Preparing for the National Transition to Single-Family New Homes **Version 3.1** Multifamily New Construction **Version 1.1**

2022 Residential New Construction Partner Meeting

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October 20, 2022

EPA United States Environmental Protection Agency

Agenda

- Context for the transition to higher Versions
- The key differences between ENERGY STAR Versions
- How to benchmark homes against v3.1 / v1.1 in rating software
- Example compliance paths for homes in different regions
- Q&A

Timeline for National Transition to:

Single-Family New Homes (SFNH) **Version 3.1**
Multifamily New Construction (MFNC) **Version 1.1**

- All states still using **SFNH Version 3.0** will transition to **Version 3.1**, with a transition date of **January 1, 2023** (based on permit date).
- All states still using **MFNC Version 1.0** will transition to **Version 1.1**, with a transition date of **January 1, 2024** (based on permit date).
- This means that the SFNH National v3 and MFNC National v1 program requirements will be sunset.

ENERGY STAR Residential New Construction Eligibility

Single-family detached

Two-family

Townhomes

SFNH

Low-rise MF

Mid-rise MF

High-rise MF

Townhomes

MFNC

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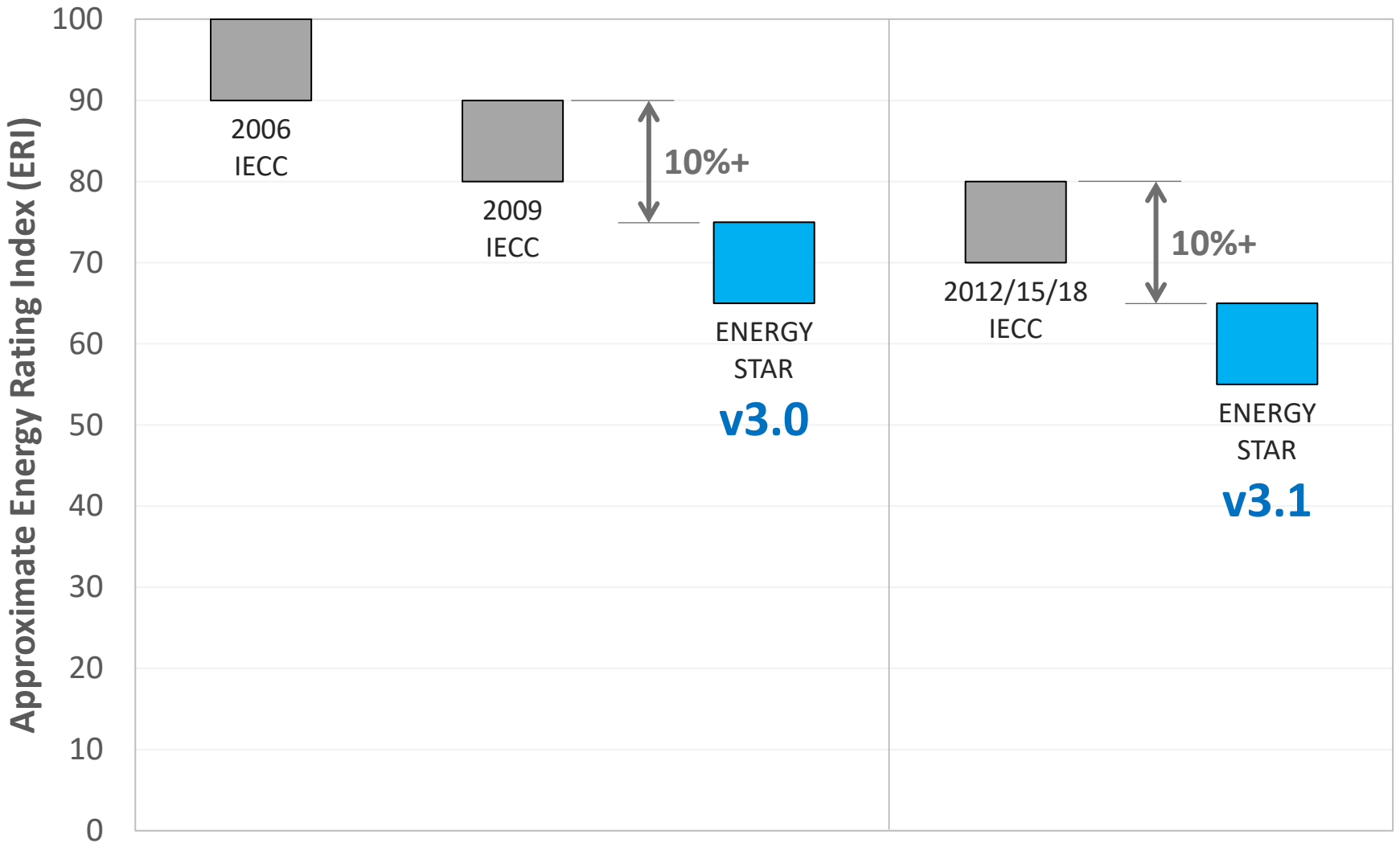
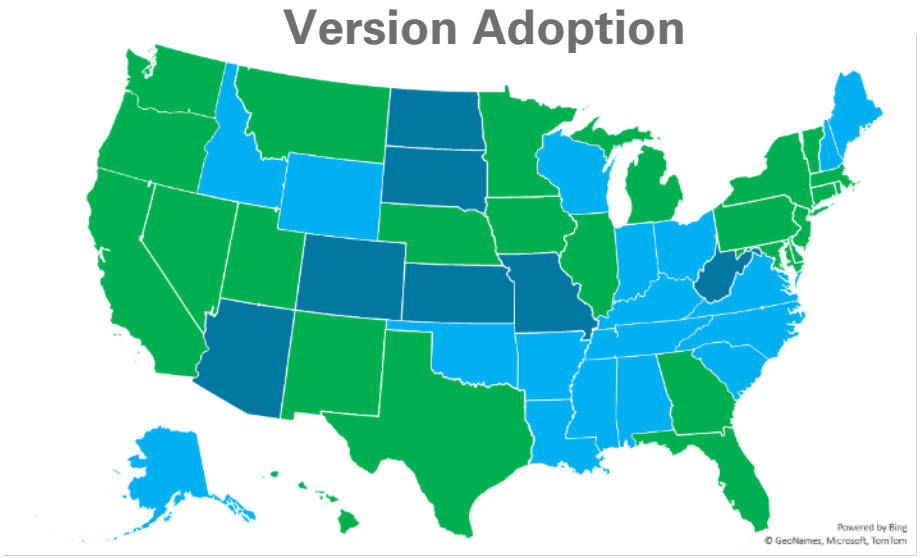
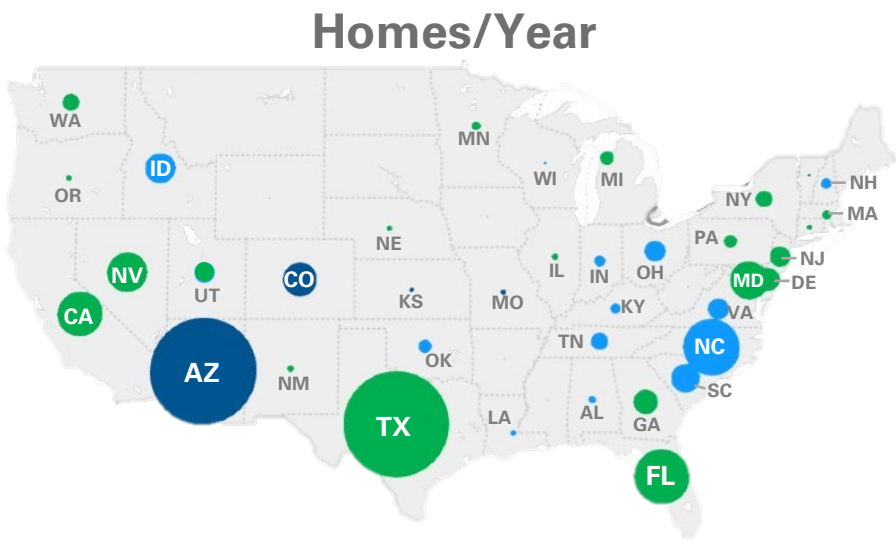
Context for National Transition to SFNH v3.1 / MFNC v1.1

