation and verification issues especially relevant to architects.



Learning Objectives

1. Know how the ENERGY STAR for Homes program developed and how updates to that program are made.
2. Understand the substantive changes and timeline for such changes being implemented in ENERGY STAR for Homes Version 3, specifically as they impact architects and residential designers.
3. Understand key differences in energy efficiency gains for multifamily versus single family residential properties, including the related impacts on water efficiency and indoor air quality.
4. Learn why these changes are important and how to explain the value of energy efficiency and green building to residential developers and building owners.



Speaker: Dean Gamble



Technical Coordinator

EPA ENERGY STAR
New Homes





ENERGY STAR v3: Best Practice for the Future of Environmental Design for Homes + Apartments

Dean Gamble
EPA

Learn more at energystar.gov

Agenda



- Program eligibility
- The value of ENERGY STAR New Homes, v3
- How to get started with ENERGY STAR New Homes, v3

Program Eligibility



- The following homes are eligible to earn the ENERGY STAR under the New Homes program:
 - Single-family homes
 - Units in any multifamily buildings with 4 units or fewer
 - Units in multifamily buildings with 3 stories or fewer above-grade
 - Units in multifamily buildings with 4 or 5 stories above-grade that have their own heating, cooling, and hot water systems, separate from other units, and where dwelling units occupy 80% or more of the occupiable square footage of the building.
- Multifamily buildings that aren't eligible to participate under the New Homes program may be eligible to participate in the multifamily high-rise program: www.energystar.gov/mfhr

A technician in a white shirt and blue jeans is kneeling on the floor, working on a white furnace. He is holding a small device, possibly a smartphone or a diagnostic tool, and looking at it. The furnace is open, showing its internal components.

The Value of ENERGY STAR New Homes Version 3

The ENERGY STAR brand promise



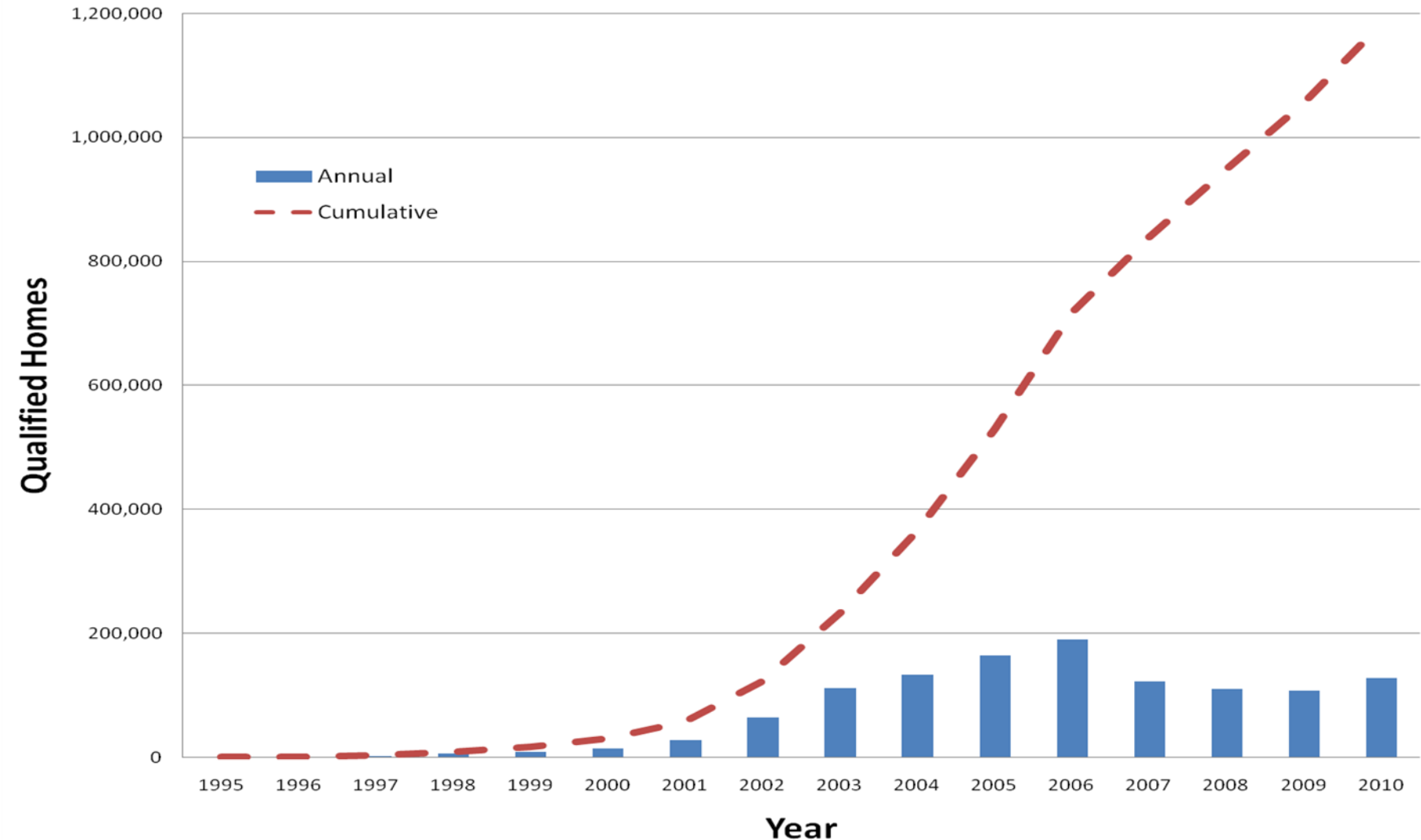
- Cost-effective
- Meaningful improvement in efficiency
- Equal or better performance



