



# **New Opportunities for Raters: ENERGY STAR Multifamily High Rise Program**

**2013 RESNET Conference  
Orlando, Florida**

**March 1, 2013**

Learn more at [energystar.gov](http://energystar.gov)

# Today's Session

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- ENERGY STAR Certification for Multifamily Buildings
- Multifamily Market
- Overview of ENERGY STAR for Multifamily High Rise
- Opportunities for Raters in the MFHR Sector
- Support and Future Outreach

# ENERGY STAR Residential Program



- Has guidelines that apply to:

- Single Family Homes (detached and attached)

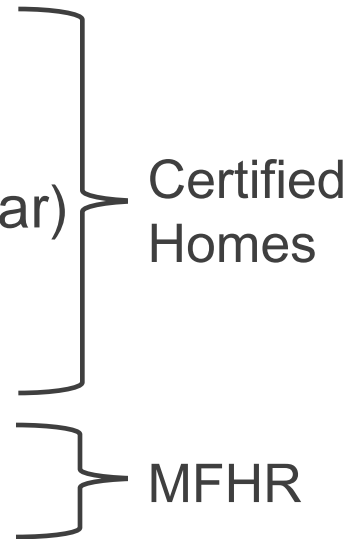
- Factory Built Homes (manufactured and modular)

- Low Rise Residential Buildings

- Mid and High Rise Residential Buildings\*

- Covers buildings previously ineligible for ENERGY STAR certification

- Launched mid-2011



\*Criteria defining Mid and High Rise available at [www.energystar.gov/mfhr](http://www.energystar.gov/mfhr)

# ENERGY STAR Program Eligibility



- Low Rise Eligibility

- All buildings with  $\leq 3$  stories; and
- 4 and 5 story buildings with distributed HVAC and DHW systems, and less than 20% residential associated common space

- High Rise Eligibility

- 4 and 5 story buildings with distributed HVAC and DHW systems, and more than 20%; and
- 4 and 5 story buildings with central HVAC and/or DHW system; and
- All buildings with  $\geq 6$  stories

# Why Two Different Programs?



## Single Family and Low Rise Multifamily

- Residential Building Code
- Development time (0.5 - 2 years)
- HVAC configurations typically residential
- Existing verification oversight infrastructure in place
- HERS Index energy modeling
- 2-3 verification visits needed
- Common areas of multifamily not addressed

## High Rise Multifamily

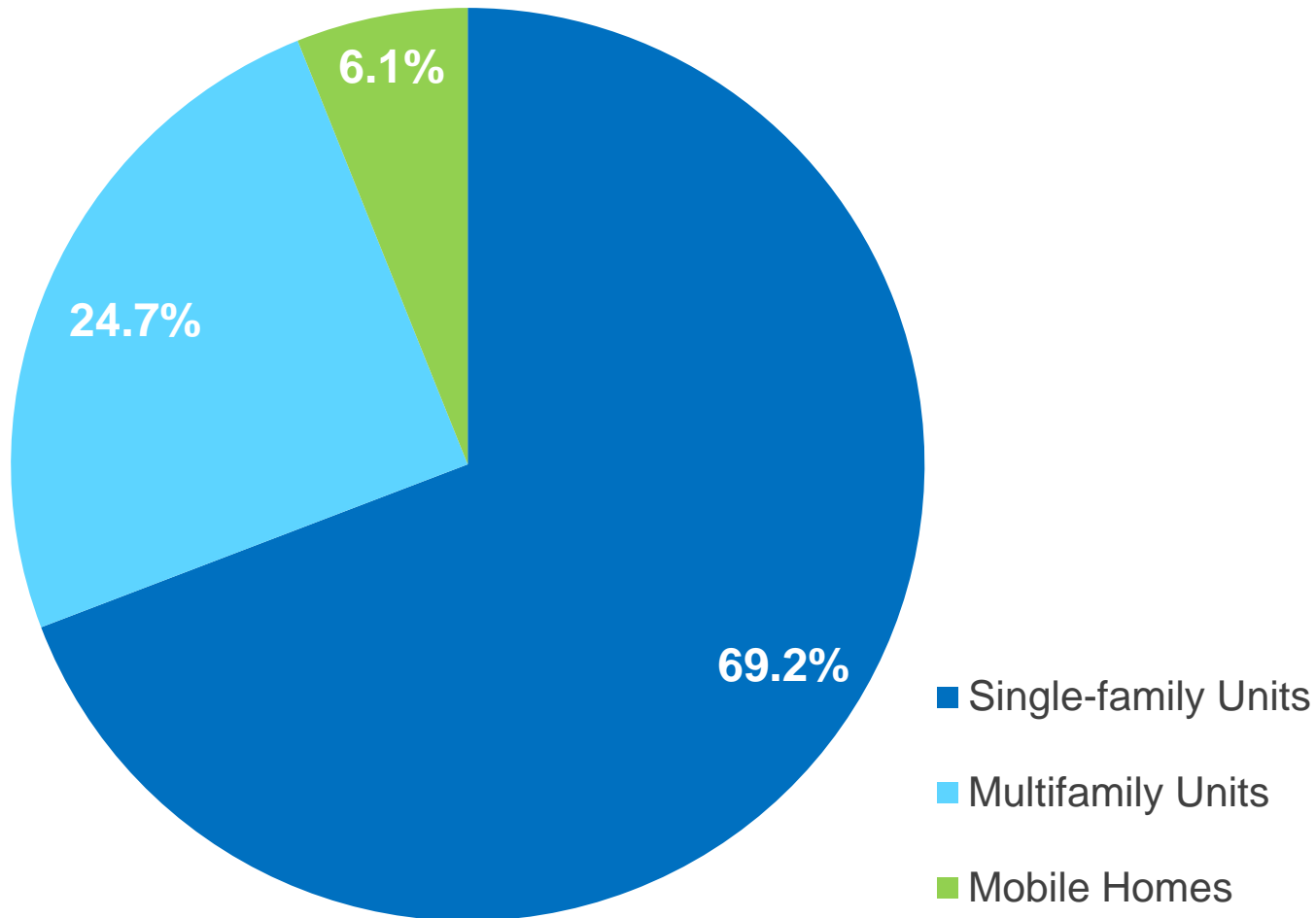
- Commercial Building Code
- Development time (2 - 5 years)
- HVAC configurations may include large commercial systems
- Currently no national 3<sup>rd</sup> party Verification Oversight Organization
- ASHRAE 90.1 App. G modeling
- Multiple verification visits needed
- Significant common areas are addressed