Modern code evolution



Implementation of ENERGY STAR versions as of July 2022





25 **Version 3.1+** (national or regional)

7 **Version 3.0** due to home rule, meaning no statewide code to trigger version change

18 **Version 3.0** due to code ≤ 2009 IECC

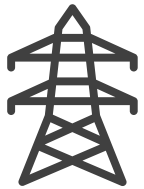
Rationale for transitioning to SFNH v3.1 / MFNC v1.1

- Over the next 5 years, transitioning all remaining states to Version 3.1 could help homeowners:

Save over

$150 million

in consumer energy costs



Avoid more than

800 million

killowatt-hours electricity

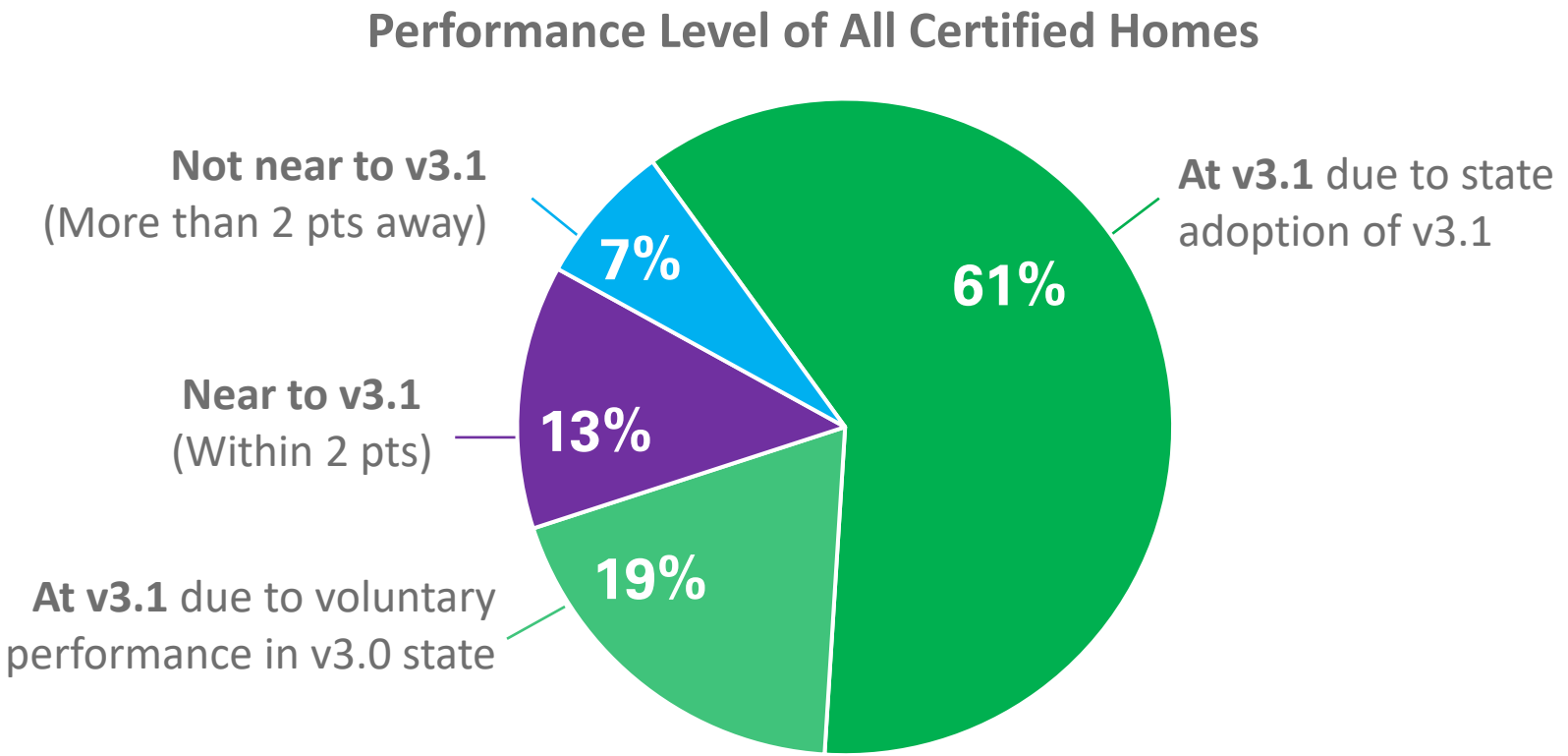
Achieve nearly

1 million

metric tons of carbon dioxide equivalent reductions

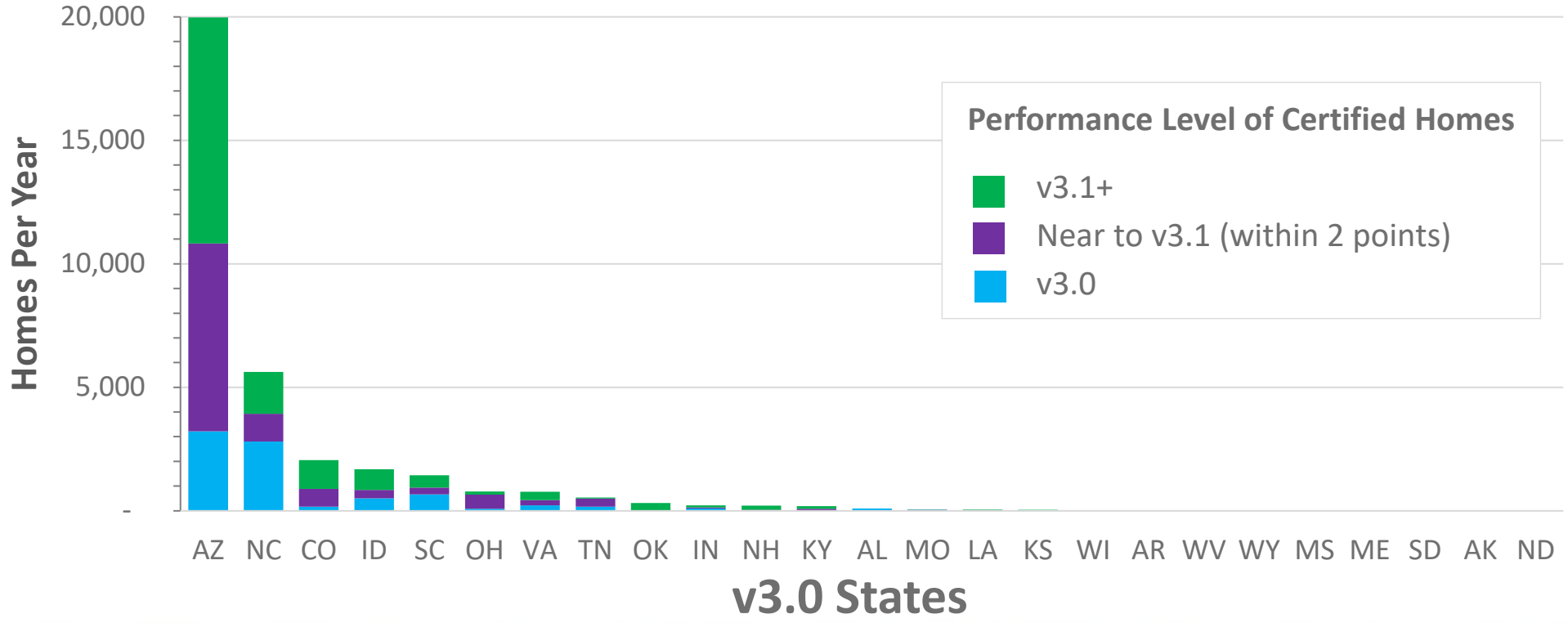
Partners are well-positioned for the transition to Version 3.1