Market-Recognized Value



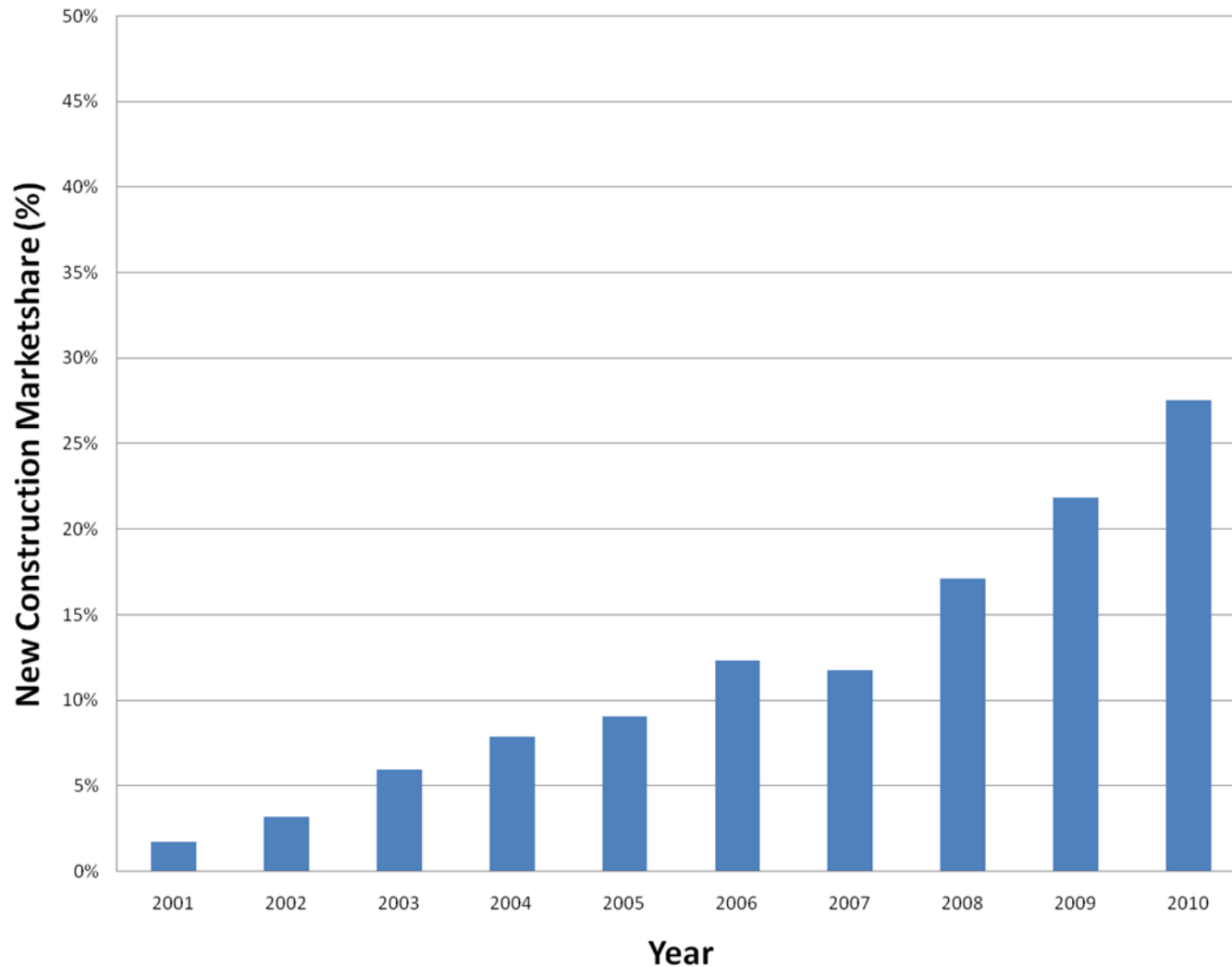
Number of ENERGY STAR Qualified Homes



Market-Recognized Value



Market Share of ENERGY STAR Qualified Homes



Value through building science



If you want your homes to be..

Affordable

Comfortable

Durable

Building science says to have a..

1

**Complete
Thermal
Enclosure
System**

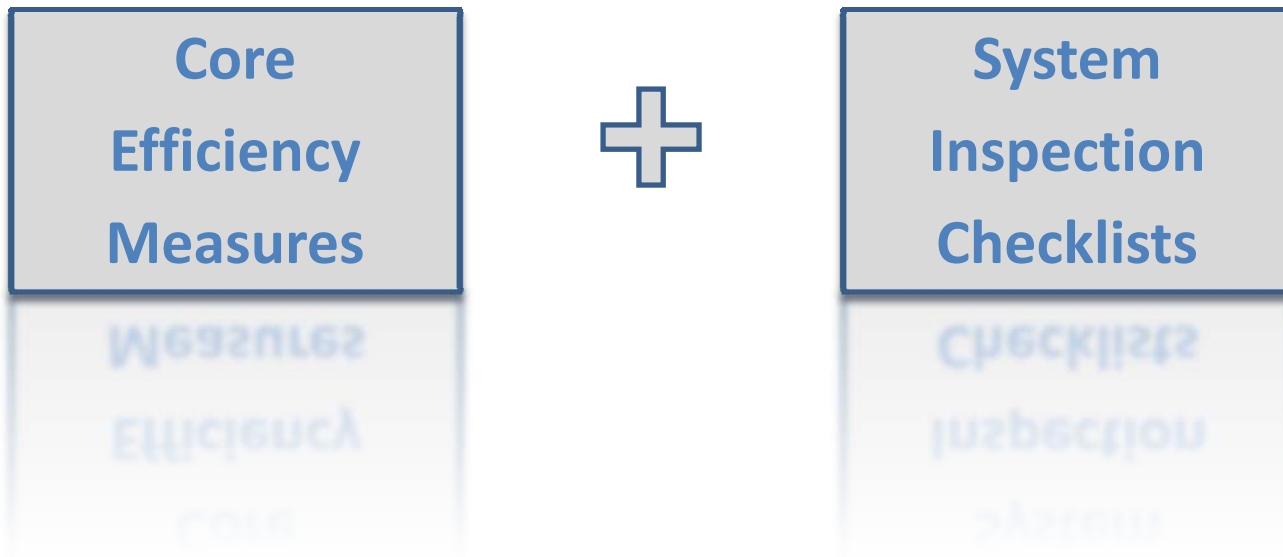
2

**Complete
HVAC
System**

3

**Complete
Water
Management
System**

The value of ENERGY STAR New Homes, v3

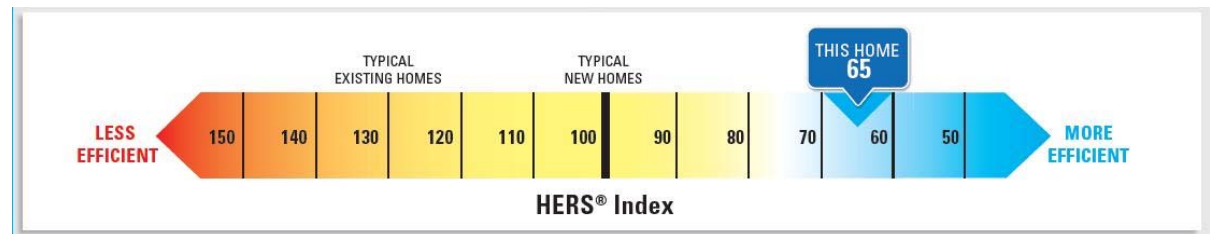


Value in every qualified home



Core Efficiency Measures

- Guarantees that efficiency measures are included in every qualified home.
 - Prescriptive Path
 - ENERGY STAR Reference Design
 - Performance Path
 - ENERGY STAR HERS Index Target



