ENERGY STAR Qualified
Modular Homes
Version 2.5 Orientation

This presentation is aligned with Version 3 (Revision 04) of the ENERGY STAR for Homes guidelines.

Learn more at energystar.gov
Agenda

• Overview
• Modular Program Structure
• Qualifying Homes under Version 2.5
• Inspection Checklists
• Action Items for Version 2.5
• Getting to Version 3 for Modular Homes
• Resources
Overview
Why change from Version 2?

• **Keep pace with codes and building practices**
  – Energy codes are becoming more stringent, particularly with the adoption of the 2009 IECC.
  – Energy codes are increasing more rapidly and updates will be adopted more regularly by many states.
  – Market penetration is increasing, and ENERGY STAR is becoming the standard for new home construction in some markets.
  – Increasing penetration of thermography reduces tolerance for defects.

• **Continually improve value proposition**
  – To protect its value to consumers, partners and other stakeholders, ENERGY STAR must continue to be a mark of distinction that represents significant efficiency above standard constructions practices.
  – The guidelines are augmented with building science practices that can help improve comfort, indoor air quality and durability in qualified homes.
What is Version 2.5?

• **Version 3 with allowances for transition**
  – Version 2.5 applies to homes that are ordered by the Builder between October 1, 2011 and June 30, 2012.
  – Maintains same modular program compliance verification procedures, but incorporates the new energy efficiency requirements and additional verification items on the new Inspection Checklists.

• **Version 2.5 will help partners succeed with Version 3**
  – By completing all mandatory checklists, but providing an allowance for deficiencies during this transitional period, Version 2.5 allows partners to identify what parts of the full Version 3 guidelines require further preparation and assistance.
Key features of Version 2.5

• **ENERGY STAR Reference Design**
  – A set of core efficiency requirements for the building envelope, HVAC and water heating equipment, lighting and appliances.

• **Enhanced Inspection Checklists**
  – The current Thermal Bypass Checklist has been expanded into the Thermal Enclosure System Checklist and three new checklists related to HVAC System Quality Installation and Water Management Systems have been added.
  – The checklists include building science-based details that control air, thermal and moisture flows within homes to deliver improved durability, comfort and efficiency.
Key features of Version 2.5

• Variable vs. Fixed HERS Index
  – Instead of a fixed HERS Score, a variable HERS Index Target is calculated for each home by applying the efficiency requirements of the ENERGY STAR Reference Design.

• Benchmark Home Size
  – Homes larger than the average size for a specified number of bedrooms (called the ‘Benchmark Home Size’) must apply a Size Adjustment Factor that will reduce the ENERGY STAR HERS Index Target and increase the home’s energy efficiency requirements.
## Implementation timeline

<table>
<thead>
<tr>
<th>Date Builder Orders Home from Manufacturer</th>
<th>Now</th>
<th>10/1/2011</th>
<th>7/1/2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>version 2</td>
<td>v2</td>
<td>v2.5</td>
<td>v3</td>
</tr>
</tbody>
</table>

- **Version 2**: 2006 Guidelines
- **Version 2.5**: Core Version 3 energy efficiency measures with Design Requirements Checklist and Section 3 Air Barriers and Section 5 Air Sealing of Thermal Enclosure System Checklist enforced; All other checklists completed but not enforced
- **Version 3**: Core Version 3 energy efficiency measures with all checklists completed and enforced
Modular Program Structure
The modular housing program

• **Energy efficiency requirements**
  – Based on ENERGY STAR National Program Requirements established and maintained by U.S. EPA

• **Three components unique to modular homes**
  1. Plant certification
  2. Compliance verification responsibilities divided between plant and field
  3. Reporting and labeling qualified homes
The modular housing program

<table>
<thead>
<tr>
<th>Provision</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLANT COMPLETED</strong></td>
<td></td>
</tr>
<tr>
<td>➢ Plant Certification</td>
<td>• Conducted by third-party plant Certifier</td>
</tr>
<tr>
<td></td>
<td>• Semi-annual inspections/tests by third-party plant Certifier</td>
</tr>
<tr>
<td>➢ Verification (Inspection &amp; Testing)</td>
<td>• Visual inspection (checklist) of all homes by plant QC staff</td>
</tr>
<tr>
<td>➢ Labeling</td>
<td>• Quality Assurance (QA) label applied in the plant by plant staff</td>
</tr>
<tr>
<td><strong>FIELD COMPLETED</strong></td>
<td></td>
</tr>
<tr>
<td>➢ Home Qualification</td>
<td>• Conducted by third-party HERS Rater retained by Builder</td>
</tr>
<tr>
<td>➢ Verification (Inspection &amp; Testing)</td>
<td>• Visual inspection (checklist) of all homes; responsibility for each item assigned to Builder or Rater</td>
</tr>
<tr>
<td></td>
<td>• Testing by HVAC contractor of HVAC systems in all homes</td>
</tr>
<tr>
<td></td>
<td>• Testing by Rater (1 in 7 minimum, plus first 2 homes per Builder)</td>
</tr>
<tr>
<td>➢ Labeling</td>
<td>• ENERGY STAR Qualified New Home label applied to home upon completion on site</td>
</tr>
</tbody>
</table>
Labels for modular homes