- **93%** of single-family homes certified as ENERGY STAR between 08/2019 and 08/2020 were already **at or near the v3.1**:



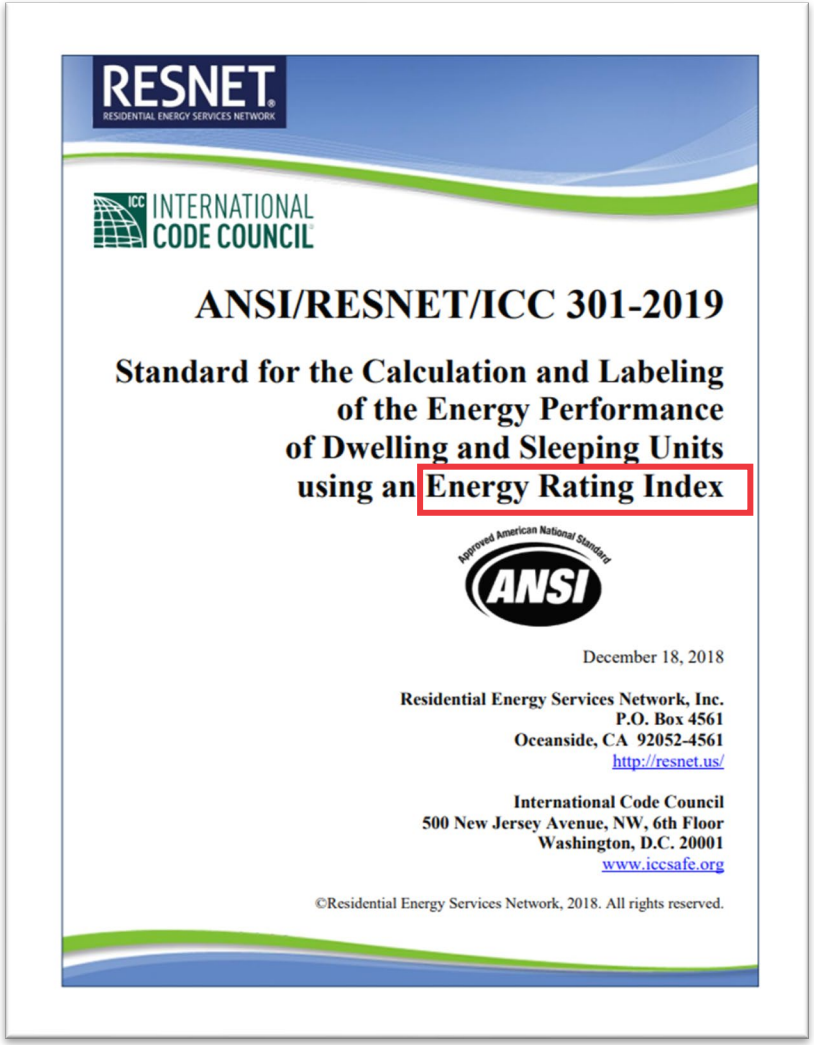
Partners are well-positioned for the transition to Version 3.1

- Within states still using Version 3.0, most homes are in AZ, NC, CO, ID & SC.
- In states >100 homes/year, at least **half** of the homes are already performing at or near **Version 3.1**:



Energy Rating Index (ERI) Definition

- ERI is the generic term defined by the ANSI/RESNET/ICC 301 national standard.
- For ENERGY STAR's purpose, this is a 'stock' ERI (with only minor exceptions for time-limited special circumstances).
- Very different from a 'code' ERI, as IECC heavily modifies the calculation.
- Numerically very similar to a HERS score but note that "HERS" is a proprietary term exclusive to RESNET. (Cross-marketing is allowed)


RESNET
RESIDENTIAL ENERGY SERVICES NETWORK
ICC INTERNATIONAL CODE COUNCIL
ANSI/RESNET/ICC 301-2019
Standard for the Calculation and Labeling of the Energy Performance of Dwelling and Sleeping Units using an Energy Rating Index
Approved American National Standard
ANSI
December 18, 2018
Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561
http://resnet.us/
International Code Council
500 New Jersey Avenue, NW, 6th Floor
Washington, D.C. 20001
www.iccsafe.org
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Pop quiz question #1:

- What happens to states currently using National Version 3.1 / 1.1?