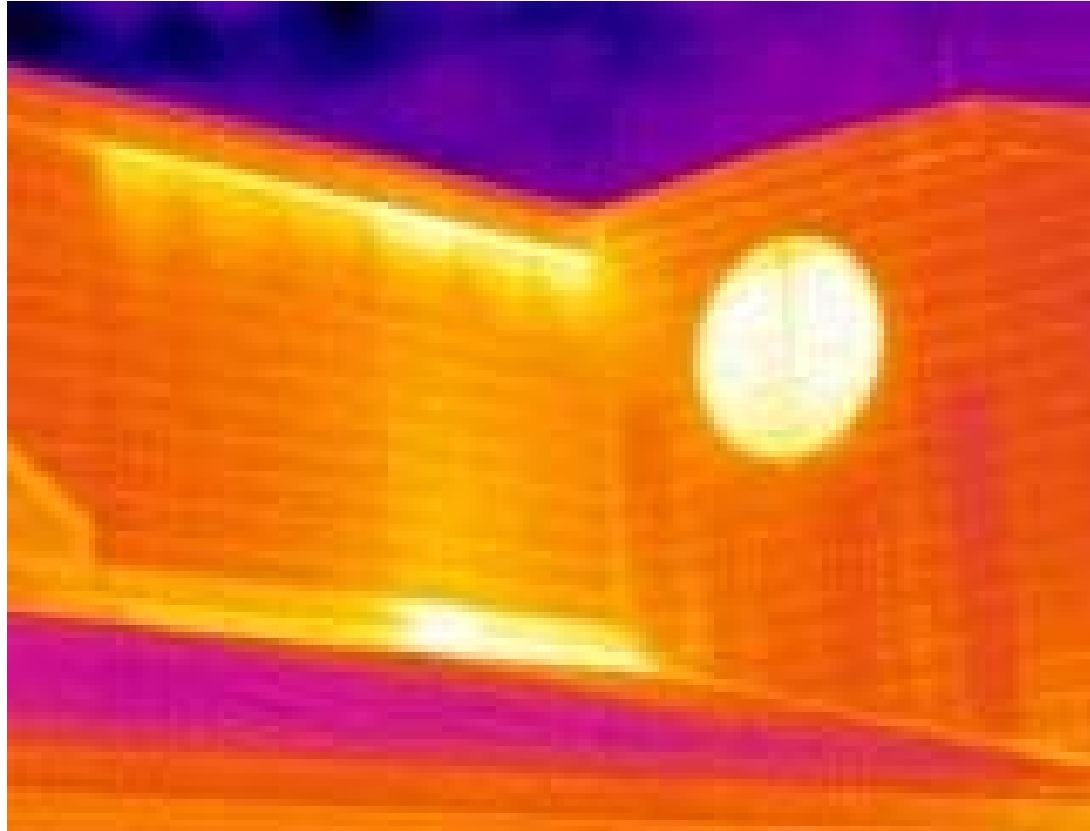
Value in every qualified home



System Inspection Checklists

- Sets standards for often-overlooked details that have a critical impact on efficiency, comfort, quality, & durability.
- Reflects 15 years of experience from EPA, researchers, industry, and thousands of partners.

Complete thermal enclosure system?



Complete thermal enclosure system



1

Thermal Enclosure System Checklist

- Less than two pages, verified by the Rater.
- Features
 - High-quality insulation installation.
 - High-performance windows & doors.
 - Tightly sealed home.
 - Reduced thermal bridging in walls.
- Why is this important?
 - A well-insulated and air-sealed home, with good windows and doors, reduces the amount of energy needed to keep the home comfortable.

Complete HVAC system?



Complete HVAC system



2

HVAC System QI Checklists

- Two checklists, each just two pages.
- One verified by Rater, one verified by the HVAC designer and contractor during their work.
- HVAC designer and contractor must be credentialed.

Complete HVAC system



2

HVAC System QI Checklists

- Features
 - A right-sized and properly installed heating, cooling, and duct system.
 - A ventilation system that meets the industry standard.
 - Reduced safety and air quality risks from combustion appliances.

Complete HVAC system

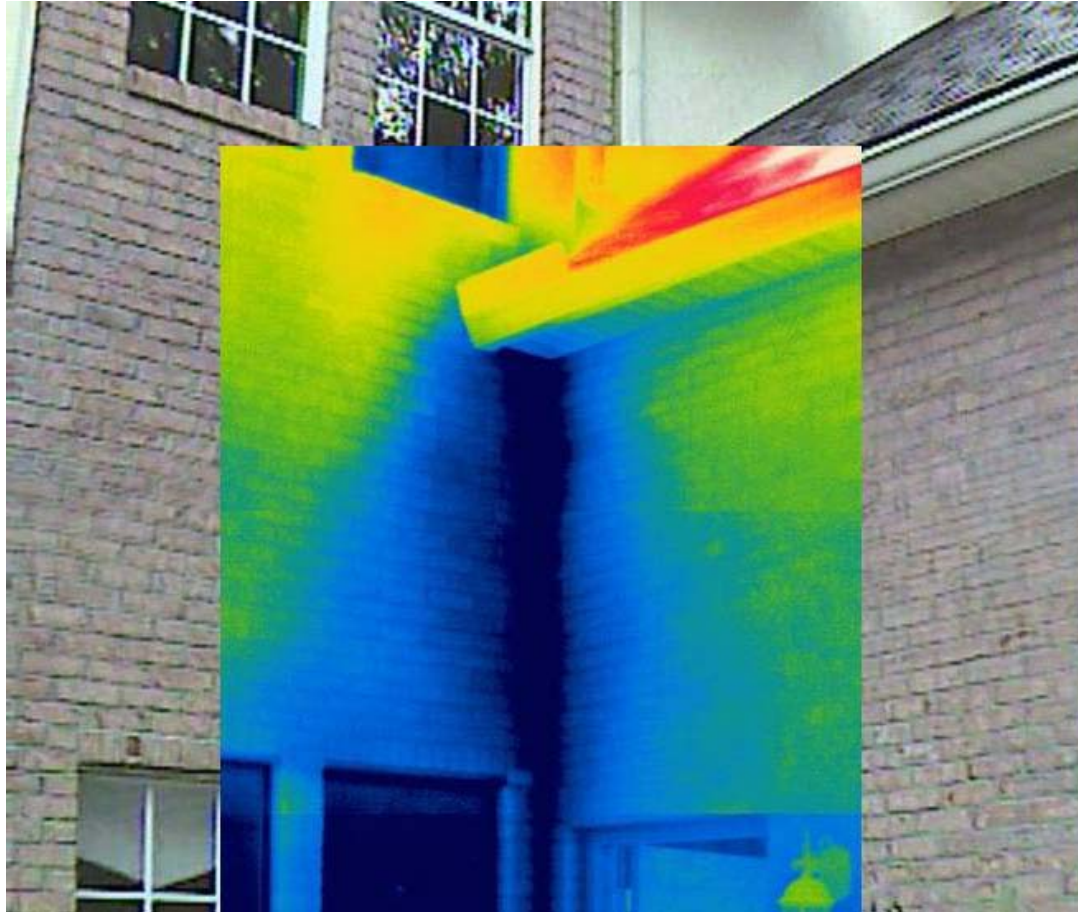


2

HVAC System QI Checklists

- Why is this important?
 - Improved airflow & efficiency maintain comfort with less energy.
 - Properly-sized equipment costs less to operate and better manages humidity levels.
 - Ventilation systems remove low-quality air, provide outdoor air, and filter dust and particles.

Complete water management system?



Complete water management system



3

Water Management System Checklist

- One page verified by the builder during construction.
- Features
 - Water-managed roof, walls, foundation, site, and building materials.
- Why is this important?
 - Prolonged moisture in walls, floors, and ceilings can cause rot and mold, hurting durability.
 - Wet walls, floors, and ceilings in air-sealed homes don't dry as quickly; therefore, it's more important to not let them get wet.

How do the checklists improve homes?



- Would you want an operation on the wrong body part?
- Surgical checklists help prevent careless errors that occur even in life and death situations, with the most highly-trained professionals.
- Are these checklists just bureaucratic paperwork?
- Surgical teams that followed a basic checklist in the operating room reduced the rate of deaths and complications by more than a third.

How do the checklists improve homes?



- Ensure consistent delivery from design to installation.
 - Help satisfy homebuyer expectations.
 - Maximize value of investments.
- Avoid/catch oversights. (Plan, do, check.)



"You take something as complex as surgery, and you think there isn't a lot that can be done to make it better... A checklist seems like a no-brainer, but the size of the benefit is dramatic."

A detailed inspection checklist for ENERGY STAR Qualified Homes. The form is titled "ENERGY STAR Qualified Homes Thermal Bypass Inspection Checklist" and includes sections for "Inspector Information", "Inspection Checklist", and "Notes". The checklist is organized into columns for "Inspection Item", "Pass/Fail", "Date", and "Inspector". It covers various aspects of home energy efficiency, including insulation, windows, doors, and mechanical systems.

<http://www.washingtonpost.com/wp-dyn/content/story/2009/01/14/ST2009011402914.html>

Value in Every Qualified Home



- For builders /developers / architects
 - Greater quality and process control.
 - Reduced costs from warranty issues & customer complaints.
 - Maximum value for money invested.
- For homeowners
 - Lower utility bills.
 - Better comfort, durability, and quality.
 - A more livable home.