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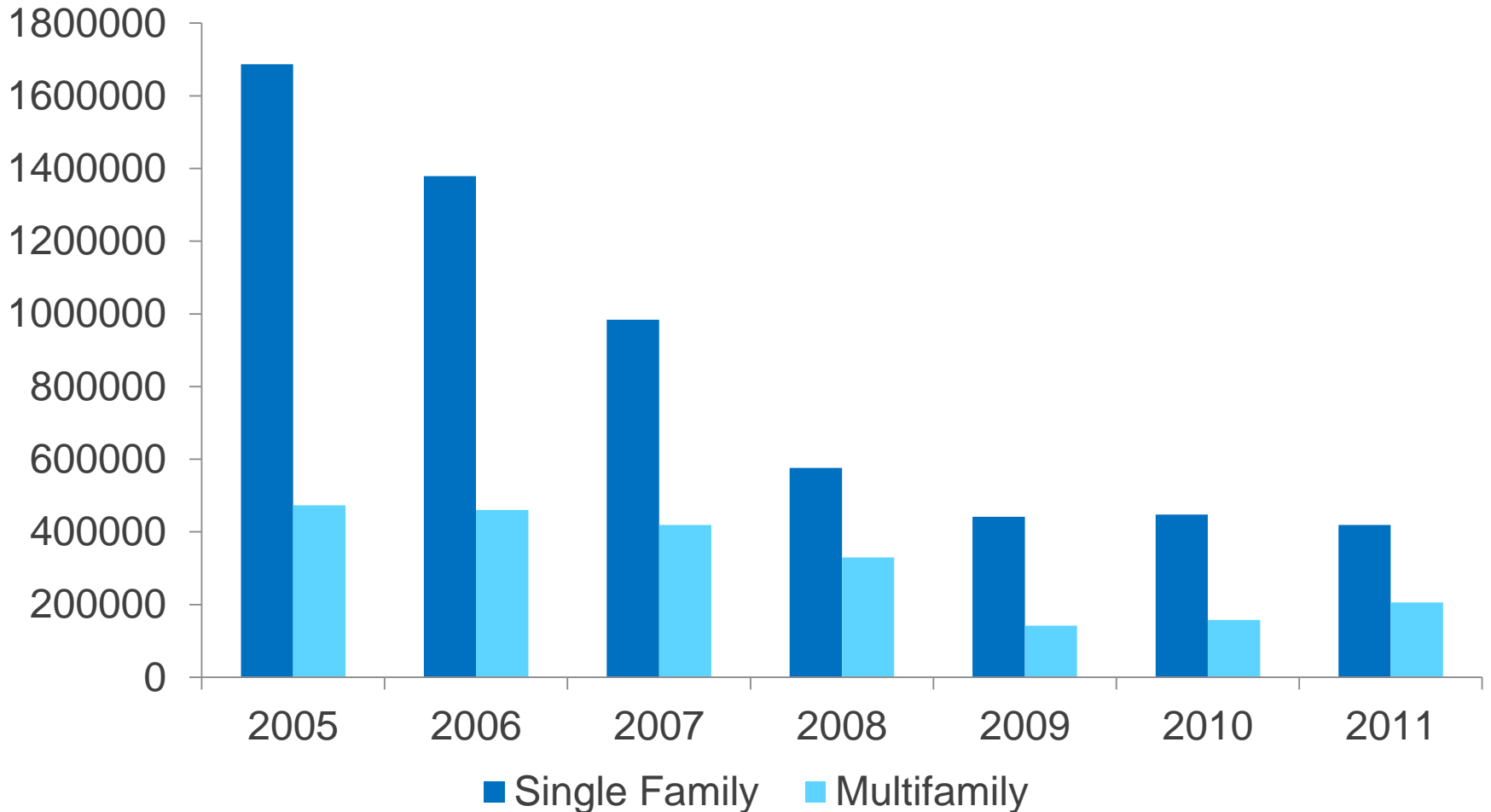
# Multifamily Sector

