

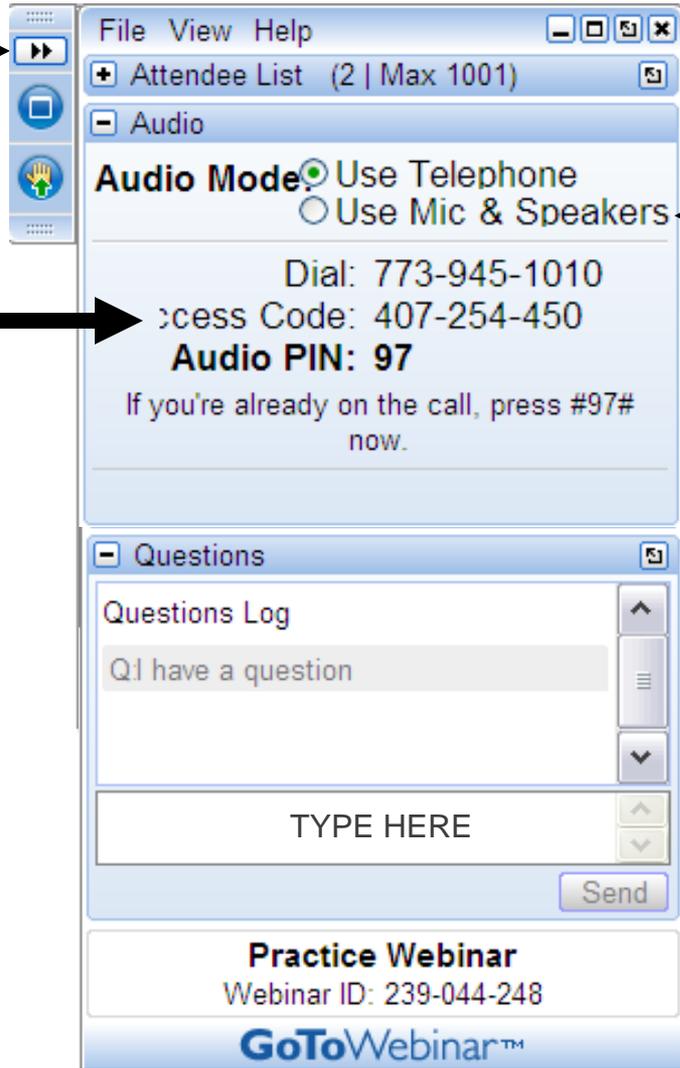
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Speaking