Key Differences in Requirements



Parameter	Version 2	Version 2.5	Version 3
Performance Path	Fixed HERS Index	Variable HERS Index	
Prescriptive Path	Builder Option Package (BOP)	ENERGY STAR Reference Design	
House Size	No impact on requirements	Size Adjustment Factor	
Duct Leakage to Outside	<ul style="list-style-type: none">• ≤ 4 CFM25 per 100ft² CFA for Prescriptive Path• ≤ 6 CFM25 per 100ft² CFA for Performance Path	<ul style="list-style-type: none">• ≤ 4 CFM25 per 100ft² CFA for both Paths	
Total Duct Leakage	No maximum leakage		<ul style="list-style-type: none">• ≤ 6 CFM25 per 100ft² CFA

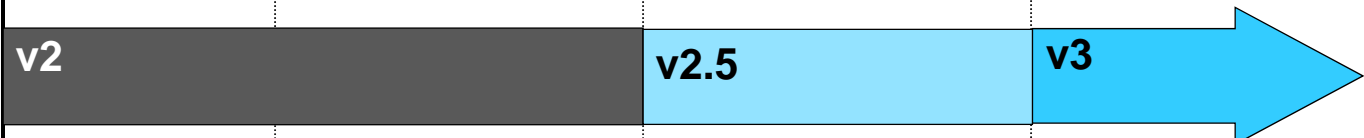
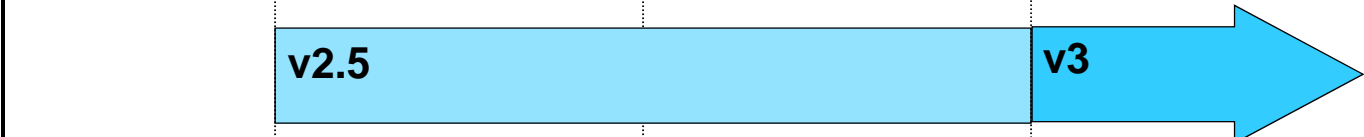
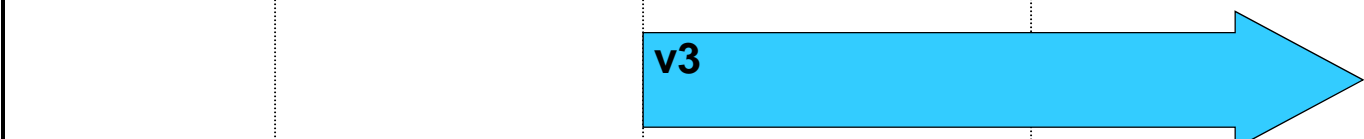
Key Differences in Requirements



Parameter	Version 2	Version 2.5	Version 3
Inspection Checklists	Thermal Bypass Checklist completed & enforced. Builder may verify up to six (6) items.	All sections of all Version 3 inspection checklists completed.	
		Sections 3 & 5 of Thermal Enclosure System Rater Checklist enforced. Builder may verify up to six (6) items.	All sections of all Version 3 inspection checklists enforced. Builder may verify up to eight (8) items of the Thermal Enclosure System Rater Checklist.



Implementation timeline

Permit Date ²	Date of Final Inspection ¹								
	4/1/2011	1/1/2012	7/1/2012						
Before 4/1/2011 ^{3, 4}									
Between 4/1/2011 and 12/31/2011 ⁴									
On or after 1/1/2012 ⁵									
<table><tr><td>Version 2</td><td>Version 2: 2006 Guidelines</td></tr><tr><td>Version 2.5</td><td>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</td></tr><tr><td>Version 3</td><td>Version 3: Core Version 3 energy efficiency measures with all checklists completed and enforced</td></tr></table>				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
Version 2	Version 2: 2006 Guidelines								
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Version 3	Version 3: Core Version 3 energy efficiency measures with all checklists completed and enforced								

How to Get Started



1. Review the guidelines at:
www.energystar.gov/newhomesguidelines
2. Find a Home Energy Rater at
www.energystar.gov/partnerlocator


New Homes Partner Locator

Select a state for additional information about local partners and homes:

National Program Indicators <ul style="list-style-type: none">▪ 1,209,065 ENERGY STAR qualified homes built to date▪ 25,797 ENERGY STAR qualified homes built 2011 to date▪ 127,589 ENERGY STAR qualified homes built in 2010▪ 8,534 ENERGY STAR for Homes Partners	ENERGY STAR qualified homes built in 2010 are the equivalent of: <ul style="list-style-type: none">▪ Eliminating emissions from 62,519 vehicles▪ Saving 378,173,796 lbs of coal▪ Planting 103,347 acres of trees▪ Saving the environment 741,674,857 pounds of CO₂ <p><i>Based on national averages</i></p>
---	--

Select a state for additional information about local partners and homes:

State:



How to Get Started



3. Compare current practices to ENERGY STAR
4. Get your team's commitment, using free EPA webinars, presentations, and your Rater
5. Sign a Partnership Agreement at www.energystar.gov/homesPA
6. Integrate ENERGY STAR into your business
 - Start with educational resources at www.energystar.gov/homes
 - Design, purchasing, construction
 - Marketing & sales

Resources for More Information



ENERGY STAR for New Homes

www.energystar.gov/newhomespartners

www.energystar.gov/mfhr

www.energystar.gov/designedtoearn

energystarhomes@energystar.gov

Now on Twitter and Facebook!



[@energystarhomes](https://twitter.com/energystarhomes)



facebook.com/energystar

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Speaker: James Brauer



Managing Director

US Eco Logic (Dallas, TX)



ENERGY STAR v3

Technical Details

James Brauer
TexEnergy Solutions

ENERGY STAR v3 Key Components

- Core Efficiency Measures
 - Prescriptive Path: ENERGY STAR Reference Design
 - Performance Path: ENERGY STAR HERS Index Target
 - Based on ENERGY STAR Reference Design
 - Target is individualized per house
 - Allows you to mix and match upgrades, with some limitations
- 4 Inspection Checklists
 - Thermal Enclosure System
 - Water Management System
 - HVAC System Quality Installation for Contractor
 - HVAC System Quality Installation for Rater

Overview of Qualification Process

- Use the ENERGY STAR Reference Design, or,
- Use the ENERGY STAR HERS Index Target
 - Your rater will calculate the target using modeling software, entering information from your plans
 - You'll work with your rater to select the measures that meet the target
- Construct the units with the selected measures
- Complete the inspection checklists, with the help of the rater and HVAC contractor
- Qualify the units



Elements in ENERGY STAR Reference Design

Exhibit 1: ENERGY STAR Reference Design

Hot Climates (2009 IECC Zones 1,2,3)¹¹

Mixed and Cold Climates (2009 IECC Zones 4,5,6,7,8)¹¹

Cooling Equipment (Where Provided)¹²

- | | |
|---|--|
| <ul style="list-style-type: none">• Cooling equipment shall meet the following applicable efficiency levels: | |
| <ul style="list-style-type: none">• ≥ 14.5 SEER / 12 EER ENERGY STAR qualified AC, OR;• Heat pump (See Heating Equipment) | <ul style="list-style-type: none">• ≥ 13 SEER AC, OR;• Heat pump (See Heating Equipment) |