# Multifamily Home Market Share



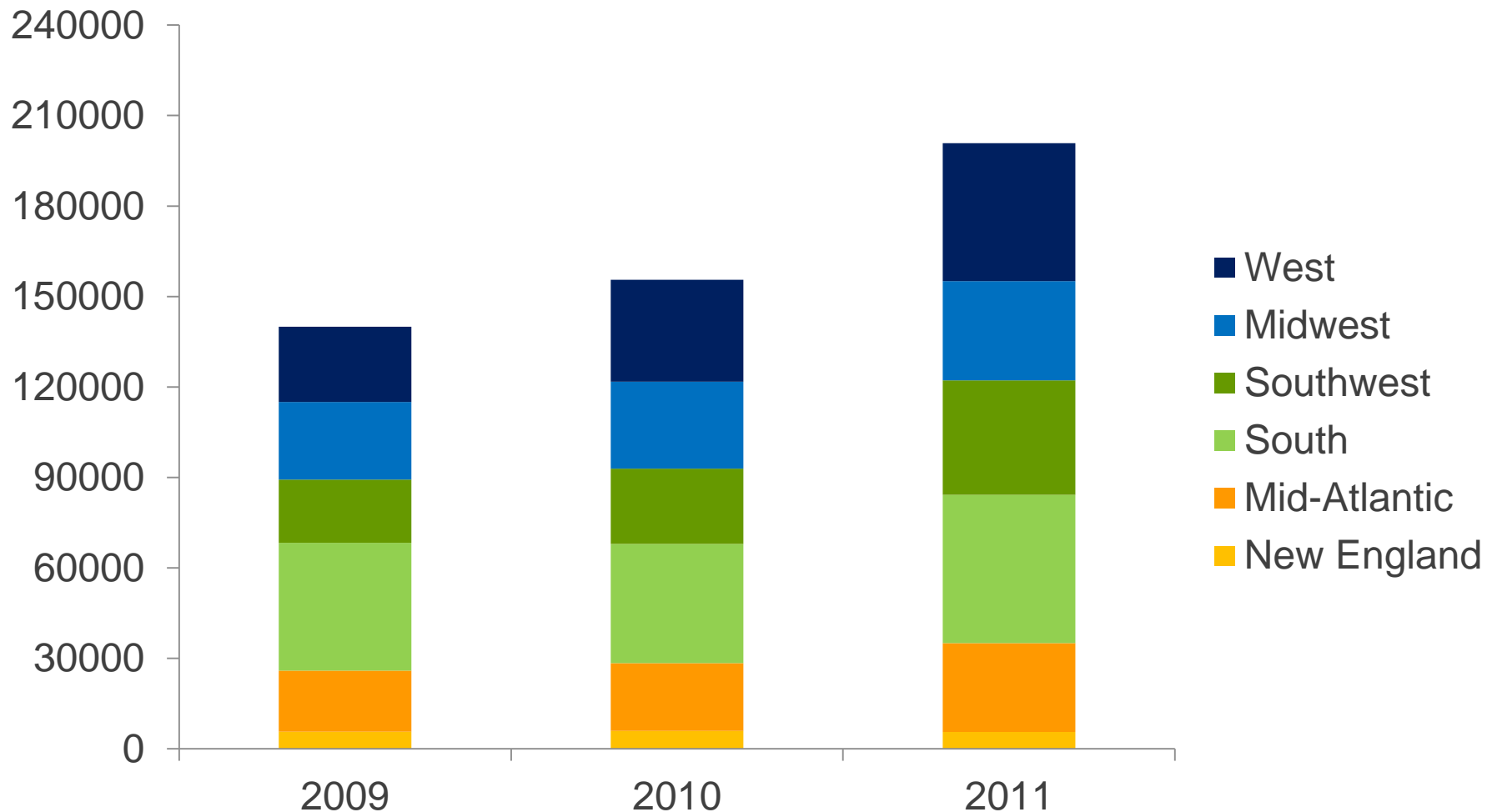
Source: 2009 EIA RECS Survey Data

# Building Permit Comparison

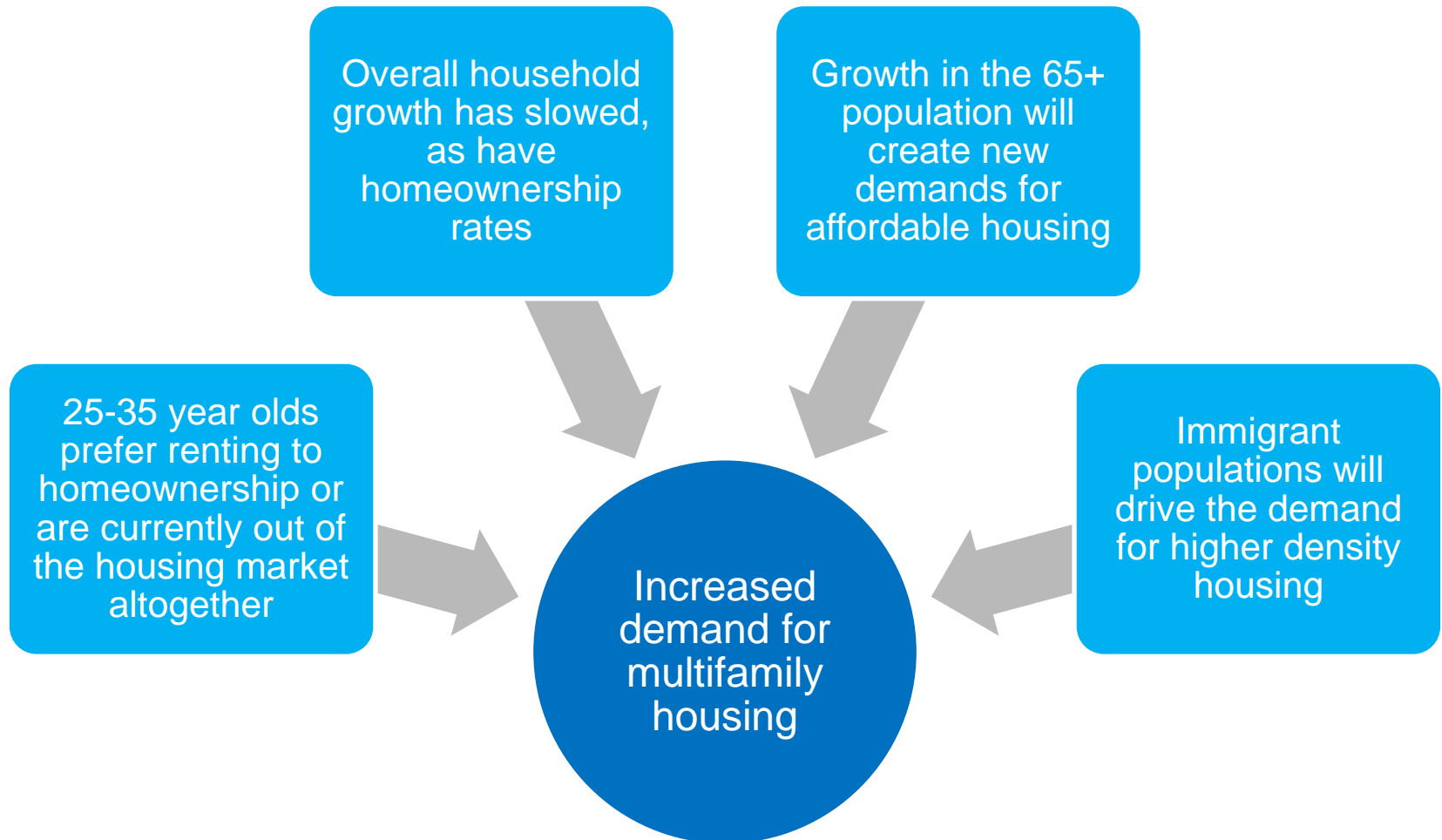




# Multifamily Building Permits: Regional Growth



# Population & Demographic Trends



# Highest Rental Rate Growth



Top U.S. Multifamily Markets Highest Rental Rate Growth		Rental Rate Growth 2011
1.	San Francisco	4.7%
2.	San Jose	4.6%
3.	Seattle	4.6%
4.	Austin	3.2%
5.	New York City	3.0%
6.	Dallas	2.7%
7.	Northern New Jersey	2.6%
8.	Columbus	2.5%
9.	Oakland/East Bay	2.5%
10.	Washington DC	2.4%

Source: REIS

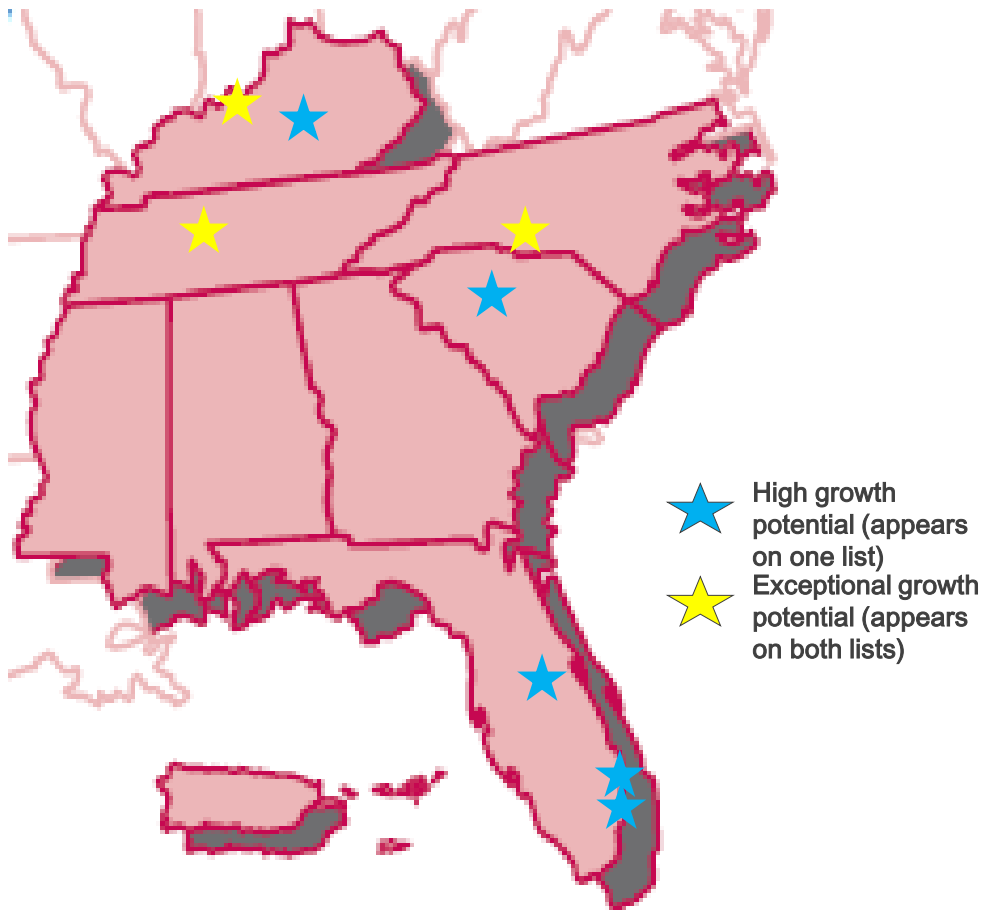
# Lowest Vacancy Levels



Top U.S. Multifamily Markets Lowest Vacancy Levels		YE 2011
1.	New York City	2.4%
2.	Minneapolis	2.5%
3.	Portland	2.7%
4.	San Jose	2.9%
5.	Seattle	2.9%
6.	San Diego	3.1%
7.	San Francisco	3.3%
8.	Pittsburgh	3.5%
9.	Oakland/East Bay	3.8%
10.	Milwaukee	3.9%