EPA’s ENERGY STAR® Qualified New Home Label

SBRA’s Quality Assurance Label
The role of key partners

- **Plant**
  - Retains third-party Certifier
  - Once certified, produces homes per Certifier-approved plans
  - QC staff inspects and verifies plant-installed items
  - Ships home modules to the Builder with partially-completed Inspection Checklists, flagging items to be verified in the field

- **Builder**
  - Retains third-party Rater
  - Completes homes per the Inspection Checklists
  - Verifies items flagged for field verification, including items on the Water Management System Checklist

- **HVAC Contractor**
  - Completes the items flagged for field verification in the HVAC System Quality Installation Checklist
The role of key partners

• **Certifier**
  – Reviews plant’s procedures and designs; certifies the plant as conforming to ENERGY STAR and modular program requirements
  – Conducts periodic in-plant inspections for ongoing compliance

• **Rater**
  – Coordinates inspection schedule with Builder and HVAC contractor
  – Verifies items flagged for field verification on the Inspection Checklists
  – Conducts required testing and reports homes to SBRA
The role of key partners

• **EPA**
  – Establishes the ENERGY STAR guidelines and technical requirements
  – Implements ENERGY STAR partnership program for plants and builders
  – Promotes the ENERGY STAR brand nationally and supports industry promotion
  – Monitors and enforces use of the ENERGY STAR marks in promotional materials

• **SBRA**
  – As an EPA-approved Quality Assurance Provider program, develops, maintains and administers quality assurance compliance procedures for modular housing
  – Reviews reports and inspection checklists submitted by Rater
  – Issues labels and home certificate
  – Reports qualified homes to EPA quarterly
Qualifying Homes under Version 2.5
Eligible housing types

- Single family homes
- Units in any multifamily building with 4 units or fewer
- Units in multifamily buildings with 3 stories or fewer
- Units in multifamily buildings with 4 or 5 stories above-grade that have their own heating, cooling and hot water systems and where dwelling units occupy 80% or more of the building area

Units in multifamily buildings that are not eligible to earn the ENERGY STAR through the New Homes Program may be eligible through the Multifamily High Rise Program.
Qualifying homes under Version 2.5

1. Compare home size to Benchmark Home Size
2. Select either Prescriptive or Performance path

**Prescriptive Path**
3. Build home using the measures listed in the ENERGY STAR Reference Design

**Performance Path**
3. Build home using a custom package based on the ENERGY STAR HERS Index Target

4. Verify compliance using the Inspection Checklists
5. Report and label homes
Evaluate home size

• **Compare home size to Benchmark Home**
  – Conditioned Floor Area (CFA) and bedrooms are defined in the footnotes of the National Program Requirements document
  – Homes that are larger than their Benchmark Home Size must use the Performance Path so that the **Size Adjustment Factor** can be applied

<table>
<thead>
<tr>
<th>Benchmark Home Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedrooms</td>
</tr>
<tr>
<td>CFA</td>
</tr>
</tbody>
</table>

• **Determine Size Adjustment Factor**
  – A multiplier between 0 and 1 that lowers the ENERGY STAR HERS Index Target
  – Only applied to homes larger than the Benchmark Home Size

\[
SAF = \left( \frac{\text{CFA of Benchmark Home}}{\text{CFA of home to be built}} \right)^{0.25}
\]
Select a compliance path

• **Prescriptive Path**
  – A pre-defined set of specifications that must be met. No trade-offs are allowed.
  – Can only be used if home is the same size or smaller than Benchmark Home Size.
  – The home must be designed and constructed to specifications and pass all required inspections and testing.

• **Performance Path**
  – A custom set of energy efficiency specifications that achieves the **ENERGY STAR HERS Index Target**—the customized threshold for each home based on the **ENERGY STAR Reference Design** and, for homes larger than their Benchmark Home Size, includes the **Size Adjustment Factor** (SAF).
  – The home must be designed and constructed to the custom specifications and pass all required inspections and testing.
Complete inspection checklists

- **Inspection Checklists**
  - In Version 2.5, all inspection checklists must be completed.
    - ✓ Design Requirements Checklist
    - ✓ Thermal Enclosure System Checklist
    - ✓ HVAC System Quality Installation Checklist
    - ✓ HVAC System Quality Verification Checklist
    - ✓ Water Management System Checklist
      (or Indoor airPLUS Verification Checklist)
  - Homes must meet all requirements of the Design Requirements Checklist, Section 3—Air Barriers and Section 5—Air Sealing of the Thermal Enclosure System Checklist.
  - Noncompliance with other checklist items will not prevent homes from earning the label under Version 2.5.
  - Compliance with all checklist items will be required under Version 3.
Modular Home Completion Report

- The field verification form completed by the Rater (or the Certifier for plant certification homes) and submitted to SBRA to report qualified homes and request the ENERGY STAR label and home certificate.
Inspection Checklists
Inspection checklists for v2.5