Elements in ENERGY STAR Reference Design

Hot Climates (2009 IECC Zones 1,2,3) ¹¹	Mixed and Cold Climates (2009 IECC Zones 4,5,6,7,8) ¹¹
Heating Equipment¹²	
<ul style="list-style-type: none">Heating equipment shall meet the following applicable efficiency levels:	
<ul style="list-style-type: none">≥ 80 AFUE gas furnace, OR;≥ 80 AFUE oil furnace, OR;≥ 80 AFUE boiler, OR;≥ 8.2 HSPF / 14.5 SEER / 12 EER air-source heat pump, ENERGY STAR qualified with electric backup or ENERGY STAR qualified dual-fuel backup heating, OR;Ground-source heat pump, any product type, ENERGY STAR qualified:	<ul style="list-style-type: none">≥ 90 AFUE gas furnace, ENERGY STAR qualified, OR;≥ 85 AFUE oil furnace, ENERGY STAR qualified, OR;≥ 85 AFUE boiler, ENERGY STAR qualified, OR;Air-source heat pump¹³, ENERGY STAR qualified with efficiency as follows:CZ 4: ≥ 8.5 HSPF / 14.5 SEER / 12 EER with electric backup, OR;CZ 5: ≥ 9.25 HSPF / 14.5 SEER / 12 EER with electric backup, OR;CZ 6: ≥ 9.5 HSPF / 14.5 SEER / 12 EER with electric backup, OR;Air-source heat pump, ENERGY STAR qualified, ≥ 8.2 HSPF / 14.5 SEER / 12 EER with ENERGY STAR qualified dual-fuel backup, OR;Ground-source heat pump, any product type, ENERGY STAR qualified¹⁴



Hot Climates (2009 IECC Zones 1,2,3) ¹¹		Mixed and Cold Climates (2009 IECC Zones 4,5,6,7,8) ¹¹																										
Envelope, Windows, & Doors																												
<ul style="list-style-type: none">If more than 10 linear feet of ductwork are located in an unconditioned attic, a radiant barrier or ENERGY STAR qualified roof product shall be installed.¹⁵	<ul style="list-style-type: none">No radiant barrier or ENERGY STAR qualified roof product required.																											
<ul style="list-style-type: none">Insulation levels shall meet or exceed 2009 IECC levels and achieve Grade I installation per RESNET standards.^{7, 8, 9,10}Infiltration rates shall be less than or equal to the following values:¹⁶																												
<table><tr><td>6 ACH50 in CZs 1,2</td><td>5 ACH50 in CZs 3,4</td><td>4 ACH50 in CZs 5,6,7</td><td>3 ACH50 in CZ 8</td></tr></table>				6 ACH50 in CZs 1,2	5 ACH50 in CZs 3,4	4 ACH50 in CZs 5,6,7	3 ACH50 in CZ 8																					
6 ACH50 in CZs 1,2	5 ACH50 in CZs 3,4	4 ACH50 in CZs 5,6,7	3 ACH50 in CZ 8																									
<ul style="list-style-type: none">Windows, doors, and skylights shall be ENERGY STAR qualified, as illustrated below:¹⁰																												
<table><tr><td>Window U-Value:</td><td>0.60 in CZs 1,2</td><td>0.35 in CZ 3</td><td>0.32 in CZ 4</td><td>0.30 in CZs 4-8</td></tr><tr><td>Window SHGC:</td><td>0.27 in CZs 1,2</td><td>0.30 in CZ 3</td><td>0.40 in CZ 4</td><td>Any in CZs 4-8</td></tr><tr><td>Skylight U-Value:</td><td>0.70 in CZs 1,2</td><td>0.57 in CZ 3</td><td>0.55 in CZ 4</td><td>0.55 in CZs 4-8</td></tr><tr><td>Skylight SHGC:</td><td>0.30 in CZs 1,2</td><td>0.30 in CZ 3</td><td>0.40 in CZ 4</td><td>Any in CZs 4-8</td></tr><tr><td>Doors:</td><td>Opaque: 0.21 U-Value, No SGHC Rating</td><td>≤½ lite: 0.27 U-Value, 0.30 SHGC</td><td colspan="2">>½ lite: 0.32 U-Value, 0.30 SHGC</td></tr></table>				Window U-Value:	0.60 in CZs 1,2	0.35 in CZ 3	0.32 in CZ 4	0.30 in CZs 4-8	Window SHGC:	0.27 in CZs 1,2	0.30 in CZ 3	0.40 in CZ 4	Any in CZs 4-8	Skylight U-Value:	0.70 in CZs 1,2	0.57 in CZ 3	0.55 in CZ 4	0.55 in CZs 4-8	Skylight SHGC:	0.30 in CZs 1,2	0.30 in CZ 3	0.40 in CZ 4	Any in CZs 4-8	Doors:	Opaque: 0.21 U-Value, No SGHC Rating	≤½ lite: 0.27 U-Value, 0.30 SHGC	>½ lite: 0.32 U-Value, 0.30 SHGC	
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<ul style="list-style-type: none">Homes with total window-to-floor area greater than 15% shall have adjusted U-values or SHGCs as outlined in footnote 17.																												



Elements in ENERGY STAR Reference Design

Hot Climates (2009 IECC Zones 1,2,3) ¹¹				Mixed and Cold Climates (2009 IECC Zones 4,5,6,7,8) ¹¹			
Water Heater							
• DHW equipment shall meet the following efficiency requirements: ¹⁸							
Gas:	30 Gal: .63 EF	40 Gal: .61 EF	50 Gal: .59 EF	60 Gal: .57 EF	70 Gal: .55 EF	80 Gal: .53 EF	
Electric:	30 Gal: .94 EF	40 Gal: .93 EF	50 Gal: .92 EF	60 Gal: .91 EF	70 Gal: .90 EF	80 Gal: .89 EF	
Oil:	30 Gal: .55 EF	40 Gal: .53 EF	50 Gal: .51 EF	60 Gal: .49 EF	70 Gal: .47 EF	80 Gal: .45 EF	

Thermal Enclosure System Checklist

- [1] High Performance Fenestration: Meet or exceed ENERGY STAR requirements
- [2.2] Insulation shall achieve RESNET Grade 1 or Grade 2 for walls with minimum continuous insulated sheathing.
 - R-3 for climate zones 1 to 4
 - R-5 for climate zones 5 to 8
- [3] Fully Aligned Air Barriers
 - 6-sided encapsulation of insulation with an air barrier

Thermal Enclosure System Checklist



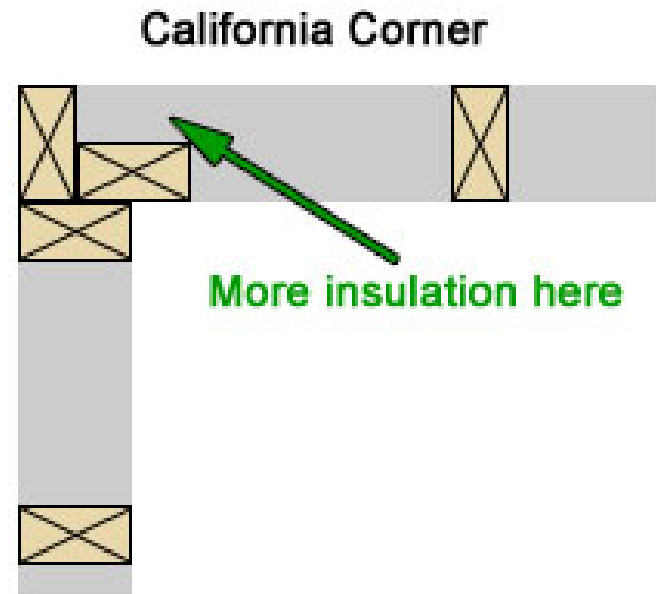
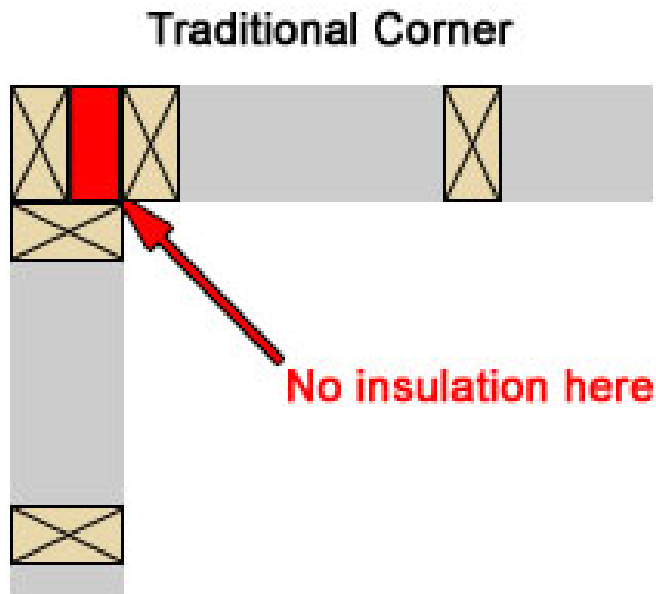
Photo by Jason Helm