A. Nothing. Transition only affects states using National v3.0 / v1.0.

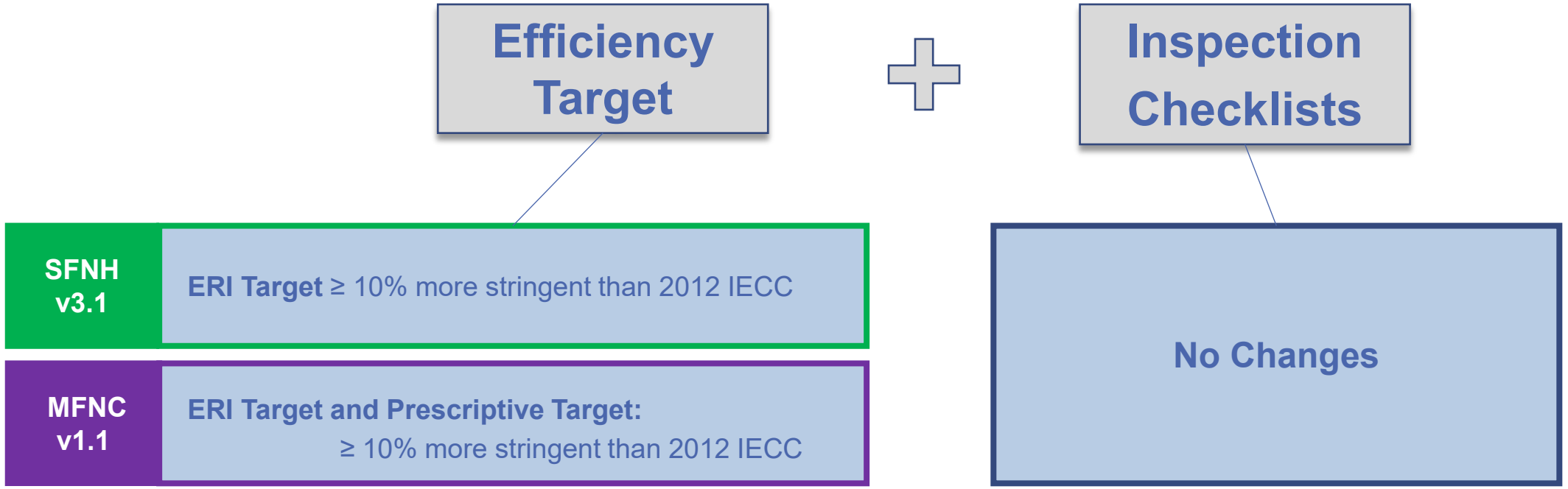
B. States using National v3.1 / v1.1 are required to meet DOE ZERH.

C. Homes in states already using National v3.1 / v1.1 get a gold star.

Key Differences Between ENERGY STAR Program Versions

Key differences between Versions

- Two key components to program requirements:



Key differences for MFNC ASHRAE Path

- The ASHRAE Performance Target is based on state commercial code adoption.
  - No changes for the 36 states that have already adopted ASHRAE 90.1-2010 or later.
- National minimum baseline is increased with this transition:
  15% savings over ASHRAE 90.1-2007 → 15% savings over ASHRAE 90.1-2010.
- The 14 impacted states include:

  Alaska, Arkansas, Arizona, Colorado, Indiana, Kansas, Louisiana, Mississippi, Missouri, North Dakota, Oklahoma, South Carolina, South Dakota, Wyoming
- No changes to inspection checklists.

Key differences between Versions

- The more stringent efficiency target (SFNH v3.1 ERI 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 Versions

Single-Family New Homes Version 3.1
ENERGY STAR Reference Design

Climate Description	Hot		Mixed & Cold				
Climate Zone	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Air Conditioner (SEER)	15	15	13	13	13	13	13
Gas Furnace (AFUE)	80	80	95	95	95	95	95
Heat Pump (HSPF/SEER)	8.2/15	8.2/15	8.5/15	9.25/15	9.5/15	9.2/16	9.2/16
Duct Location	In Conditioned Space						
Radiant Barrier?	No						
Infiltration Rate (ACH50)	4	3	3	3	3	3	3
Insulation Levels	2012 IECC						
Windows (U-Value)	0.4	0.3	0.3	0.27	0.27	0.27	0.27
Windows (SHGC)	0.25	0.25	0.4	Any	Any	Any	Any
Door (R-value)	5.9	5.9	5.9	5.9	5.9	5.9	5.9
Water Heater (EF)	Gas: 0.61 EF for 40 gal; Elec: 0.93 for 40 gal.						
Thermostat Type	Programmable						
Refrigerator	ENERGY STAR Certified						
Dishwasher	ENERGY STAR Certified						
Lighting	90% ENERGY STAR Certified						

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Key differences between Versions

Multifamily New Construction Version 1.1
ENERGY STAR Reference Design

Climate Description	Hot		Mixed & Cold				
Climate Zone	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Air Conditioner (SEER)	15	15	13	13	13	13	13
Gas Furnace (AFUE)	80	80	95	95	95	95	95
Heat Pump (HSPF/SEER)	8.2/15	8.2/15	8.5/15	9.25/15	9.5/15	9.2/16	9.2/16
Duct Location	In Conditioned Space						
Radiant Barrier?	No						
Infiltration Rate ((cfm50/ft2))	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Insulation Levels	2012 IECC- Commercial Chapter						
Windows (U-Value)	0.4	0.3	0.3	0.27	0.27	0.27	0.27
Windows (SHGC)	0.25	0.25	0.4	Any	Any	Any	Any
Door (R-value)	5.9	5.9	5.9	5.9	5.9	5.9	5.9
Water Heater (EF)	Gas: 0.67 EF for 40 gal; Elec: 0.95 for 40 gal.						
Thermostat Type	Programmable						
Refrigerator	ENERGY STAR Certified						
Dishwasher	ENERGY STAR Certified						
Lighting	90% ENERGY STAR Certified						
Plumbing Fixtures	WaterSense						

