Speaking

Dean Gamble
Technical Manager
EPA, ENERGY STAR Single-Family New Homes Program
Agenda

• The key differences between Version 3 and 3.1
• How to benchmark homes against v3.1 in rating software
• Example compliance paths for homes in Maine
• The implementation timeline for Version 3.1
• Q&A
Key Differences Between Version 3 and Version 3.1
Key differences between Version 3.0 & Version 3.1

• Two key components to program requirements:

- Efficiency Target
  - In Version 3.1, this is an ERI Target ≥10% more stringent than 2012 IECC

- Inspection Checklists
  - In Version 3.1, this is identical to Version 3
Key differences between Version 3 & Version 3.1

• The more stringent v3.1 ERI target is in the range of ~55-65.
• Avg. HERS Index of all rated homes in 2020, not just ENERGY STAR, was 58.
• You can hit the more stringent target using ‘off-the-shelf’ technologies:
  – Lower infiltration rates; and,
  – Better windows & doors; and,
  – More efficient HVAC equipment; and,
  – Ducts in conditioned space; and,
  – More efficient lighting.
• No new mandatory requirements, use any combo of measures to hit target.
# Key differences between Version 3 & Version 3.1

<table>
<thead>
<tr>
<th>Climate Description</th>
<th>Mixed &amp; Cold</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Climate Zone</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Air Conditioner (SEER)</strong></td>
<td>13</td>
</tr>
<tr>
<td><strong>Gas Furnace (AFUE)</strong></td>
<td>95</td>
</tr>
<tr>
<td>Heat Pump (HSPF/SEER)</td>
<td>9.5/15</td>
</tr>
<tr>
<td><strong>Duct Location</strong></td>
<td>In Conditioned Space</td>
</tr>
<tr>
<td><strong>Radiant Barrier?</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Infiltration Rate (ACH50)</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Insulation Levels</strong></td>
<td>2012 IECC</td>
</tr>
<tr>
<td><strong>Windows (U-Value)</strong></td>
<td>0.27</td>
</tr>
<tr>
<td><strong>Windows (SHGC)</strong></td>
<td>Any</td>
</tr>
<tr>
<td><strong>Door (R-value)</strong></td>
<td>5.9</td>
</tr>
<tr>
<td><strong>Water Heater (EF)</strong></td>
<td>Gas: 0.61 EF for 40 gal Elec: 0.39 for 40 gal.</td>
</tr>
<tr>
<td><strong>Thermostat Type</strong></td>
<td>Programmable</td>
</tr>
<tr>
<td><strong>Refrigerator</strong></td>
<td>ENERGY STAR Certified</td>
</tr>
<tr>
<td><strong>Dishwasher</strong></td>
<td>ENERGY STAR Certified</td>
</tr>
<tr>
<td><strong>Lighting</strong></td>
<td>90% ENERGY STAR Certified</td>
</tr>
</tbody>
</table>
Summary of key differences

• More stringent ENERGY STAR ERI target.
• No new mandatory measures required.
• No changes at all to the:
  – Rater Design Review Checklist
  – Rater Field Checklist
  – HVAC Commissioning Checklist
  – Water Management System Builder Requirements
Quiz #1

- Are ducts in conditioned space mandatory for Version 3.1?
  - Yes
  - No
  - Who knows?
Quiz #2

• What is the typical range of ENERGY STAR ERI targets for v3.1?
  – About 65 to 75
  – About 55 to 65
  – 0 to Hero
How to Demonstrate Compliance with Version 3.1
Demonstrating compliance with Version 3.1

- REM/Rate, EnergyGauge, and Ekotrope all have the ENERGY STAR Version 3.1 Reference Design programmed in.

- This means that you can run the ENERGY STAR Version 3.1 compliance report for any home in the country, even if Version 3.1 has not yet been implemented in your state!