Thermal Enclosure System Checklist

- [4.3] Reduce Thermal bridging at walls with one of the following
 - [4.3.1] Continuous rigid insulation sheathing. Steel framing must follow this method. **OR**,
 - [4.3.2] Structurally Insulated Panels (SIP) **OR**,
 - [4.3.3] Insulated Concrete Forms (ICF) **OR**,
 - [4.3.4] Double wall framing **OR**,
 - [4.3.5] Advanced Framing, including **ALL** of the items below,
 - All corners insulated to edge. **AND**;
 - All headers above windows and doors insulated. **AND**;
 - Framing limited at all windows and doors. **AND**;
 - All interior/exterior wall intersections insulated. **AND**;
 - Studs spaced at 16" for 2x4 framing and at 24" for 2x6 framing unless construction documents specify otherwise.

Thermal Enclosure System Checklist

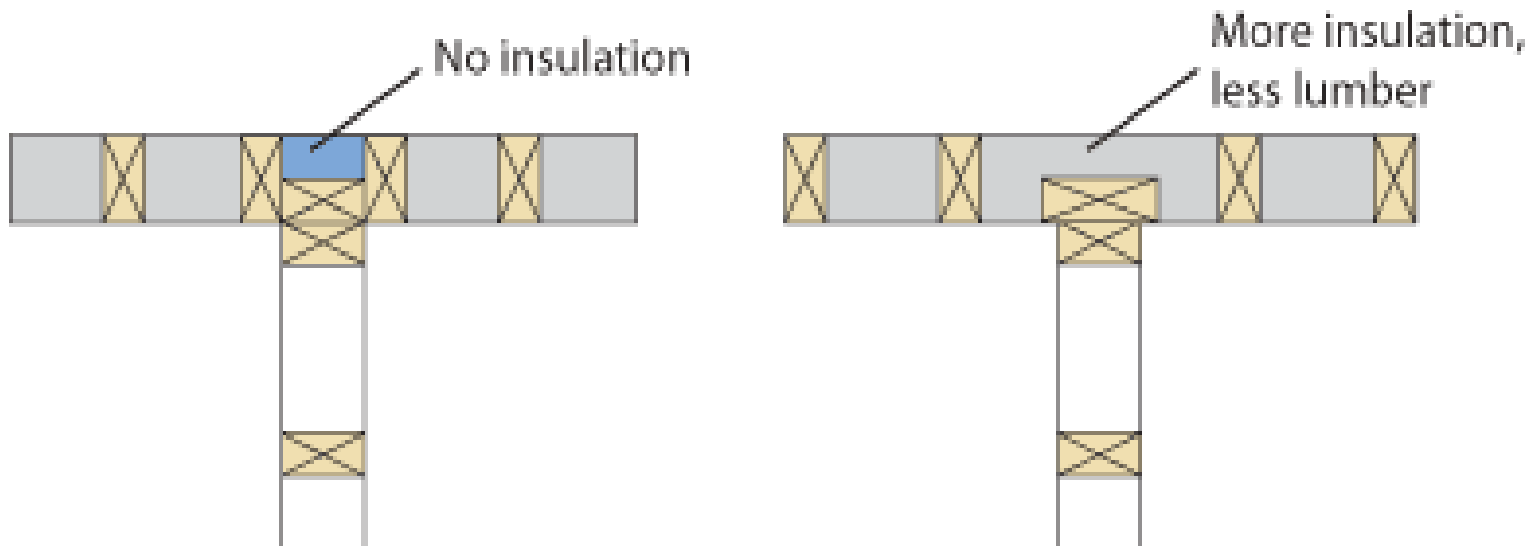
- California corner



Graphic by EPA

Thermal Enclosure System Checklist

- Ladder blocking



Graphic by EPA

Thermal Enclosure System Checklist

- [4.1] For insulated ceilings with attic space above, uncompressed insulation extends to the inside face of the exterior wall at minimum:
 - R-21 for Climate Zone 1 to 5
 - R-30 for Climate Zone 6 to 8
- [4.3] HVAC and other attic platforms installed to allow for minimum:
 - R-21 for Climate Zone 1 to 5
 - R-30 for Climate Zone 6 to 8

Thermal Enclosure System Checklist

- Most items are from Thermal Bypass Checklist with the following exceptions:
 - [5.1.4] Bathroom and Kitchen exhaust fans sealed to drywall using caulk or foam.
 - [5.2.1] For external walls, sill plates sealed to foundation and floor framing with foam gasket AND sealant. All floors, not just base plate.

Thermal Enclosure System Checklist

- [5] Air sealing
 - [5.1] Penetrations to unconditioned space
 - [5.2] Cracks in the building envelope
 - [5.2.3] Sheetrock sealed to top plate at all attic/wall interfaces. Sealing shall be completed using silicone, latex foam, or equivalent material. Construction adhesives shall not be used.
 - [5.3] Other openings
 - [5.3.2] Attic access panels and drop down stairs equipped with $\geq R-10$ insulated cover and gasket.

Thermal Enclosure System Checklist



Photo by EPA

HVAC System Quality Installation Contractor Checklist

- Must be performed by an ENERGY STAR qualified contractor
- Created to promote quality:
 - Design
 - Installation
 - Start-up
 - Performance

HVAC System Quality Installation Contractor Checklist

- [1.1] Ventilation designed using ASHRAE 62.2-2010. This means Fresh Air with kitchens and bathrooms exhausted to outside.
- [2] HVAC contractors must perform, and provide to the Rater, Manuals J, D, S and T. The following design parameters shall be used.
 - Home must be listed as “Tight”.
 - Duct work setting “Extreme”.
 - Indoor set points 70F for heating and 75F for cooling.
 - Window values must match rated home.
 - Insulation values must match rated home.
 - ASHRAE 62.2-2010 ventilation loads accounted for.

HVAC System Quality Installation Contractor Checklist

- [3.15] AHRI certificate supplied to rater.
- [6] If cold weather makes it impossible to verify proper refrigerant charge, TXV must be installed.
- [10.1] Room by room airflow testing.
 - Airflows within +/- 20% or 25 cfm of design, whichever is greater for both supply and return.
- Any blank “Contractor Approved” block on the contractor checklist warrants a denial of certification.

HVAC System Quality Installation Rater Checklist

- [2.1 - 2.3] No excessive loops, coils, bends and compressions in flexible duct work.
- [2.5] Building cavities used as supply or return ducts must perform the same as ductwork in regards to insulation and tightness.
- [2.8] All bedrooms pressure balanced.
 - Testing
 - Transfer grills, jump ducts, dedicated returns, and/or door undercuts

HVAC System Quality Installation Rater Checklist

- [4.1] Total Duct Leakage ≤ 6 cfm per 100 sqft.
- [4.2] Leakage to Outside ≤ 4 cfm per 100 sqft.
Current protocol is at 6
 - Duct leakage shall be determined and documented only after all components of the system have been installed (e.g. air handler and register grills).
- [4.3] Duct boots sealed to floor, wall, or ceiling using caulk, foam, mastic tape, or mastic paste.
- [5.1] Measured fresh air ventilation rate within 100-120% of HVAC contractor design.