Elliot Seibert

Implementation Manager
EPA, ENERGY STAR Residential Branch





ENERGY STAR Certified Homes

ENERGY STAR Version 3.1

Connecticut, New York, and Texas

June 6th, 2017



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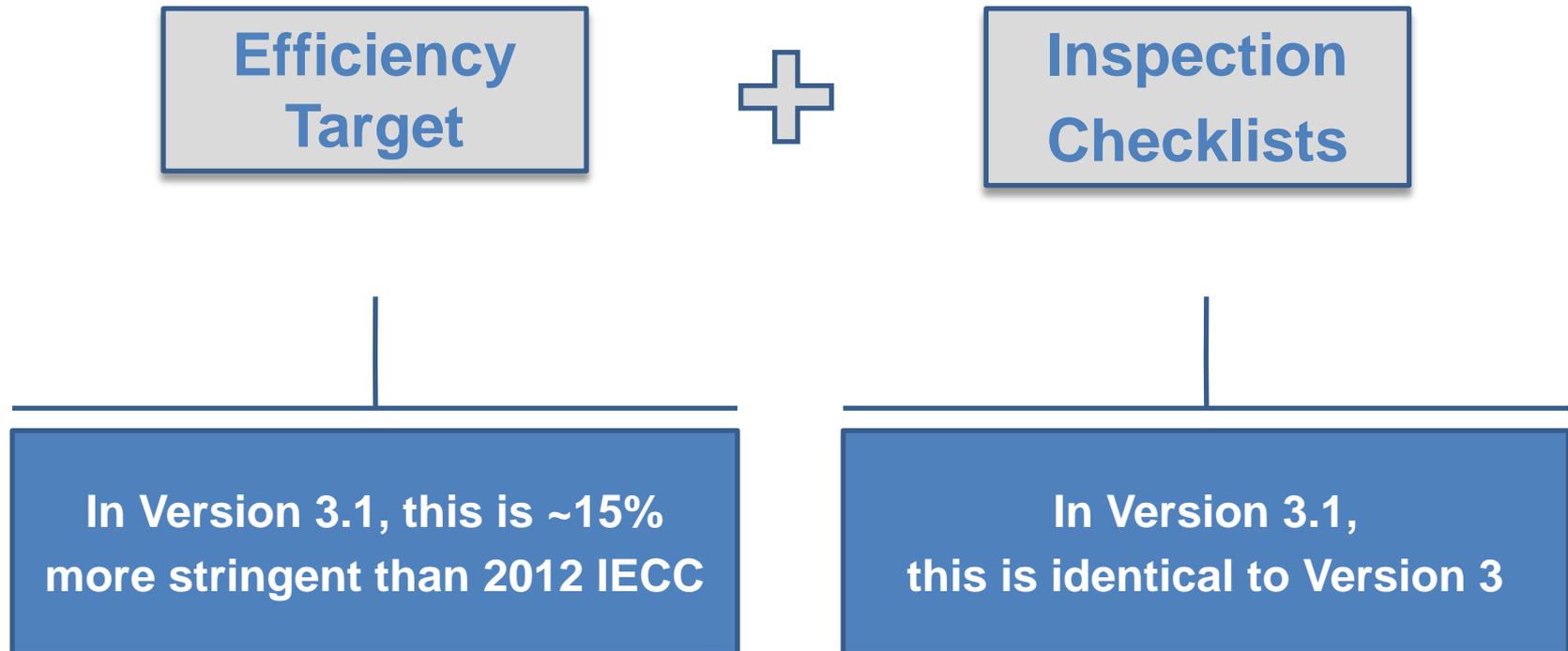
Key Differences Between Version 3 and Version 3.1





Key differences between Version 3 & Version 3.1

- Two key components to program requirements:





Key differences between Version 3 & Version 3.1

- The more stringent efficiency target is achievable using 'off-the-shelf' technologies. Key changes include:
 - 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, but the ENERGY STAR HERS index target is in the range of ~55-65.



Key differences between Version 3 & Version 3.1

Climate Description	Hot		Mixed & Cold			
Climate Zone	1 & 2	3	4	5	6	7 & 8
Air Conditioner (SEER)	15	15	13	13	13	13
Gas Furnace (AFUE)	80	90	95	95	95	95
Heat Pump (HSPF / SEER)	8.2 / 15	8.2 / 15	8.5 / 15	9.25 / 15	9.5 / 15	n/a
Duct Location	In Conditioned Space		In Conditioned Space			
Radiant Barrier?	No	No	No	No	No	No
Infiltration Rate (ACH50)	4	3	3	3	3	3
Insulation Levels	2012 IECC	2012 IECC	2012 IECC	2012 IECC	2012 IECC	2012 IECC
Windows (U-Value)	0.40	0.30	0.30	0.27	0.27	0.27
Windows (SHGC)	0.25	0.25	0.40	Any	Any	Any
Door (R-value)	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.		Gas: 0.61 EF for 40 gal.; Elec: 0.93 for 40 gal.			
Thermostat Type	Programmable		Programmable			
Refrigerator	ENERGY STAR Certified		ENERGY STAR Certified			
Dishwasher	ENERGY STAR Certified		ENERGY STAR Certified			
Lighting	90% ENERGY STAR Certified		90% ENERGY STAR Certified			

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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 15.3

Selected Reports:

ENERGY STAR V3.1 Home (1)

ENERGY STAR v3.1 Home Report

Property
, 77001

Organization

HERS
Rater ID:

Builder

Weather:Houston-Bush Intercont,
TX
2011 ES_hp_CZ2_TX
v3_1 ES_hp_CZ2_TX.tlg

Projected Rating: Based on Plans - Field Confirmation Required.
Normalized, Modified End-Use Loads (MMBtu/yr)

	ENERGY STAR	As Designed	
Heating	9.5	9.2	
Cooling	21.5	21.5	
Water Heating	8.0	7.5	
Lights and Appliances	23.0	23.3	
Total	62.1	61.6	
HERS Index of Reference Design Home	65	65	HERS Index w/o PV
HERS Index Target (SAF Adjusted)	65	65	HERS Index
Size Adjustment Factor	1.00		



