Tips and Tricks for Meeting the Latest ENERGY STAR Program Requirements - and Beyond

January 28, 2025

United States Environmental Protection Agency

Agenda

- Preparing for Single-Family New Homes National Version 3.2
- Introducing Single-Family New Homes National Version 3.3
- Preparing for Multifamily New Construction National Version 1.2
- Introducing Multifamily New Construction National Version 1.3

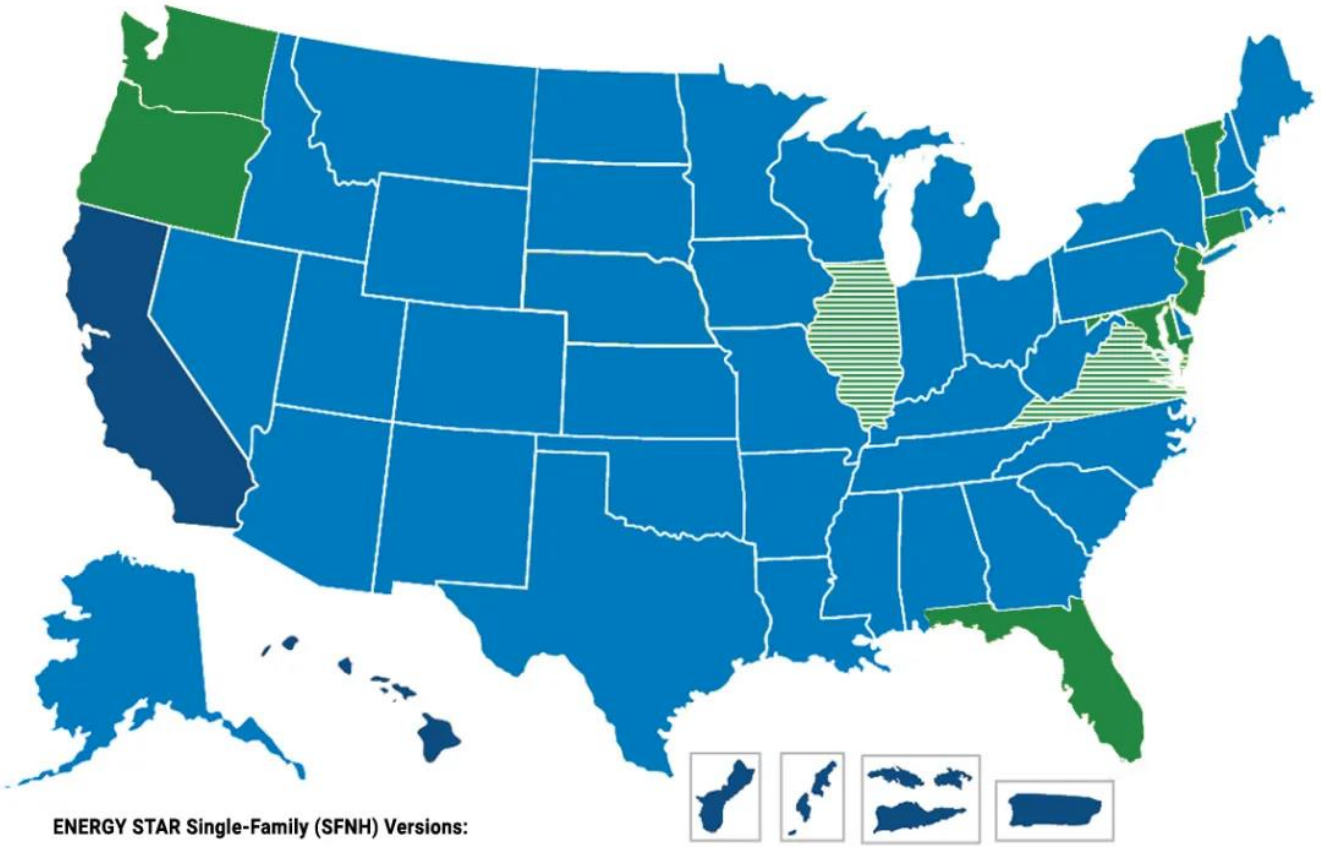
Single-Family New Homes (SFNH)

Preparing for SFNH National Version 3.2

Poll

- How familiar are you with National Version 3.2?
  - A. It is a stranger to me. This is the first time I'm hearing of it.
  - B. We're generally acquainted. I have a basic understanding.
  - C. We're best buds. I'm already assessing whether homes comply.

Where is National Version 3.2 required?