HVAC System Quality Installation Rater Checklist

- [8] In each kitchen and bathroom, system exhausts directly to outdoors and meets one of the following measured airflow standards.
 - [8.1] Kitchen (Must be vented to outside)
 - Continuous - > 5 ACH based on volume
 - Intermittent - > 100 cfm
 - [8.2] Bathroom (Must be vented to outside)
 - Continuous - > 20 cfm
 - Intermittent - > 50 cfm
 - [8.3] If fans share common exhaust duct, back draft dampers must be installed.

HVAC System Quality Installation Rater Checklist

- [10.1] For atmospherically vented water heaters, the Rater will conduct BPI's combustion safety test procedure.
- [11.1] & [11.4] MERV 6 filters. (Access panel to filter must have gasket or comparable sealing mechanism)

Water Management System Builder Checklist

- [1.1] Patio slabs, walks, and driveways sloped ≥ 0.25 in/ft away from home.
- [1.2] Final grade sloped at ≥ 0.5 in/ft away from the home.
- [1.3] Capillary break beneath all concrete slabs
 - 6mil Polyethylene

Water Management System Builder Checklist

- [1.4] Capillary break for all crawlspace floors.
(only if there are basement/foundation walls)
- [1.8] Protected drain tile surrounded with clean gravel and fabric filter.
- [2.2] Continuous drainage plane behind cladding
 - a monolithic weather-resistant barrier (i.e., house wrap) sealed or taped at all joints; OR
 - weather-resistant sheathings (e.g., faced rigid insulation) fully taped at all “butt” joints; OR
 - lapped shingle-style building paper or felts.

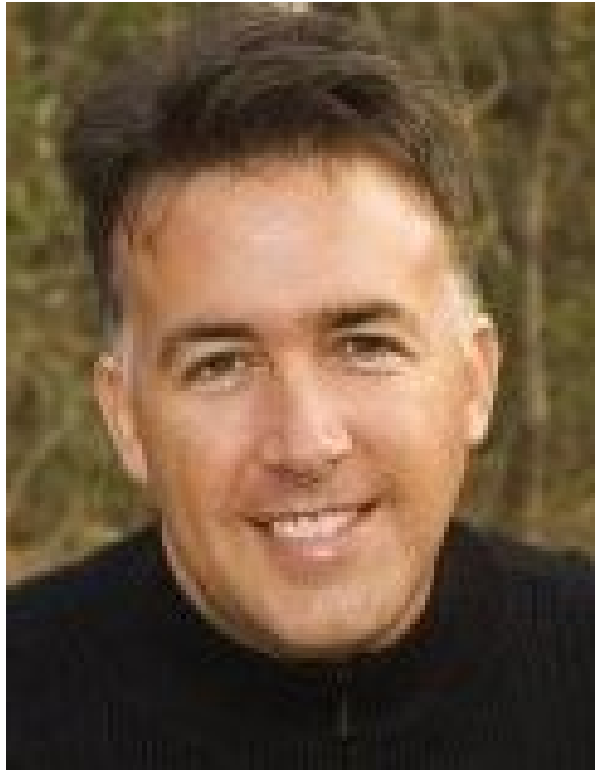
Water Management System Builder Checklist

- [3.1] Step and kick-out flashing at all roof-wall intersections
- [3.2] For homes that do not have slab on grade foundation and do not have expansive soils, gutters and downspouts that deposit water on sloping finish grade ≥ 5 feet away from foundation.
- [4.1] No carpet within 2.5 feet of toilets, tubs, and showers.

Water Management System Builder Checklist

- [4.2] Cement board/moisture-resistant backing material behind tubs and showers. Paper-faced wall board does not meet this requirement.
- [4.3] Permeability rating of finishes > 0.1 on the inside of the exterior walls
 - Tile is allowed at bath walls if desired

Speaker: Bill Greene



Architect/Design Manager

Wood Partners



WOOD PARTNERS

ENERGY STAR For New Homes MULTI-FAMILY DEVELOPMENT PERSPECTIVE

Presented by
William J. Greene III, LEED® AP BD+C
Architect/Design Manager
Wood Partners



Agenda

- About Wood Partners
- Wood Partners ENERGY STAR Program
- ENERGY STAR Program Benefits
- Wood Partners Residents' Awareness
- CAP Rate Impact – Development 101
- Q&A



About Wood Partners

- National real estate company that acquires, develops, constructs and property manages high density and mixed-use communities.
- Development of more than 36,000 homes with a combined value of almost \$5 billion nationwide.
- 16 regional offices in major markets throughout the U.S.
- To learn more about Wood Partners, please visit our Web site at www.woodpartners.com.



Wood Partners Energy Policy

ENERGY STAR for New Homes

- As of March 2009, Wood Partners has executed an ENERGY STAR Program Policy as their “Energy Policy Standards.”
- Wood Partners employs this initiative as a minimum standard for all designs and construction projects.



Wood Partners Energy Policy

ENERGY STAR for New Homes

- We have made a firm commitment to providing a better value to our residents by saving as much as 15% on their energy bills, estimated by the U.S. EPA.
- As energy costs rise, the savings increase, sustaining and growing our developments' long-term value for our investors.
- We have taken the lead in reducing the impact of our developments on the environment.



Wood Partners Energy Policy

ENERGY STAR for New Homes

- Integrate sustainability into our overall business strategy to optimize the value of investments across the entire life cycle of our properties.
- Acquisition, development programs, site identification and selection through underwriting due diligence including new projects and redevelopment.
- Our approach will assist our consultants in both strategy and tactics through all phases of executing their projects:

entitlement
pre–construction
turnover
management

design
construction
retrofit/reuse



ENERGY STAR for New Homes Program Benefits

- EPA-projected energy savings of 15% or more
- Marketing materials support from ENERGY STAR
- Differentiation, goodwill in the marketplace
- Relevance, given consumers' heightened awareness of energy and environmental issues and sensitivity to energy costs
- Potential neighborhood and municipal support during development
- Recognition from institutional investors of higher quality product



Wood Partners Resident Green Survey

July 2007, WP Resident Survey:

- Approx. 1,000 respondents of 6,600 occupied units.
- Over 60% of our residents agree or strongly agree with the following environmental issue questions.
- Nearly 90% of our residents would consider paying more for environmentally designed units.



Wood Partners Resident Green Survey

Environmental issues are a concern for me.

1. strongly disagree	3.79%
2. disagree	2.17%
3. neutral	14.23%
4. agree	46.61%
5. strongly agree	33.20%



Wood Partners Resident Green Survey

My concern for environmental issues affects my purchase decisions.

1. strongly disagree	3.93%
2. disagree	9.21%
3. neutral	26.15%
4. agree	40.65%
5. strongly agree	20.05%



Wood Partners Resident Green Survey

I believe that my actions do not have an impact on the environment.

1. strongly disagree	39.84%
2. disagree	35.77%
3. neutral	9.89%
4. agree	9.35%
5. strongly agree	5.15%



Wood Partners Resident Green Survey

I recycle whenever possible.

1. strongly disagree	3.52%
2. disagree	11.92%
3. neutral	19.65%
4. agree	43.63%
5. strongly agree	21.27%



Wood Partners Resident Green Survey

I am aware of the concept of a "carbon footprint."

1. strongly disagree	12.60%
2. disagree	21.95%
3. neutral	20.05%
4. agree	31.30%
5. strongly agree	14.09%



Wood Partners Resident Green Survey

I am familiar with the benefits that the ENERGY STAR logo indicates.