USA EnergyGauge USA - v3_1 ES_hp_C22_TX

File View Calculate Reports Registration Support Help Improvement Analysis

Project ID		User Entry Mode
	Annual Simulations	
	BESTEST Loads	Z2_TX
	IECC Code Compliance	
	Florida Code Compliance 2014	
	Fannie Mae	
	Rating...	
	Tax Credit	
	Manual JB System Sizing	
	ENERGY STAR	ENERGY STAR (National 3.0)
	DOE Zero Energy Ready Home	ENERGY STAR (National 3.1)
	Energy Rating Index	ENERGY STAR (Florida 3.1)
Comment:		ENERGY STAR IECC 2009 Thermal Envelope
		ENERGY STAR Compliance Status(National 3.1)
		ENERGY STAR Compliance Status(Florida 3.1)



Demonstrating compliance with Version 3.1 Ekotrope v2.2

Select report(s):

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

ENERGY STAR V3.1 Home Report

Property
MA 77001

Organization
U.S. EPA
Dean Gamble

v3_1 ES_hp_CZ2_TX
v3_1 ES_hp_CZ2_TX
Inspection Status
Results are projected

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	64
SAF (Size Adjustment Factor)	× 1.00
SAF Adjusted HERS Target	<u>64</u>
As Designed Home HERS	64
As Designed Home HERS w/o PV	64

Version 3.1 Example Homes





Version 3.1 Example – Typical Home in CT and NY

- 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



Version 3.1 Example – New York CZ 4

- ENERGY STAR v3 Target: **77**; ENERGY STAR v3.1 Target: **62**
- **15** points needed

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures	Alternative Path
Walls (R-value)	R-13	R-13 + 5ci (4)	R-15 (1)
Ceiling (R-value)	R-38	R-49 (1)	R-49 (1)
Windows (U/SHGC)	0.32 / 0.40	0.30 / 0.40 (~0.5)	0.30 / 0.22 (~3.5)
Infiltration (ACH50)	5	3 (1)	3 (1)
Duct Location	Uncond. Space	Cond. Space (6)	Uncond. Space (-)
DHW (gas, EF)	0.61	0.61 (-)	0.94 (6)
Furnace (AFUE)	90	95 (2)	95 (2)
Lighting (% CFL)	80%	90% (~0.5)	90% (~0.5)



Version 3.1 Example – New York CZ 5

- ENERGY STAR v3 Target: **74**; ENERGY STAR v3.1 Target: **62**
- **12** points needed

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures	Alternative Path
Walls (R-value)	R-20	R-20 (-)	R-20 (-)
Ceiling (R-value)	R-38	R-49 (~ 0.5)	R-49 (~ 0.5)
Windows (U-factor)	0.30	0.27 (1)	0.27 (1)
Infiltration (ACH50)	4	3 (2)	3 (2)
Duct Location	Uncond. Space	Cond. Space (6)	Uncond. Space (-)
DHW (gas, EF)	0.61	0.61 (-)	0.94 (6)
Furnace (AFUE)	90	95 (2)	95 (2)
Lighting (% CFL)	80%	90% (~ 0.5)	90% (~ 0.5)



Version 3.1 Example – Connecticut CZ 5

- ENERGY STAR v3 Target: **75**; ENERGY STAR v3.1 Target: **64**
- **11** points needed

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures	Alternative Path
Walls (R-value)	R-20	R-20 (-)	R-20 (-)
Ceiling (R-value)	R-38	R-49 (1)	R-49 (1)
Windows (U-factor)	0.30	0.27 (~0.5)	0.27 (~0.5)
Infiltration (ACH50)	4	3 (1)	3 (1)
Duct Location	Uncond. Space	Cond. Space (6)	Uncond. Space (-)
DHW (gas, EF)	0.61	0.61 (-)	0.94 (6)
Furnace (AFUE)	90	95 (2)	95 (2)
Lighting (% CFL)	80%	90% (~0.5)	90% (~0.5)



Version 3.1 Example – New York CZ 6

- ENERGY STAR v3 Target: **73**; ENERGY STAR v3.1 Target: **61**
- **12** points needed