Summary of key differences

- More stringent ENERGY STAR ERI target.
  - (or MFNC ASHRAE 90.1 target or Prescriptive requirements).
- No new mandatory measures required.
- No changes at all to the:
  - Rater Design Review Checklist
  - Rater Field Checklist
  - HVAC Commissioning Checklist (SFNH)
  - HVAC Functional Testing Checklist (MFNC)
  - Water Management System Requirements

Pop quiz question #2:

- What's the key difference between Version 3.0 and Version 3.1?
  A. You have to add an ERV or HRV to the home.
  B. The number of checklists doubles.
  C. The ENERGY STAR ERI target is about 10 points more stringent.

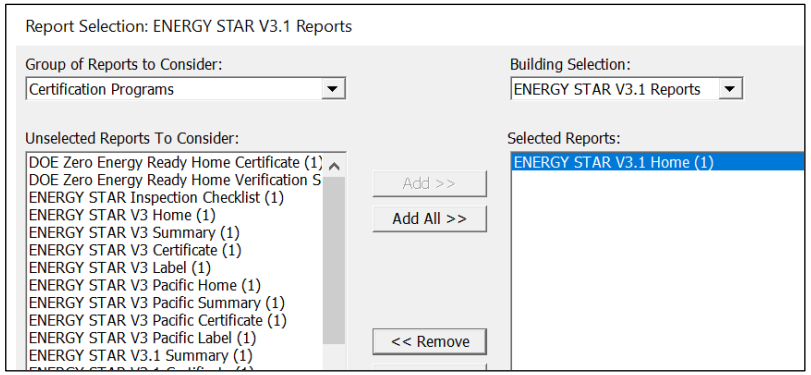
How to Demonstrate Compliance with SFNH v3.1 & MFNC v1.1

Demonstrating compliance with Version 3.1

- REM/Rate, EnergyGauge, and Ekotrope all have the ENERGY STAR SFNH Version 3.1 and MFNC Version 1.1 Reference Design programmed in.
- This means that you can run the ENERGY STAR Version 3.1/1.1 compliance report for any home in the country!
- And, because this is the only key difference with the higher Version, you can easily demonstrate compliance with SFNH v3.1 and MFNC v1.1.

Demonstrating compliance with Version 3.1

REM/Rate 16.3.1



ENERGY STAR v3.1 Home Report

Property
, 05401

Organization

Builder

HERS
Rater ID:

Weather:Portland, ME
v3_1 ES_gas_CZ6_ME.blg

Projected Rating: Based on Plans - Field Confirmation Required.

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

	ENERGY STAR	As Designed	
Heating	22.0	22.2	
Cooling	3.2	3.3	
Water Heating	10.6	10.6	
Lights and Appliances	21.9	22.3	
Total	57.8	58.3	
ENERGY STAR HERS Index Target	61	61	HERS Index w/o PV
		61	HERS Index

HERS Index w/o PV <= ES HERS Index Target to comply.

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Demonstrating compliance with Version 3.1

Ekotrope v4.0.1

Select report(s):

- [ ] HERS Certificate
- [ ] ENERGY STAR V3 Home Report
- [x] ENERGY STAR V3.1 Home Report
- [ ] IECC 2015 ERI

ENERGY STAR V3.1 Home Report

Property
, AK 64030

v3.1 CZ6 ME

Organization
U.S. EPA
Dean Gamble

Builder

Inspection Status
Results are projected

Mandatory Requirements

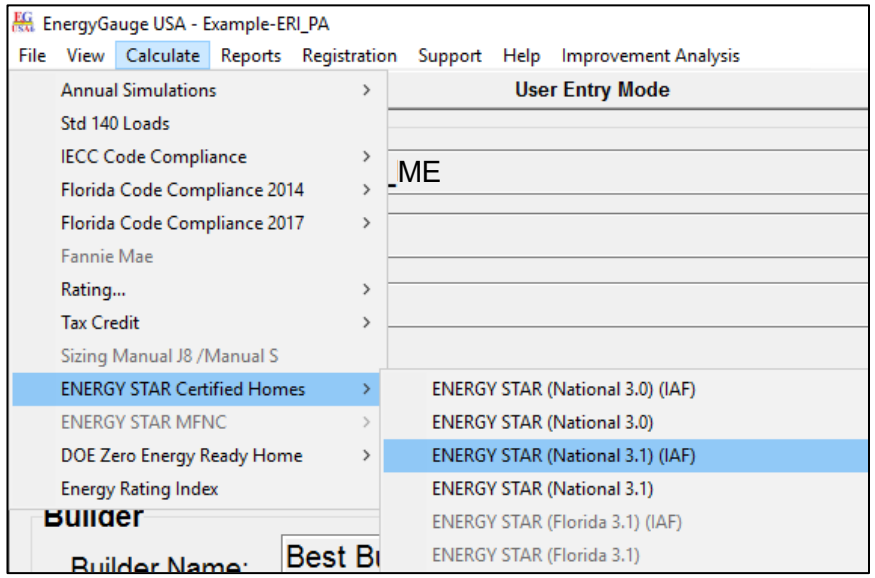
- ✓ Duct leakage at post construction better than or equal to ENERGY STAR v3/3.1 requirements.
- ✓ Envelope insulation levels meet or exceed ENERGY STAR v3/3.1 requirements.
- ✓ Slab on Grade Insulation must be > R-5, and at IECC 2009 Depth for Climate Zones 4 and above.
- ✓ Envelope insulation achieves 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.