Source: REIS

# Growth in Southeast Region



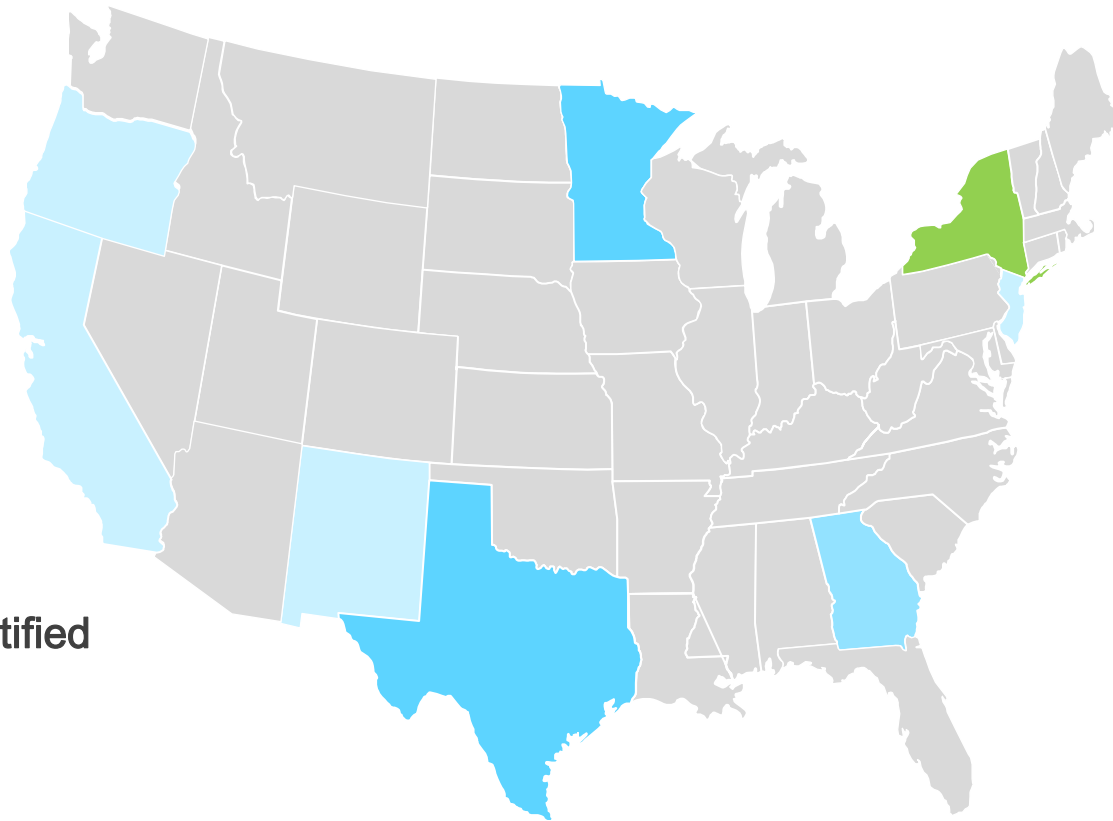
City	Vacancy Rate
Miami	3.2%
Louisville	3.5%
Lexington	3.9 %
Charlotte Nashville Fort Lauderdale Orlando	4-6%

City	Rental Growth Rate
Charlotte Louisville Nashville Greenville- Spartanburg- Anderson	5-6%



# Multifamily High Rise Activity

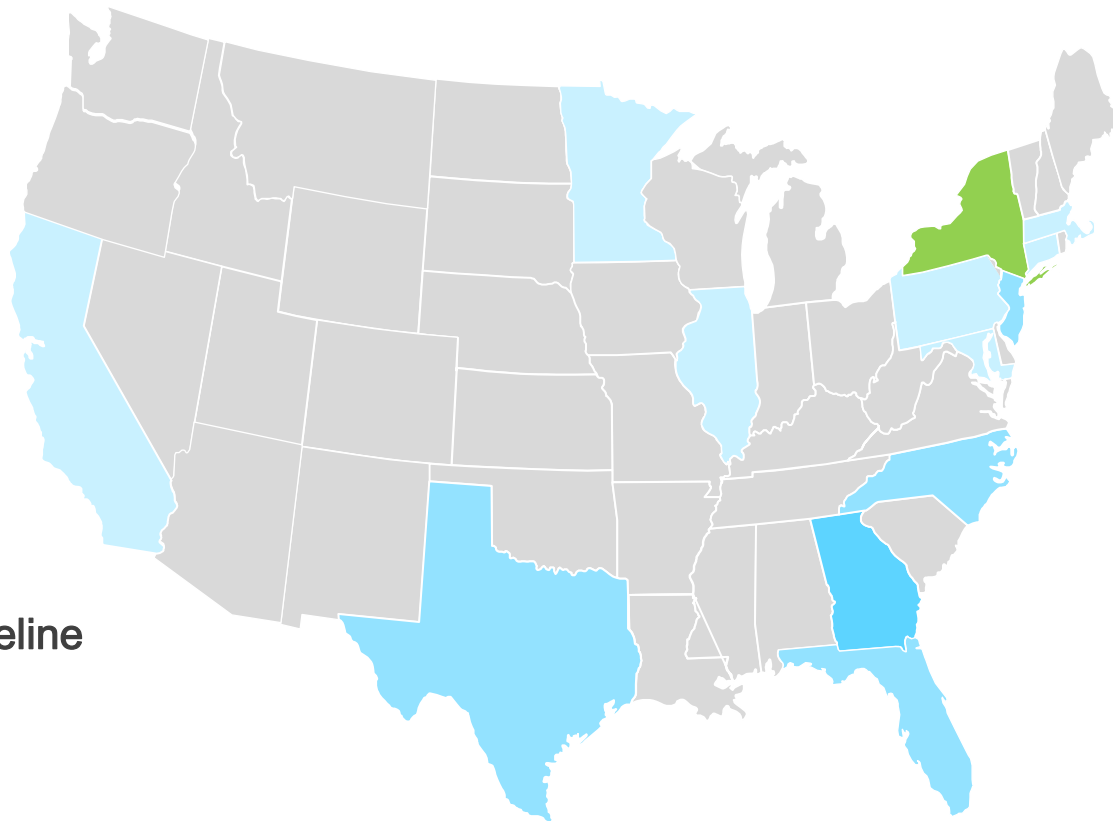
## Total $\approx$ 3,800 (Since 2006)



### MFHR Units Certified

- None Reported
- 1 – 250
- 251 – 500
- 501- 750
- 751 to 1,000
- 1,000 – 1,250
- Over 1,251

# Multifamily High Rise Pipeline (Total $\approx$ 18,000)



## MFHR Units Pipeline

- None Reported
- 1 - 250
- 251 - 500
- 501 - 750
- 751 - 1,000
- 1,000 - 1,250
- ≥ 15,000



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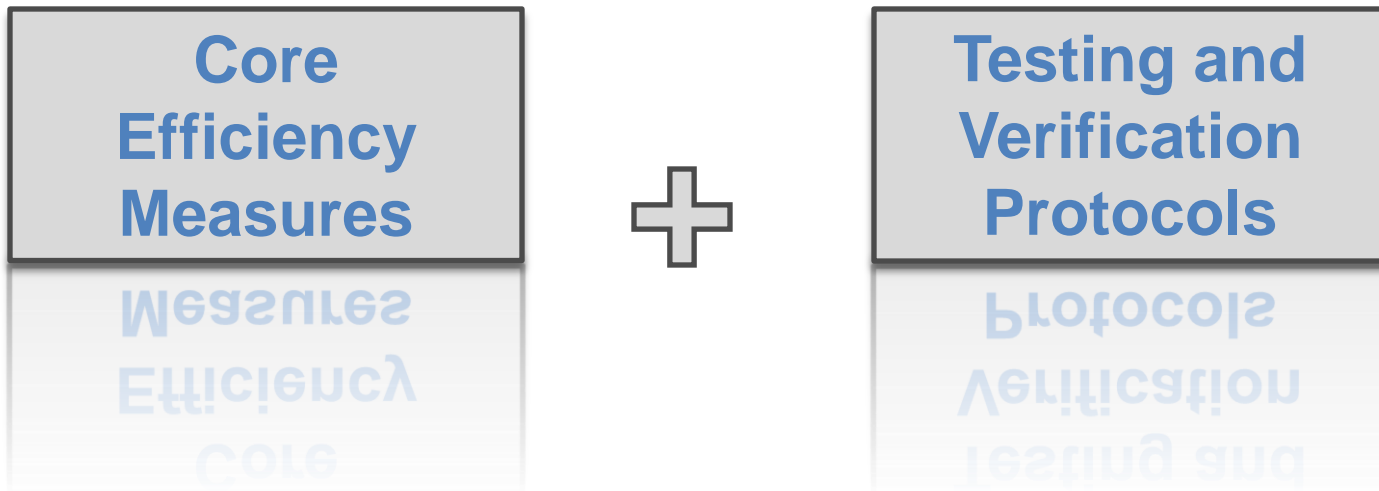
# The Value of Earning the ENERGY STAR for High Rise Residential Buildings