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures	Alternative Path
Walls (R-value)	R-20	R-20 + 5ci (2)	R-21 (~ 0.5)
Windows (U-factor)	0.30	0.27 (~ 0.5)	0.27 (~ 0.5)
Doors (R-value)	R-4.8	R-5.9 (~ 0.5)	R-5.9 (~ 0.5)
Infiltration (ACH50)	4	3 (1)	3 (1)
Duct Location	Uncond. Space	Cond. Space (6)	Uncond. Space (-)
DHW (gas, EF)	0.61	0.61 (-)	0.94 (7)
Furnace (AFUE)	90	95 (2)	95 (2)
Lighting (% CFL)	80%	90% (~ 0.5)	90% (~ 0.5)

Version 3.1 Example – Typical Homes in Texas

- 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 – Texas CZ 2

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures	Alternative Path
Ceiling (R-value)	R-30	R-38 (~0.5)	R-38 (~0.5)
Radiant Barrier?	Yes	No (-1)	Yes
Windows (U/SHGC)	0.60 / 0.27	0.40 / 0.25 (3)	0.32 / 0.22 (5)
Infiltration (ACH50)	6	4 (~0.5)	4 (~0.5)
Duct Location	Uncond. Space	Cond. Space (5)	Uncond. Space (-)
DHW (gas, EF)	0.61	0.61 (-)	0.90 (4)
AC (SEER)	14.5	15 (1)	16 (2)
Ventilation	Air-cycler + Exhaust Fan	Air-cycler + Exhaust Fan	Air-cycler (-2)
Lighting (% CFL)	80%	90% (1)	90% (1)
Fridge	ES	ES	Standard (-1)

Version 3.1 Example – Texas CZ 3

- Texas statewide 2015 prescriptive code levels:

Envelope Component	Prescriptive (CZ3)
Air Leakage	< 3 ACH50
Wall Insulation Value	R-13+R-5 <u>or</u> R-20
Fenestration U-Factor/SHGC	0.35 / 0.25
Ceiling R-Value	R-38
Duct Insulation	R-8

- More stringent code requirements in CZ 3 are driving the more stringent Version 3.1 target.



Version 3.1 Example – Texas CZ 3

- The North Central TX Council of Governments (NCTCOG) has suggested two alternative code compliance packages
 (http://www.nctcog.org/envir/SEEDevEx/codes/NCTCOG_ESL_TrafficGuidanceDocument_Approved012117.pdf)

Envelope Component	2015 IECC CZ 3	NCTCOG Option #1	NCTCOG Option #2
Air Leakage	< 3 ACH50	< 4ACH50	< 4ACH50
Wall Insulation Value	R-13 + R-5	R-13 + R-3	R-13 + R-3
Fenestration U-Factor/SHGC	0.35 / 0.25	0.32 / 0.25	0.32 / 0.25
Ceiling R-Value	R-38	R-49	R-49
Duct Insulation	R-8	R-8	R-6
Radiant Barrier Required	No	No	Yes

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Version 3.1 Example – Texas CZ 3

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures	ERV Alternative Path
Walls (R-value)	R-13	R-13 + 5ci (2)	R-13 + 3ci (1)
Ceiling (R-value)	R-38	R-38	R-49 (1)
Radiant Barrier?	Yes	No (-1)	Yes
Windows (U/SHGC)	0.35 / 0.30	0.30 / 0.25 (1)	0.32 / 0.25 (1)
Infiltration (ACH50)	5	3 (1)	4 (1)
Duct Location	Uncond. Space	Cond. Space (5)	Uncond. Space
DHW (gas, EF)	0.61	0.61	0.94 (4)
Furnace (AFUE)	80	90 (3)	80
AC (SEER)	14.5	15 (1)	16 (2)
Ventilation	Air-cycler + Exhaust Fan	Air-cycler + Exhaust Fan	ERV (3)
Lighting (% CFL)	90%	90% (1)	100% (1)