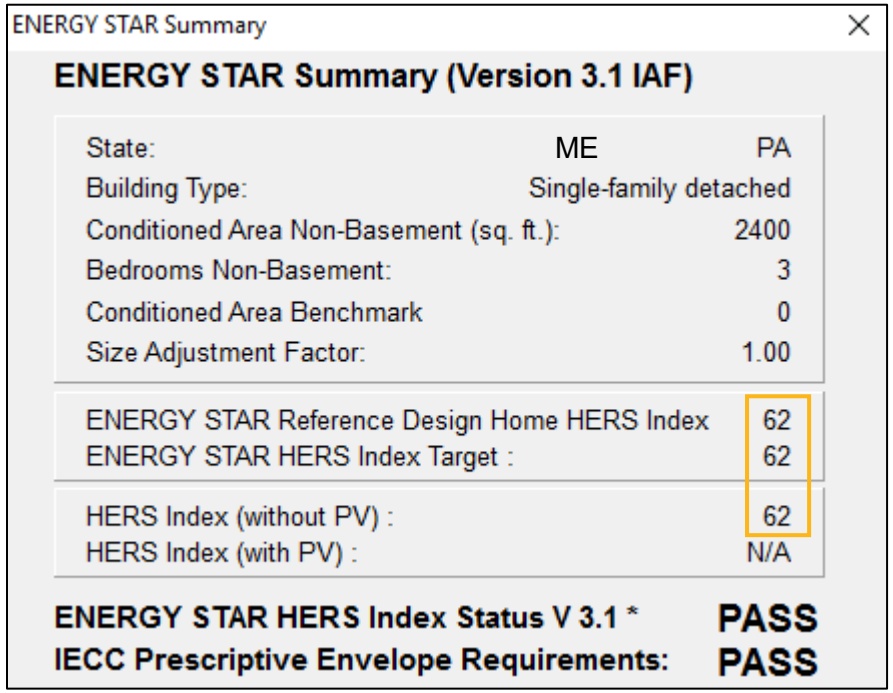
HERS Index Target

Reference Home HERS		59
SAF (Size Adjustment Factor)	✕	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





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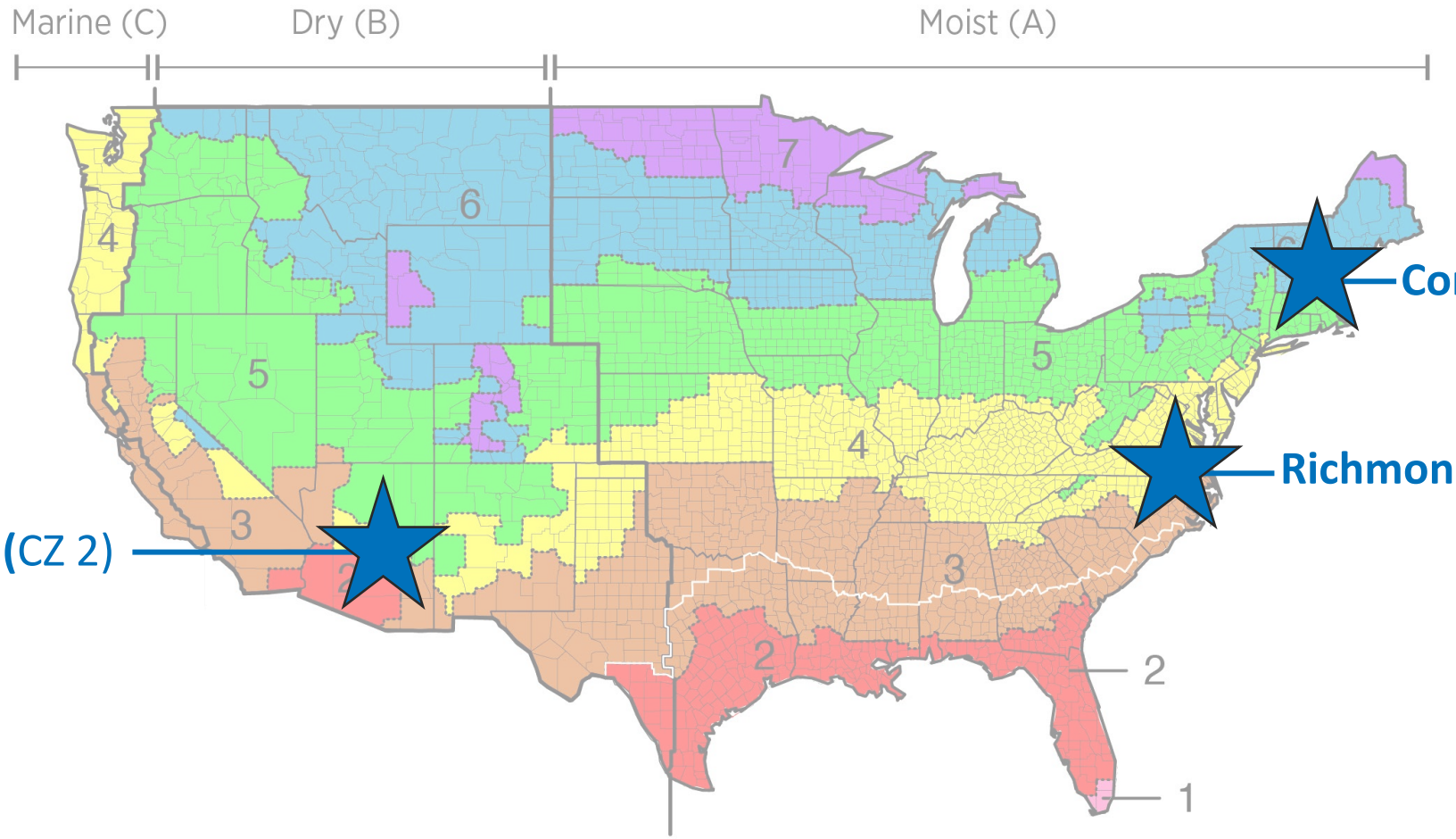
SFNH Version 3.1 Example Homes