# Earning the ENERGY STAR

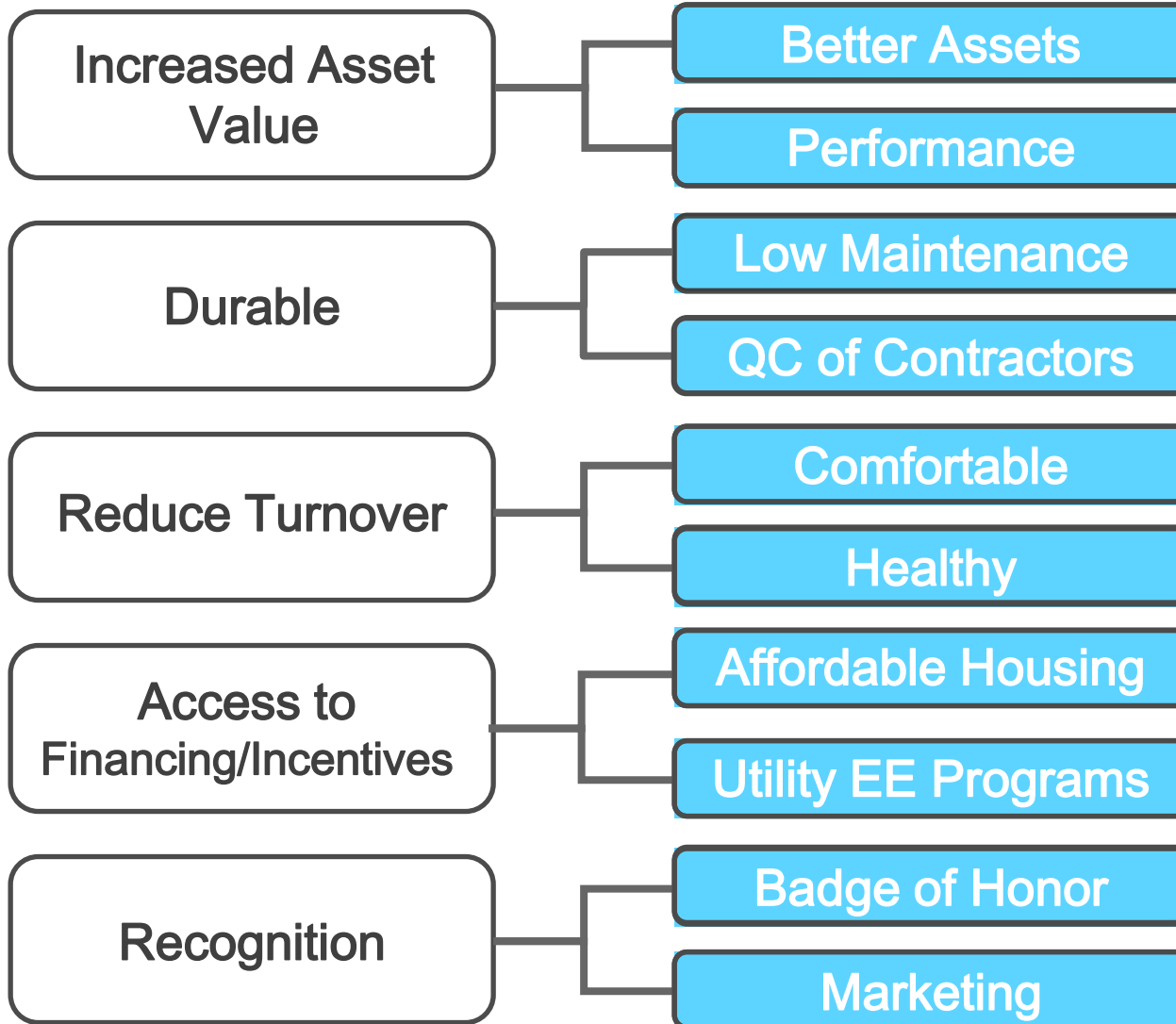


**= Energy Efficient**

# Value in Every Certified Building



# Value in Every Certified Building



# Earning the ENERGY STAR



=

- **Energy Efficient**
- **Affordable**
- **Comfortable**
- **Durable**
- **Financing/Incentives**
- **Recognition**

# Opportunities for Residential Energy Professionals



“What does this mean for my business?”

- ✓ Expand into a new construction sector
- ✓ Diversify income stream
- ✓ Build a broader professional network
- ✓ Incorporate highly visible projects into marketing efforts
- ✓ Explore commercial modeling





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# The ENERGY STAR Multifamily High Rise Program

# Program Requirements for Multifamily High Rise Projects (MFHR)



- Each ENERGY STAR certified mid and high rise project is verified to be at least **15%** more energy efficient than a building built to the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2007.

A full list of program requirements is listed at [www.energystar.gov/mfhr](http://www.energystar.gov/mfhr).



# ENERGY STAR MFHR Partnership



- EPA created a new partnership category for Multifamily High Rise Developer
  - Follow ENERGY STAR Logo Guidelines
  - Provide a project application for each project that enters the program
  - Design with intent to meet ENERGY STAR MFHR requirements
  - Work with a Licensed Professional to validate completion of ENERGY STAR MFHR requirements
  - Commit to benchmarking building for at least 2 years after occupancy

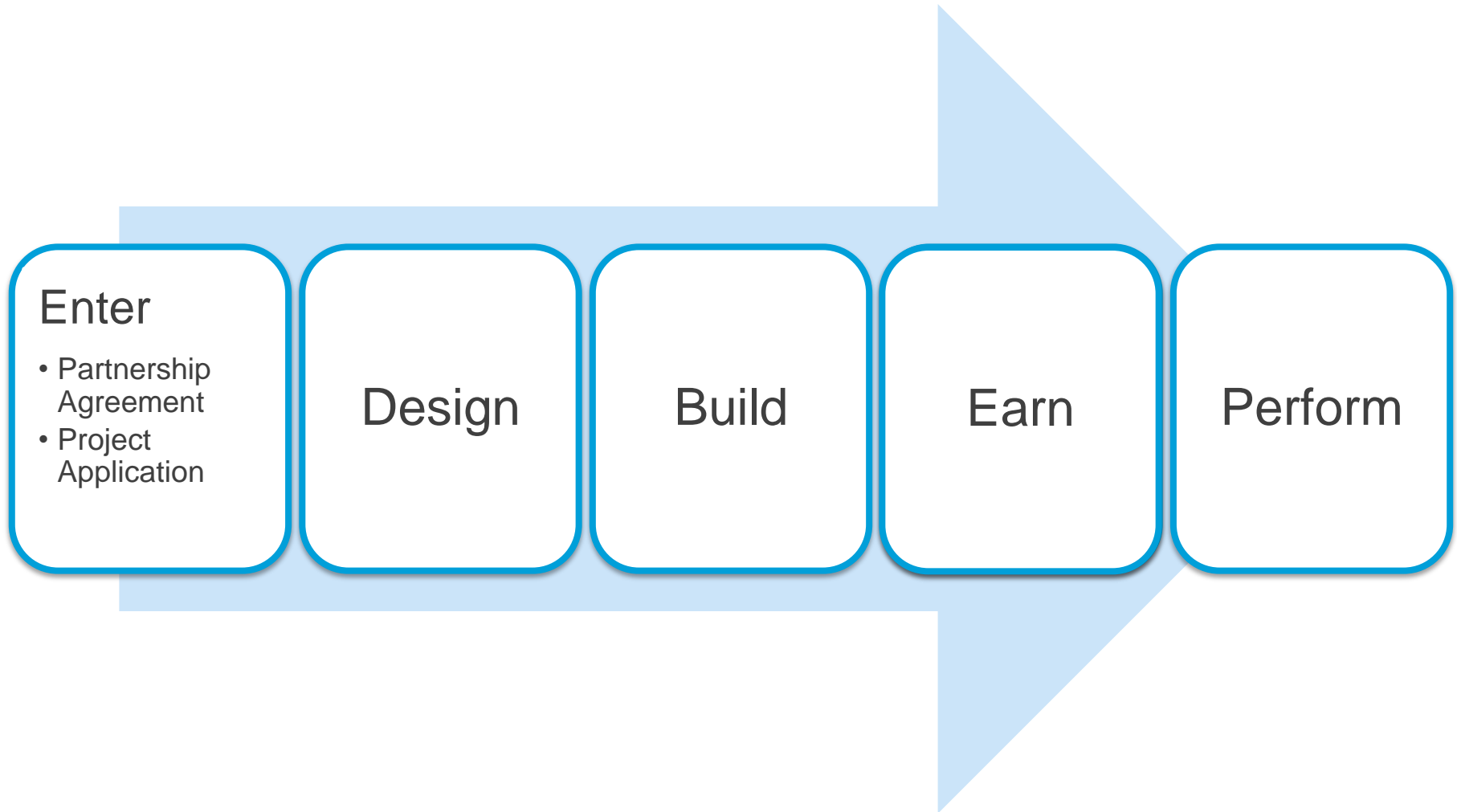
# Role of the Verifier for High Rise Residential Buildings