- And, because this is the only key difference between v3 and v3.1, you can easily demonstrate compliance with v3.1.
Demonstrating compliance with Version 3.1

REM/Rate 16.3.1

ENERGY STAR v3.1 Home Report

Property: 05401
Organization: Builder
Weather: Portland, ME
v3.1 E3_gpa_CZ6_MEbig

Projected Rating: Based on Plans - Field Confirmation Required.

Normalized, Modified End-Use Loads (MMBtu/yr)

<table>
<thead>
<tr>
<th></th>
<th>ENERGY STAR</th>
<th>As Designed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating</td>
<td>22.0</td>
<td>22.2</td>
</tr>
<tr>
<td>Cooling</td>
<td>3.2</td>
<td>3.3</td>
</tr>
<tr>
<td>Water Heating</td>
<td>10.6</td>
<td>10.6</td>
</tr>
<tr>
<td>Lights and Appliances</td>
<td>21.9</td>
<td>22.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>57.8</strong></td>
<td><strong>58.3</strong></td>
</tr>
</tbody>
</table>

ENERGY STAR HERS Index Target: 61

HERS Index w/o PV <= ES HERS Index Target to comply.
Demonstrating compliance with Version 3.1

Ekotrope v4.0.1

ENERGY STAR V3.1 Home Report

Property: Anchorage, AK 64030

v3.1 CZ6 ME

Organization: U.S. EPA

Dean Gamble

Builder:

Mandatory Requirements

✓ Duct leakage at post construction better than or equal to ENERGY STAR V3/3.1 requirements.
✓ Envelope insulation levels meet or exceed ENERGY STAR v3/3.1 requirements.
✓ Slab on Grade Insulation must be > R-5, and at IECC 2009 Depth for Climate Zones 4 and above.
✓ Envelope insulation achieves RESNET Grade I installation, or Grade II with insulated sheathing.
✓ Windows meet the 2009 IECC Requirements - Table 402.1.1.
✓ Duct insulation meets the EPA minimum requirements of R-6.
✓ Mechanical ventilation system is installed in the home.
✓ ENERGY STAR Checklists fully verified and complete.

HERS Index Target

Reference Home HERS: 59

SAF (Size Adjustment Factor): x 1.00

SAF Adjusted HERS Target: 59

As Designed Home HERS: 59

As Designed Home HERS w/o PV: 59
Demonstrating compliance with Version 3.1

EnergyGauge v7.0.03
Version 3.1 Example Homes
Version 3.1 Example – Typical Home in ME

- Main architectural features:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation Type</td>
<td>Unconditioned Basement</td>
</tr>
<tr>
<td>Number of Stories</td>
<td>2</td>
</tr>
<tr>
<td>House size</td>
<td>2,400 sq. ft. CFA</td>
</tr>
<tr>
<td>WFA</td>
<td>15%</td>
</tr>
<tr>
<td>HVAC System</td>
<td>Gas Furnace with Central AC</td>
</tr>
</tbody>
</table>
### Version 3.1 Example – Maine CZ 6

- ENERGY STAR v3 Target: 73; ENERGY STAR v3.1 Target: 62
- 11 points needed

<table>
<thead>
<tr>
<th>Measure</th>
<th>v3 Efficiency Measures</th>
<th>v3.1 Efficiency Measures</th>
<th>Alternative Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls (R-value)</td>
<td>R-20</td>
<td>R-20 + 5ci (1)</td>
<td>R-21 (0)</td>
</tr>
<tr>
<td>Windows (U-factor)</td>
<td>0.30</td>
<td>0.27 (1)</td>
<td>0.27 (1)</td>
</tr>
<tr>
<td>Doors (R-value)</td>
<td>R-4.8</td>
<td>R-5.9 (~1)</td>
<td>R-5.9 (~1)</td>
</tr>
<tr>
<td>Infiltration (ACH50)</td>
<td>4</td>
<td>3 (1)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Duct Location</td>
<td>Uncond. Space</td>
<td>Cond. Space (4)</td>
<td>Uncond. Space (-)</td>
</tr>
<tr>
<td>DHW (gas, EF)</td>
<td>0.61</td>
<td>0.61 (-)</td>
<td>0.85 (5)</td>
</tr>
<tr>
<td>Furnace (AFUE)</td>
<td>90</td>
<td>95 (2)</td>
<td>95 (2)</td>
</tr>
<tr>
<td>Lighting (% CFL)</td>
<td>80%</td>
<td>90% (~1)</td>
<td>90% (~1)</td>
</tr>
</tbody>
</table>
### Version 3.1 Example – Maine CZ 7