1. strongly disagree	9.62%
2. disagree	14.91%
3. neutral	13.28%
4. agree	37.26%
5. strongly agree	24.93%



Wood Partners Strategy and Timeline to Achieve ENERGY STAR

Conceptual/Schematic Estimate Phase

- Wood Partners uses the Builder Option Package (Prescriptive Path) to provide a preliminary estimated cost for ENERGY STAR qualification.
- Wood Partners contacts HERS Rater(s) at this time to solicit bids.



Wood Partners Strategy and Timeline to Achieve ENERGY STAR

Design Development Phase

- The design consultants are provided with the Builder Option Package (Prescriptive Path estimated cost) and incorporates the required measures into the early building design & specs.
- Wood Partners selects the HERS Rater and determines which options to be included in the scope of the work. The HERS Rater is provided with the Builders Option Package (Prescriptive Path estimated cost) from the SD Phase along with the early building designs & specs prepared by the design consultant.
- Energy Modeling with REM/Rate is conducted at this time by the HERS Rater prior to final Construction Documents.



Wood Partners Strategy and Timeline to Achieve ENERGY STAR

Contract Document Phase (25% to 50%)

- The HERS Rater completes the Energy Modeling with REM/Rate for the project and provides feedback on which recommended options with the least cost to achieve qualification.
- The design consultants and applicable subcontractors are provided with the HERS Rater's recommendations.
- Design refinement is anticipated during this period prior to the completion of the Contract Documents.



Wood Partners Strategy and Timeline to Achieve ENERGY STAR

Substantial Completion

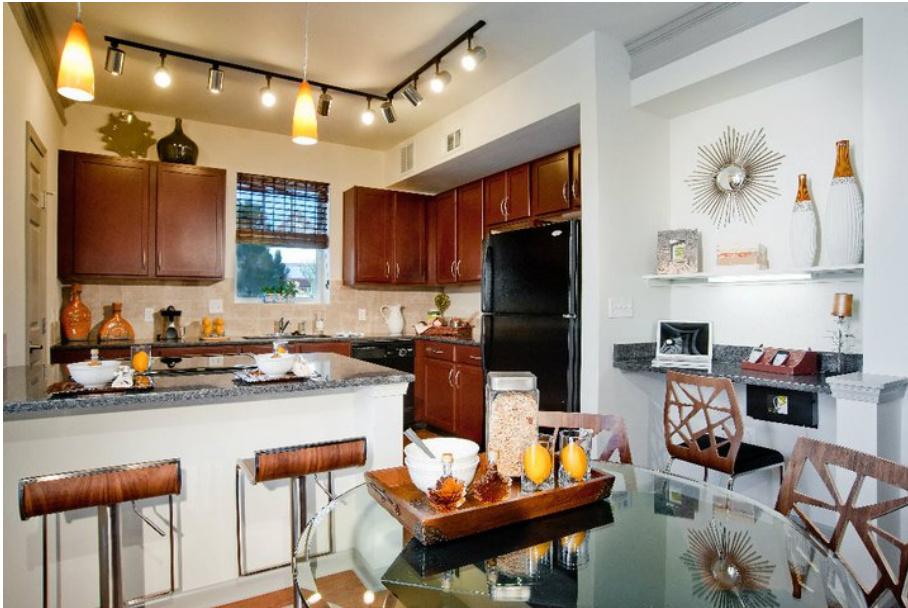
- The HERS Rater obtains sampling of units with a blower door and duct blaster to ensure building envelope and ducts meet the air tightness requirements.
- The HERS Rater's instructions are carefully followed throughout the design and construction process to avoid any design or construction remediation.
- The HERS Rater's visual inspection for air barrier alignment, insulation installation, thermal bridging, duct installation and ventilation commissioning.



Wood Partners Projects

Alta Aspen Grove – Littleton, Colorado

- ENERGY STAR for New Homes (v2)
- LEED for Homes – Silver



Wood Partners Projects

Alta Henderson – Dallas, Texas

- ENERGY STAR for New Homes (v2.5)



CAP Rate Impacts Development 101

- **Small investments** that *reduce* **Expenses** have a large impact on the **Sales Price**.
- **Small investments** that *increase* **Revenues** have a large impact on the **Sales Price**.
- **Very small changes** in the **Cap Rate** cause very large changes in the **Sales Price**.



CAP Rate Impacts Development 101

$$\begin{array}{r} \text{Total Revenues} \\ - \text{Total Expenses} \\ \hline \text{Net Operating Income (NOI)} \end{array}$$



CAP Rate Impacts Development 101

The Cap Rate represents the return to the buyer on the investment.

$$\text{Cap Rate} = \frac{\text{NOI}}{\text{Sales Price}}$$



CAP Rate Impacts Development 101

The Cap Rate determines the Sales Price that the buyer will pay. Cap Rates have been in the 5-6% range for the last 4 years. Look for Cap Rates to increase as buyers perceive a riskier market

$$\text{Sales Price} = \frac{\text{NOI}}{\text{Cap Rate}}$$



Cap Rate Examples

EXAMPLE 1

5.5 % CAP Rate

240 Units
240,000 Rentable Square Feet

1,000 Square foot average unit size

Revenues

Rent	2,592,000
Premiums	30,000
Other	<u>20,000</u>

240,000 RSF @ 0.90 per SF per month
50 Units @ \$50 per Unit (pool views etc)
Laundry, CATV, Garages etc

Gross Revenues 2,642,000

Expenses

Salaries	150,000
Utilities	50,000
Landscape Maint	45,000
Property Taxes	120,000
Insurance	50,000
The Rest	<u>500,000</u>

Property Staff
Water, Sewer, House Electrical
Grass Maint, Pine Straw, Annuals

Liability Insurance
Redec, Capital reserves etc

Total Expenses 915,000

Revenues	2,642,000
Expenses	<u>915,000</u>
NOI	1,727,000

$$\text{Sales Price} = \frac{\text{NOI}}{\text{Cap Rate}} = \frac{1,727,000}{5.50\%} = \$31,400,000$$

EXAMPLE 2**5.5 % CAP Rate**

240 Units

240,000 Rentable Square Feet

1000 Squire foot average unit size

Investment:	
\$140 per unit for ENERGY STAR	\$33,600 investment
Lower utilities by \$35,000	

Revenues

Rent	2,592,000	240,000 RSF @ 0.90 per SF per month
Premiums	30,000	50 Units @ \$50 per Unit
Other	<u>20,000</u>	Laundry, CATV etc

Gross Revenues 2,642,000**Expenses**

Salaries	150,000	Property Staff
Utilities	15,000	Water, Sewer, House Electrical
Landscape Maint	45,000	Grass Maint, Pine Straw, Annuals
Property Taxes	120,000	
Insurance	50,000	Liability Insurance
The Rest	<u>500,000</u>	Redec, Capital reserves etc

Total Expenses 880,000

Revenues	2,642,000
Expenses	<u>880,000</u>
NOI	1,762,000

$$\text{Sales Price} = \frac{\text{NOI}}{\text{Cap Rate}} = \frac{1,762,000}{5.50\%} = \$32,036,364$$

Example 1 Sales price W/O ENERGY STAR

\$31,400,000

Increased Value for ENERGY STAR**\$636,364**



Dean Gamble

Technical Coordinator

EPA ENERGY STAR New Homes



James Brauer

Managing Director

US Eco Logic (Dallas, TX)



Bill Greene

Design Manager

Wood Partners



Moderator

Casius Pealer, Assoc. AIA

Principal

Oystertree Consulting

Submit a question to the moderator via the “questions” box. They will be answered as time allows.



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This concludes the AIA/CES Course #R11006.

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