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- Developers must work with a Licensed Professional to gain the ENERGY STAR certification.
- Licensed Professionals are Registered Architects or Professional Engineers who:
  - Oversee a team of verification providers (e.g. Rater, HVAC Contractor, Test and Balance Engineer)
  - Validates program reporting requirements (Stamped and Signed)
- More information on Licensed Professionals can be found at [www.energystar.gov/mfhr](http://www.energystar.gov/mfhr)

# Certification Process for MFHR Projects



## Certified Homes Program

- ENERGY STAR Reference Design
  - Approximately 15% savings above 2009 IECC
- Prescriptive Path
- Performance Path
  - RESNET
  - HERS Index Target

## MF High Rise Program

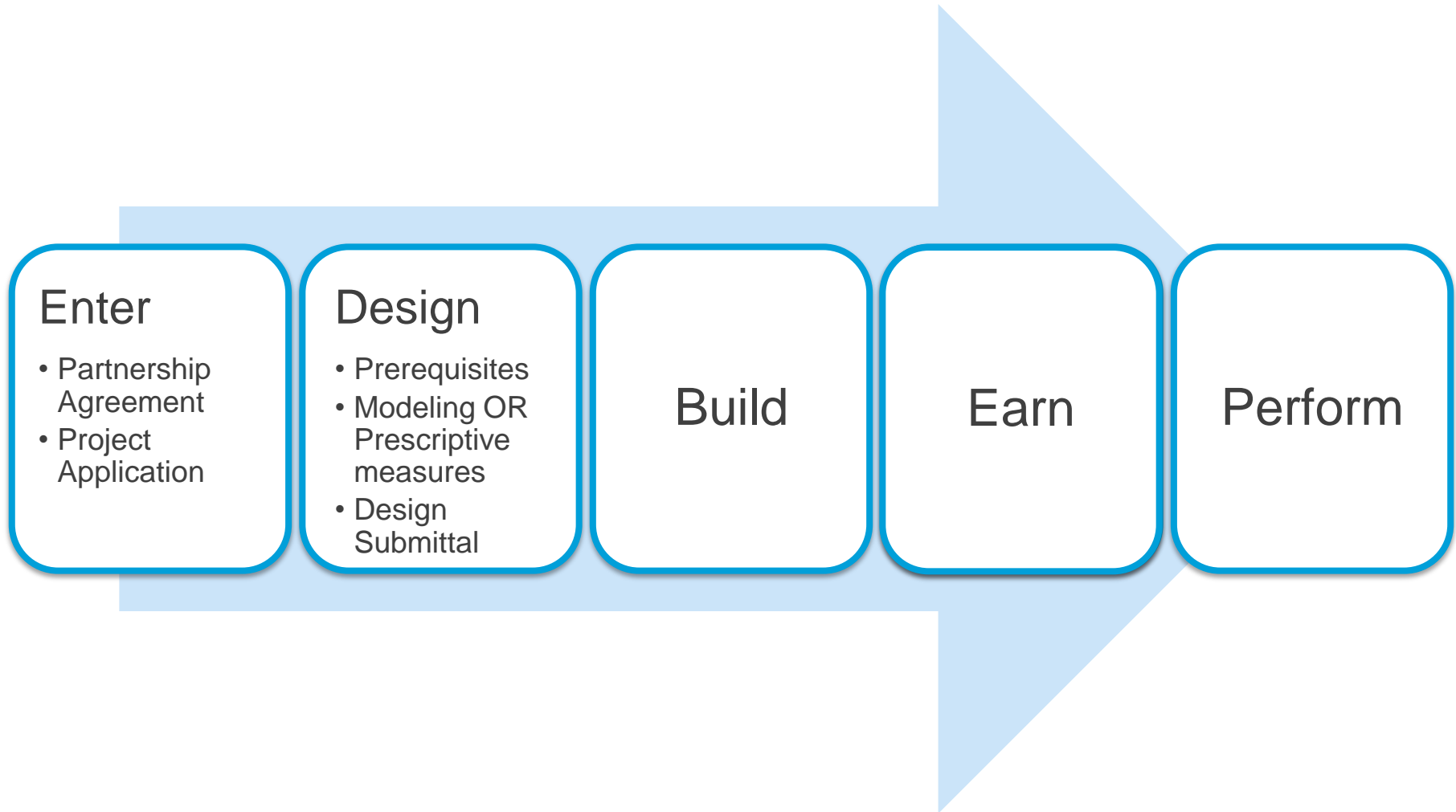
- 15% cost savings above ASHRAE 90.1-2007
- Prescriptive Path
- Performance Path
  - ASHRAE 90.1 Appendix G
  - ENERGY STAR Simulation Guidelines

# Documentation: Design Intent



- Proposed Design Submittal (Pre-Construction)
  - Model output summary that confirms design is 15% above ASHRAE 90.1-2007 Baseline (*Performance Path only*)
  - Plan review confirming Prerequisite and/or Prescriptive measure are in construction documents
  - Validation Form signed and stamped by Licensed Professional

# Certification Process for MFHR Projects



## Certified Homes Program

- ENERGY STAR Version 3 Inspection Checklists
  - Thermal Enclosure System
  - HVAC System (Contractor and Rater)
  - Water Management System
- Verification performed by certified HERS Rater

## MF High Rise Program

- ENERGY STAR Testing & Verification Worksheets
  - Thermal Enclosure System
  - HVAC & DHW System
  - Lighting, Motors, Pumps, Etc
- Verification performed by an energy consultant(s) and validated by a licensed professional

# Documentation: As-Built Building



- As-Built Submittal (Post Construction)
  - Model updated to reflect actual building conditions (*Performance Path only*)
  - Energy conservation measures are tested and Verified to ensure they meet EPA's ENERGY STAR MFHR Testing and Verification requirements
  - Validation Form signed and stamped by Licensed Professional



# Certification Process for MFHR Projects



## Enter

- Partnership Agreement
- Project Application

## Design

- Prerequisites
- Modeling OR Prescriptive measures
- Design Submittal

## Build

- Build to design
- Testing and Verification
- As-Built Submittal



## Perform

- Benchmark for two years

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# The ENERGY STAR MFHR Requirements

# Two Paths to ENERGY STAR MFHR

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- **Performance Path**
  - Meet Prerequisites
  - Conduct Energy Modeling
  - Build according to Design
  - Conduct Testing and Verification
- **Prescriptive Path**
  - Meet Prerequisites
  - Build according to Prescriptive Requirements
  - Conduct Testing and Verification

# Two Paths to ENERGY STAR MFHR



- **Performance Path**
  - Meet Prerequisites
  - Conduct Energy Modeling
  - Build according to Design
  - Conduct Testing and Verification
- **Prescriptive Path**
  - Meet Prerequisites
  - Build according to Prescriptive Requirements
  - Conduct Testing and Verification