- **ENERGY STAR v3 Target:** 71; **v3.1 Target:** 58
- **13 points needed**

<table>
<thead>
<tr>
<th>Measure</th>
<th>v3 Efficiency Measures</th>
<th>v3.1 Efficiency Measures</th>
<th>Alternative Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls (R-value)</td>
<td>R-20</td>
<td>R-20 + 5ci (1)</td>
<td>R-23 (~0.5)</td>
</tr>
<tr>
<td>Windows (U-factor)</td>
<td>0.30</td>
<td>0.27 (1)</td>
<td>0.27 (1)</td>
</tr>
<tr>
<td>Doors (R-value)</td>
<td>R-4.8</td>
<td>R-5.9 (~0.5)</td>
<td>R-5.9 (~0.5)</td>
</tr>
<tr>
<td>Infiltration (ACH50)</td>
<td>4</td>
<td>3 (1)</td>
<td>3 (1)</td>
</tr>
<tr>
<td>Duct Location</td>
<td>Uncond. Space</td>
<td>Cond. Space (~5.5)</td>
<td>Uncond. Space (-)</td>
</tr>
<tr>
<td>DHW (gas, EF)</td>
<td>0.61</td>
<td>0.61 (-)</td>
<td>0.92 (6)</td>
</tr>
<tr>
<td>Furnace (AFUE)</td>
<td>90</td>
<td>95 (~2.5)</td>
<td>96 (~2.5)</td>
</tr>
<tr>
<td>Lighting</td>
<td>80% CFL</td>
<td>90% CFL (~0.5)</td>
<td>100% LED (~1.5)</td>
</tr>
</tbody>
</table>
Version 3.1 Examples – Summary

• None of the upgrade options are mandatory. The only requirement is to hit the v3.1 ERI target.

• Most partners have pursued high-efficiency water heaters or ducts in conditioned space to get the bulk of their points.
Version 3.1 Implementation Timeline
Version 3.1 Implementation Timeline

• For Maine, all homes *permitted* on or after 10/01/2022 must be certified using Version 3.1.
Current Implementation of Program Requirements

24 National Version 3 in effect
18 National Version 3.1 in effect
4 National Version 3.1 date defined
5 Regional Version in effect
Quiz #3

• For Maine, when will v3.1 be implemented?
  – Homes certified on or after 11/01/2021.
  – Homes permitted on or after 10/01/2022.
  – It has already been implemented.
Summary

- Inspection checklists do not change, but performance target is ~10 ERI points more stringent; 55-65 for most homes.
- It is not mandatory for ducts to be in conditioned space.
- For Maine, all homes permitted on or after 10/01/2022 must be certified using v3.1.
Any questions?
ENERGY STAR Single-Family New Homes

Web:
Home: www.energystar.gov/newhomespartners
Technical: www.energystar.gov/newhomesrequirements
MESA: www.energystar.gov/mesa

Inbox Support
energystarhomes@energystar.gov

Dean Gamble
U.S. EPA
Technical Manager
ENERGY STAR Single-Family New Homes
Gamble.Dean@epa.gov

Social Media:
@energystarhomes
facebook.com/energystar

Michael Brown
ICF
Technical Support
ENERGY STAR Single-Family New Homes
Michael.Brown2@icf.com