Version 3.1 Example Homes



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Version 3.1 Example – Typical Home in Phoenix, AZ

- Main architectural features:

Feature	Description
Foundation Type	Slab
Number of Stories	2
House size	2,400 sq. ft. CFA
WFA	15%
HVAC System	Gas Furnace with Central AC

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Version 3.1 Example – Phoenix, AZ (CZ 2)

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

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures		Alternative Path	
Walls (R-value)	R-13	R-13	-	R-15	-
Ceiling (R-value)	R-30	R-38	1	R-38	1
Windows (U / SHGC)	0.60 / 0.27	0.27 / 0.25	4	0.27 / 0.22	5
Infiltration (ACH50)	6	4	1	3	2
Duct Location	Uncond. Space	Cond. Space	5	Uncond. Space	0
DHW (gas, EF)	0.61	0.61	-	0.90	2
Central AC (SEER)	14.5	15	1	16	2
Furnace (AFUE)	80	80	-	80	-
Lighting (% CFL)	80%	90%	1	90%	1
		Total	13	Total	13

Version 3.1 Example – Typical Home in Richmond, VA

- Main architectural features:

Feature	Description
Foundation Type	Unconditioned Basement
Number of Stories	2
House size	2,400 sq. ft. CFA
WFA	15%
HVAC System	Electric Heat Pump

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Version 3.1 Example – Richmond, VA (CZ 4)

- ENERGY STAR v3 Target: 75; ENERGY STAR v3.1 Target: 60
- 15 points needed

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures		Alternative Path	
Walls (R-value)	R-13	R-20	4	R-20	4
Floor Insulation	R-19	R-19	-	R-30	1
Ceiling (R-value)	R-38	R-49	~1	R-49	~1
Windows (U / SHGC)	0.32 / 0.40	0.30 / 0.40	0	0.27 / 0.22	1
Infiltration (ACH50)	5	3	2	3	2
Duct Location	Uncond. Space	Cond. Space	6	Uncond. Space	0
DHW (elec, EF)	0.93	0.93	-	0.95	1
Heat Pump (SEER / HSPF)	13 / 8.2	13 / 8.5	1	16 / 9.2	4
Lighting (% CFL)	80%	90%	~1	90%	~1
		Total	**15**	Total	**15**

Version 3.1 Example – Typical Home in Concord, NH

- Main architectural features:

Feature	Description
Foundation Type	Unconditioned Basement
Number of Stories	2
House size	2,400 sq. ft. CFA
WFA	15%
HVAC System	Gas Furnace with Central AC

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Version 3.1 Example – Concord, NH (CZ 6)

- ENERGY STAR v3 Target: 68; ENERGY STAR v3.1 Target: 56
- 12 points needed

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures		Alternative Path	
Walls (R-value)	R-20	R-20 + 5ci	1	R-21	0
Floor Insulation	R-30	R-30	-	R-38	1
Windows (U / SHGC))	0.30 / 0.40	0.27 / 0.40	1	0.27 / 0.40	1
Infiltration (ACH50)	4	3	2	3	2
Duct Location	Uncond. Space	Cond. Space	5	Uncond. Space	0
DHW (gas, EF)	0.61	0.61	-	0.90	5
Central AC (SEER)	13	13	-	13	-
Furnace (AFUE)	90	95	2	95	2
Lighting (% CFL)	80%	90%	~1	90%	~1
		Total	**12**	Total	**12**

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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, high-efficiency HVAC systems, or ducts in conditioned space to get the bulk of their points.

Pop quiz question #3:

- Are ducts in conditioned space mandatory for SFNH Version 3.1 and MFNC Version 1.1?
  - Yes
  - No
  - Who knows?

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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.
- All states still using SFNH Version 3.0 will transition to **Version 3.1**, with a transition date of **January 1, 2023** (based on permit date).
- For MFNC, all states still using Version 1.0 will transition to **Version 1.1**, with a transition date of **January 1, 2024** (based on permit date).