# Meeting the MFHR Prerequisites

- ENERGY STAR qualified appliances
- ENERGY STAR qualified lighting in 80% of light fixtures
- Occupancy sensors for lighting in some common spaces
- Right-sized heating and cooling equipment
- Double-pane, low-e windows
- Low-flow faucets & showerheads ( $\leq 2.0$ gpm) and WaterSense toilets
- Total duct leakage for in-unit systems  $\leq 8$  CFM25 per 100ft<sup>2</sup> of conditioned floor area
- Continuous air barrier between conditioned/unconditioned spaces
- Air-sealing to achieve infiltration  $< 0.30$  CFM50/ft<sup>2</sup> of enclosure
- Ventilation per ASHRAE 62-2007 (apts. and common areas)

\*Not all Prerequisites have been listed here; see ENERGY STAR MFHR Performance Path V1.0



# Meeting the MFHR Prerequisites

- ENERGY STAR qualified appliances
- ENERGY STAR qualified lighting in 80% of light fixtures
- **Occupancy sensors for lighting in some common spaces**
- Right-sized heating and cooling equipment
- Double-pane, low-e windows
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- Ventilation per ASHRAE 62-**2007** (apts. and **common areas**)

(Items in red are different from ENERGY STAR Homes Version 3)

# Prescriptive vs. Performance (MFHR)



MEASURE	PRESCRIPTIVE	PERFORMANCE (Baseline ASHRAE 90.1-2007)
Appliances	ENERGY STAR Qualified	ENERGY STAR Qualified
Heating	CZ 1-3: 80% AFUE CZ 4-5: ENERGY STAR CZ 6-8: 90-95% AFUE	None (local code or federal standards)
Cooling	CZ 1-2: SEER 16 CZ 3-5: ENERGY STAR CZ 6-8: SEER 13	None (local code or federal standards)
Heating and Cooling Distribution	Total duct leakage <8 CFM25/100 ft <sup>2</sup>	Total duct leakage <8 CFM25/100 ft <sup>2</sup>
Envelope	Climate Specific Requirements that meet or Exceed AHSRAE 189.1-2009 Maximum Allowable Glazing Area: 30% Window to Wall Ratio	Local code for insulation Double-pane, low-e windows
Ventilation and Infiltration	Compartmentalized units with ASHRAE 62-2007 ventilation (can't exceed ASHRAE by more than 50%)	Compartmentalized units with ASHRAE 62-2007 ventilation
Domestic Hot Water	High Efficiency (Same as ENERGY STAR Homes ) Lower Flow Faucets and Showerheads	No DHW efficiency requirements Low Flow Fixtures and Toilets
Lighting	ENERGY STAR qualified lighting in 80% of fixtures and Occupancy Sensors in Halls and Stairs Maximum lighting power allowance	ENERGY STAR qualified lighting in 80% of fixtures

# Prescriptive vs. Performance (MFHR)



MEASURE	PRESCRIPTIVE	PERFORMANCE (Baseline ASHRAE 90.1-2007)
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Envelope	<b>Climate Specific Requirements that meet or Exceed AHSRAE 189.1-2009</b> <b>Maximum Allowable Glazing Area: 30% Window to Wall Ratio</b>	<b>Local code for insulation</b> <b>Double-pane, low-e windows</b>
Ventilation and Infiltration	<b>Compartmentalized</b> units with ASHRAE 62-2007 ventilation (can't exceed ASHRAE by more than <b>50%</b> )	<b>Compartmentalized</b> units with ASHRAE 62-2007 ventilation
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Lighting	ENERGY STAR qualified lighting in 80% of fixtures and <b>Occupancy Sensors in Halls and Stairs</b> <b>Maximum lighting power allowance</b>	<b>ENERGY STAR qualified lighting in 80% of fixtures</b>

(Items in red are different from ENERGY STAR Homes Version 3)



# Testing and Verification Protocols

- Protocols are similar to Guidebooks in ES Version 3.
- Mandatory requirements for the inspection, testing and verification of components related to the building's energy performance.
- The intent of the protocols is to verify that
  - the construction documents & final building include all Prerequisites.
  - measures used to achieve the Performance levels predicted by the model have been installed and perform as modeled.
  - all measures specified by the Prescriptive Path have been installed.
- Changes to the initial design noted during inspections must be reflected in a revised energy model and submitted as the As-Built model, or must still comply with Prescriptive Path requirements.



# Testing and Verification Protocols

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1. ENERGY STAR Qualified Appliances
2. Domestic Water Heating (Central or In-Unit Systems)
3. Envelope Construction/Insulation, R-value/U-value/SHGC
4. Garage
5. Heating and Cooling (Central or In-Unit Systems)
6. Lighting (In-unit, common area, exterior, controls)
7. Pump Motors
8. Air-sealing and testing; Ventilation and testing
9. Metering



# Testing and Verification Protocols

1. ENERGY STAR Qualified Appliances
2. Domestic Water Heating (**Central** or In-Unit Systems)
3. Envelope Construction/Insulation, R-value/U-value/SHGC
- 4. Garage**
5. Heating and Cooling (**Central** or In-Unit Systems)
6. Lighting (In-unit, **common area**, exterior, **controls**)
- 7. Pump Motors**
8. Air-sealing and testing; Ventilation and testing
- 9. Metering**

(Items in red are different from ENERGY STAR Homes Version 3)

# Testing and Verification Protocols



February 2011 Version 1.0

## 1.0 Appliances

### Protocol 1.1 - ENERGY STAR Qualified Appliances

Type of Testing Protocol:

<input checked="" type="checkbox"/>	Visual Inspection
<input checked="" type="checkbox"/>	Data Sheet
<input type="checkbox"/>	Test Procedure
<input type="checkbox"/>	Instrumented Measurement
<input type="checkbox"/>	Third-Party Commissioning

**Performance Specification Criteria:**

- Include a schedule with location and quantity.
- Require ENERGY STAR qualified products and appliances.
- **Contract Language:** "Allow inspection of all appliances. Provide submittal to the Energy Consultant and inform them immediately after installation. Ensure the ENERGY STAR label remains attached to products and appliances."

**Procedures and Documentation:**

- Record manufacturer and model number.
- Confirm manufacturer and model number is ENERGY STAR qualified.
- Photograph one (1) representative appliance faceplate of each type of appliance being inspected.
- Photograph ENERGY STAR label and/or attach cut sheet proving ENERGY STAR qualification.
- A Statement of Substantial Completion or approved proxy may be submitted to establish completion of the work associated with this protocol. A Statement of Substantial Completion is to be completed by the installation contractor or other qualified representative on company letterhead and attached to all relevant T&V Worksheets complete with all required information, photographs, cut sheets, etc.

**Schedule:**

- The developer or GC shall ensure that deliveries are inspected prior to accepting them to verify that product substitutions by the distributor or manufacturer have not resulted in non-ENERGY STAR qualified appliances.
- Minimum of one on-site inspection required, preferably immediately after installation so that corrective action can be taken, if necessary. Delivery tickets may be used to verify complete shipments, but on-site inspections of a sample of installed appliances is required.

**Responsible Parties:**

- Energy Consultant
- Installing Contractor

**Sampling Requirement:**

- For spaces containing appliances, follow the modified RESNET sampling protocol outlined in the *How to Use this Manual* section of this document. For buildings with common laundry rooms, RESNET sampling protocols are modified to require inspection of all the clothes washers in at least one (1) laundry room.

ENERGY STAR MFHR Testing and Verification Protocols Version 1.0 Page 14

- Types of Testing Protocol
- Performance Specification Criteria
- Procedures and Documentation
- Schedule
- Responsible Parties
- Sampling Requirements
- Statement of Substantial Completion
- Recommended Equipment List
- Referenced Standards

# Testing and Verification Worksheets



- Worksheets are similar to Inspection Checklists in Version 3.
- Mandatory Excel-based worksheets that document the results of plan reviews, inspections, verification, and performance testing.
  - Provide inspection worksheets that can be used in the field that follow the Testing and Verification Protocols, but are organized for the convenience of the site inspector.
  - Provide a central file to store building information relevant to all members of the design team: architect, energy modeler, site inspector, project manager, plan reviewer, etc.
  - Must be submitted once prior to construction to document results of the plan review and once after construction is complete, to document the results of testing and verification.