Version 3.1 Example – Texas CZ 3

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures	Furnace Alt. Path
Walls (R-value)	R-13	R-13 + 5ci (2)	R-13 + 3ci (1)
Ceiling (R-value)	R-38	R-38	R-49 (1)
Radiant Barrier?	Yes	No (-1)	Yes
Windows (U/SHGC)	0.35 / 0.30	0.30 / 0.25 (1)	0.30 / 0.22 (2)
Infiltration (ACH50)	5	3 (1)	4 (1)
Duct Location	Uncond. Space	Cond. Space (5)	Uncond. Space
DHW (gas, EF)	0.61	0.61	0.94 (4)
Furnace (AFUE)	80	90 (3)	92 (3)
AC (SEER)	14.5	15 (1)	16 (2)
Ventilation	Air-cycler + Exhaust Fan	Air-cycler + Exhaust Fan	Air-Cycler (-1)
Lighting (% CFL)	90%	90% (1)	100% (1)



Version 3.1 Example – Texas CZ 3

- Additional measures may be required in some homes:
 - Large square footage with few bedrooms
 - Window-to-floor area ratio > 15%
 - 1-story homes, which often have 100% ducts in the attic
- For these homes, consider using some combination of:
 - 3 ACH50 and 3% duct LTO on just the challenging plans
 - The ASHRAE 62.2-2013 ventilation rate instead of 2010
 - Centrally located water heater
 - 100% high-efficiency lighting, including at garage and exterior
 - Low-flow showerheads



Version 3.1 Example – Texas CZ 3

- Overall, v3.1 in CZ 3 may be tough for some builders today. But keep in mind:
 - HERS scores will keep dropping, and that's the only obstacle to v3.1
 - RESNET is developing HERS credit for lower-cost options including LEDs, smart thermostats, and HVAC Grading
 - Code has plateaued again, so once builders hit v3.1, no updates are on the horizon
 - We want you and your builders to succeed with v3.1. It's easier to stick with it, then to have builders drop out and be retrained.

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Version 3.1 Example – Texas CZ 4

- ENERGY STAR v3 Target: **78**; ENERGY STAR v3.1 Target: **63**
- 15** points needed

Measure	v3 Efficiency Measures	v3.1 Efficiency Measures	Alternative Path
Walls (R-value)	R-13	R-13 + 5ci (4)	R-15 (2)
Ceiling (R-value)	R-38	R-49 (-)	R-49 (-)
Windows (U-factor)	0.32 / 0.40	0.30 / 0.40 (1)	0.30 / 0.22 (4)
Infiltration (ACH50)	5	3 (2)	3 (2)
Duct Location	Uncond. Space	Cond. Space (6)	Uncond. Space (-)
DHW (gas, EF)	0.61	0.61 (-)	0.94 (6)
Furnace (AFUE)	90	95 (1)	95 (1)
Lighting (% CFL)	80%	90% (1)	90% (1)
Fridge	ES	ES	Standard (-1)

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Version 3.1 Implementation Timeline



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Version 3.1 Implementation Timeline

- For the foreseeable future, only enforce Version 3.1 in states that adopt 2012 / 2015 / 2018 IECC or equivalent.

Location	Applicable to Homes with the Following Permit Date
Massachusetts	On or After 01/01/2015
DC, Illinois, Maryland, Rhode Island	On or After 04/01/2015
Iowa	On or After 06/01/2015
Delaware	On or After 12/01/2015
Montana, Oregon, Washington	On or After 01/01/2016
Minnesota, Vermont	On or After 04/01/2016
Nevada	On or After 10/01/2016
Michigan, New Jersey	On or After 04/01/2017
Connecticut, New York, Texas	On or After 10/01/2017



Quiz #3

- For Connecticut, New York, and Texas, when will v3.1 be implemented?
 - Homes *certified* after 10/01/2017.
 - Homes *permitted* after 10/01/2017.
 - It has already been implemented.



Summary

- Inspection checklists do not change, but performance target becomes 15% more stringent than IECC 2012.
- It is *not* mandatory for ducts to be in conditioned space.
- For CT, NY, and TX, all homes permitted on or after 10/1/2017 must be certified using Version 3.1.



Upcoming webinars

Webinar	Date
How States Can Leverage Zero Energy Ready Homes	Tues., June 13 th
Introduction to HVAC in ENERGY STAR Homes	Wed., June 14 th
ZERH Leading Builder Webinar Series: Cold Climate	Mon. June 19 th

- Visit www.energystar.gov/newhomeswebinars



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