- **Design Requirements Checklist**
  - Unique to modular homes.
  - Provides a list of features required by the selected compliance path.
  - Provides a place for the plant’s QC staff to document compliance with the design and construction specifications.
  - Provides the builder and the Rater with a record of the items inspected in the plant and a list of the items that are to be completed and verified in the field.
  - Full compliance with all checklist items is required for Version 2.5.
Inspection checklists for v2.5

• Thermal Enclosure System Checklist
  – Full compliance with Section 3 Fully-Aligned Air Barriers and Section 5 Air Sealing is required for Version 2.5.
  – Builder can verify up to six items at the Rater’s discretion.
Inspection checklists for v2.5

- **HVAC System Quality Installation Checklist**
  - Ensures that the HVAC systems are designed and installed according to industry-accepted quality installation practices.
  - **To be completed by the Plant and the HVAC contractor.**
  - The Rater will validate some key data points, but is NOT responsible for verifying the accuracy of load calculations.
  - For Version 2.5, Checklist must be completed, but homes will not be denied the ENERGY STAR label for deficiencies.
Inspection checklists for v2.5

- HVAC System Quality Verification Checklist
  - Used to verify that the home’s ductwork and ventilation system have been installed properly and to validate HVAC contractor’s work.
  - To be completed by the Rater.
  - For Version 2.5, Checklist must be completed, but homes will not be denied the ENERGY STAR label for deficiencies.
**Inspection checklists for v2.5**

- **Water Management System Checklist**
  - Requires inspection of key areas to help assure bulk moisture control, including water-managed foundation, walls, roofs and building materials.
  - **To be completed by the Plant and the Builder.**
  - Rater may also verify items on the Checklist. However, the Plant and the Builder are responsible for accuracy of all Checklist requirements.
  - For Version 2.5, this Checklist must be completed, but homes will not be denied the ENERGY STAR label for deficiencies.

As an alternative, the **Indoor airPLUS Verification Checklist** can be completed. The learn more about how homes can be qualified to earn EPA's Indoor airPLUS label, visit [www.epa.gov/indoorairplus](http://www.epa.gov/indoorairplus)
Action Items for Version 2.5
**Action items**

• **Review plant’s designs and QC procedures for Version 2.5**
  – Certifiers should work with plants to incorporate the Version 2.5 energy efficiency requirements and checklist items into the plant’s plans and procedures during the next scheduled six-month, in-plant inspection.
  – Recommended that this occur before plant begins building homes to Version 2.5 guidelines.

• **Educate the Builder**
  – Plant, Certifier and Rater should work together to educate the Builder on the Builder’s and HVAC contractor’s added responsibilities under Version 2.5.
  – Builders are encouraged to participate in an online ENERGY STAR Version 2.5 webinar that will be broadcast in late October or early November 2011.
Getting to Version 3 for Modular Homes
Getting to Version 3

- **Fall 2011**: Version 3 Modular guidelines developed
- **Winter 2012**: Version 3 Modular guidelines released
- **Spring 2012**: Version 3 Modular Training available
  - Plant re-certification
  - Builder training completed
  - HVAC contractor credentialing
- **Starting July 1, 2012**: Homes ordered on or after this date must meet Version 3 guidelines
Resources
Modular resources from SBRA

- Modular Housing Program v2.5 Guidelines
  - Comprehensive program guidebook available on the SBRA website: [www.research-alliance.org/pages/es_mod.htm](http://www.research-alliance.org/pages/es_mod.htm)
- SBRA Modular Home Update e-newsletter
- Contact SBRA
gkoch@research-alliance.org
212-496-0900 x120
- Find us on Facebook facebook_icon.png
General resources from EPA

• **Checklist item questions**
  – Consult the checklist guidebooks, which explain the rationale and installation standards for each item.

• **HVAC contractor requirements**
  – Before working on homes qualified under Version 3, HVAC contractors must complete the Version 3 Training and be credentialed
  – For information on HVAC contractor credentialing, visit [www.energystar.gov/newhomeshvac](http://www.energystar.gov/newhomeshvac)

• **ENERGY STAR brand guidelines**
  [www.energystar.gov/logos](http://www.energystar.gov/logos)

• **ENERGY STAR for New Homes**
  [www.energystar.gov/newhomespartners](http://www.energystar.gov/newhomespartners)
  @energystarhomes

Now on Twitter and Facebook! facebook.com/energystar
General resources from EPA

- Build momentum in your market by participating in the We’re In! Campaign
  - Builders committed to qualifying homes under Version 3 can make that commitment public and be recognized for their early leadership.
  - Builders can make the commitment for some or all of their homes.
  - Participants will receive a press release from EPA to use in media outreach, will be showcased on EPA’s website, and may be featured in EPA’s own media outreach.
  - [www.energystar.gov/v3commitment](http://www.energystar.gov/v3commitment)

Are You “In” for Version 3?
Show your leadership and make a commitment!

ENERGY STAR builder partners across the nation are making a public commitment to building their homes to the new Version 3 requirements in 2012. These builders will be featured on the ENERGY STAR website, will receive an EPA press release template for promotional use, and may be featured in EPA-led media outreach about the value of the new Version 3 requirements.
Thank you!

Q&A