# Photo Template



- This Word-based template was designed so that pictures used to provide photo-documentation required by the T&V Protocols could be easily formatted and consistently reported.
- Photo documentation must be submitted to the EPA at the end of construction.
- The Photo Template need only be submitted for the Developer's first three certified buildings. Also, if the Licensed Professional has submitted at least three Photo Templates, the requirement is waived.

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# Potential Roles for Residential Energy Professionals in the ENERGY STAR Multifamily High Rise Program

# Opportunities for Residential Energy Professionals



“What role can a Rater play in Multifamily High Rise?”



ENERGY STAR  
Program Recruiters



Testing &  
Verification  
Specialist



New Roles (e.g.  
Building Energy  
Consultant,  
Modeler)



You might have multiple roles.



# How Rater Skills Apply to MFHR



## Skills from Certified Homes Program That Apply to MFHR

### Thermal Enclosure

- Insulation evaluation
- Air barrier inspection
- Air sealing inspections
- Strategies for reducing thermal bridging

### HVAC

- Reviewing load/duct sizing calculations
- Understanding equipment sizing/AHRIs
- Inspecting duct installation and sealing
- Knowledge of ASHRAE 62.2
- Measuring ventilation air flow rates
- Duct blaster tests on in-unit forced air systems
- Blower door tests on apartments (not guarded)

### Other

- Verifying ENERGY STAR/WaterSense Products
- Trades training
- Coordination with builder

# How Rater Skills Apply to MFHR



## Skills to Improve/Enhance

### Plan Reviewer

- Provide plan review services to ensure MFHR requirements are included in construction documents

### Consultant

- Provide primary energy consultant services directly to Licensed Professional by overseeing team of verification service providers and completing program submittal documentation

### Modeler

- Expand services to include ASHRAE compliant commercial modeling services

# Skills/Standards to learn



## Skills That Apply to ENERGY STAR MFHR Only

### HVAC

- ASHRAE 62.1-2007
- Duct blaster tests on ventilation systems
- Inspecting outside air dampers and CO sensors

### Other

- ASHRAE 90.1-2007
- Lighting power density & illumination calculations
- Measurement of delivery water temperature
- Evaluating pipe insulation, low-flow fixtures, lighting controls, NEMA Premium pump motors

### Modeling

- ASHRAE 90.1-2007 Appendix G energy modeling

# Support and Future Outreach

# ENERGY STAR MFHR Technical Documents ([www.energystar.gov/mfhr](http://www.energystar.gov/mfhr))

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## Requirements

- Eligibility
- Performance Path
- Prescriptive Path
- Simulation Guidelines
- Testing and Verification Protocols

## Tools

- Performance Path Calculator (Excel)
- Testing and Verification Worksheets (Excel)

## Guidance

- Sample submittals, Policy Record & Eligibility Decision Tree
- Energy Modeling Quality Control Checklist

## Policy Record

- Record of recent program policy clarifications and updates

# ENERGY STAR MFHR Recordings



- Online training for MFHR developer partners, modelers, field inspectors, licensed professionals, and other program participants available at [www.energystar.gov/mfhr](http://www.energystar.gov/mfhr)
- Ten narrated presentations that cover:
  - Prescriptive and Performance Paths
  - Energy Modeling
  - Testing and Verification protocols
  - Tools that facilitate program reporting

# Outreach Strategy



- Home Energy Professionals (e.g., Raters)
  - Provide technical support and work with training and certification programs
- Market Rate Developers
  - Regions with high growth potential
  - Mid to high-end markets
  - Builders ready to capitalize on marketing advantages
- Housing Finance Agencies
  - HUD and USDA are exploring ENERGY STAR Certification for new construction portfolio
  - Continuing to grow the market for energy efficient affordable housing
- Utility Program Sponsors
  - Currently over 100 programs across the country provide incentive for ENERGY STAR homes
  - EPA will work with current partners to expand offering to multifamily
- Green Building Programs
  - ENERGY STAR Certification is a pathway to energy points for both LEED for Homes, LEED for Mid Rise and Enterprise Green Communities
- Designers & Licensed Professionals
  - Finding champions that can showcase successes and network with new developers to encourage participation

# RESNET and Multifamily



- EPA, Enterprise and USGBC working with RESNET
  - Improve multifamily guidance
    - Modeling common central HVAC systems
    - Modeling infiltration results for MF units
    - Sampling MF Units
    - Compartmentalization and duct leakage testing
  - Discuss certification for Raters who work in MF sector



## [www.energystar.gov/newhomestraining](http://www.energystar.gov/newhomestraining)

### ENERGY STAR Webinars

To register, click on the corresponding date and time below and complete the registration form.

Title	Date and time	Overview	Target Audience	CEUs
Key HVAC Design Concepts	<a href="#">Thursday, March 7, 2013; 1:30 p.m.-2:30 p.m. ET</a>	ENERGY STAR certified homes are required to have a complete thermal enclosure system and HVAC system. Learn how the thermal enclosure system plays a critical role in HVAC design, the basic three-step process of designing an HVAC system, and how these complete systems add value to a home. (This is a repeat of the January 9th webinar)	Raters, Builders, HVAC Contractors	1 BPI
Getting it Right: Sections 1-4 of the HVAC System QI Rater Checklist	<a href="#">Tuesday, March 19, 2013; 2:00 p.m.-3:00 p.m. ET</a>	ENERGY STAR Certified Homes are required to have a complete HVAC system. Learn what the Heating and Air Conditioning-related requirements of this system are, how they add value to a home, and how Sections 1 through 4 of the HVAC System QI Rater Checklist produce this value. Attendees will become better prepared to understand and successfully implement these important requirements. (This is a repeat of the January 16th webinar)	Raters, Builders, HVAC Contractors	1 BPI
Building on ENERGY STAR: Stepping up to EPA's Indoor airPLUS Label	<a href="#">Thursday, March 28, 2013; 12:00 p.m.-12:45 p.m. ET</a>	Building ENERGY STAR certified homes is a great start to improving indoor air quality. Now, consider moving up to EPA's Indoor airPLUS label, which provides a comprehensive approach to ensuring healthy indoor air in your home. Learn about recent program updates with Revision 1 and how you can easily build on your ENERGY STAR partnership to earn the Indoor airPLUS label.	Builders, Raters, Utility Representatives	N/A
ENERGY STAR Marketing Materials	<a href="#">Tuesday, April 2, 2013; 2:00 p.m.-2:45p.m. ET</a>	Attend this webinar to learn how to build and maintain value around the ENERGY STAR brand. You will hear about EPA's approach to developing their consumer messaging and platform around ENERGY STAR certified homes. New marketing materials will also be showcased.	Builders, Raters, utility sponsors and other partners.	N/A

# Discussion



## **ENERGY STAR for Certified Homes (Low Rise Multifamily)**

Main: [www.energystar.gov/newhomespartners](http://www.energystar.gov/newhomespartners)

Technical: [www.energystar.gov/newhomesguidelines](http://www.energystar.gov/newhomesguidelines)

Training: [www.energystar.gov/newhomestraining](http://www.energystar.gov/newhomestraining)

HVAC: [www.energystar.gov/newhomesHVAC](http://www.energystar.gov/newhomesHVAC)

## **ENERGY STAR for Multifamily High Rise**

Main: [www.energystar.gov/mfhr](http://www.energystar.gov/mfhr)

Questions: [mfhr@energystar.gov](mailto:mfhr@energystar.gov)

Benchmarking/Management: <http://www.energystar.gov/multifamilyhousing>

Now on Twitter and Facebook!



facebook.com/energystar



@energystarhomes