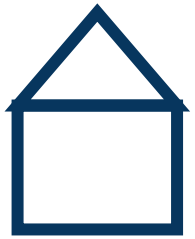
- For ENERGY STAR certification:
  - In CT, FL, MD, NJ, OR, VT, & WA for permits on or after 01/01/2025.
  - In IL & VA for permits on or after 01/01/2026.
- For the § 45L federal tax credit for homes acquired in 2025 in all states except CA and HI.
- As a prerequisite for DOE ZERH v2.

Differences between National v3.1 and v3.2

- There are only three differences between National v3.1 and v3.2:
  1. A more stringent ERI target
  2. A more stringent thermal backstop
  3. With Revision 14, a more stringent infiltration backstop

More Stringent ERI Target

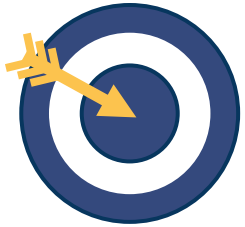
Explaining the ENERGY STAR ERI Target



1. **Rating software automatically creates a 'target home',**
with same key architectural features, location, & fuel type as home pursuing certification.

2. **Rating software applies the ENERGY STAR Reference Design to 'target home',**
a prescriptive set of efficiency measures covering all aspects of the home

3. **Rating software calculates the ENERGY STAR ERI Target,**
the ERI of the 'target home' with the ENERGY STAR Reference Design measures.



4. **Builders select measures that meet or beat the ENERGY STAR ERI Target.**

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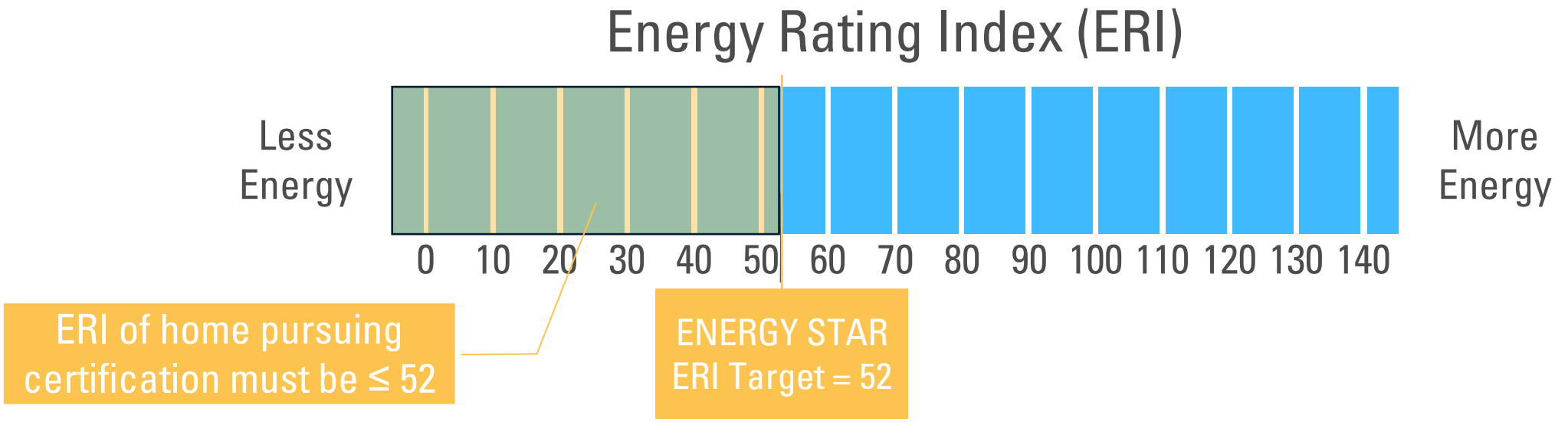
Explaining the ENERGY STAR ERI Target

- For example:



- None of the ENERGY STAR Reference Design measures are mandatory, but if not used, other measures must be selected to hit target.

Key Efficiency Features of National Version 3.2 Reference Design

Enclosure Measures

Climate Zone Type	Hot and Mixed Climates				Cold Climates				
2021 IECC Climate Zone	**1**	**2**	**3**	**4**	**4C**	**5**	**6**	**7**	**8**
Thermal Enclosure									
Ceiling, Wall, & Floor Insulation Grade	I								
Ceiling Insulation	R-30	R-49	R-49	R-60	R-60	R-60	R-60	R-60	R-60
Wall Insulation: Cavity + Continuous	R-13	R-13	R-20	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5
Frame Floor Insulation	R-13	R-13	R-19	R-19	R-30	R-30	R-30	R-38	R-38
Slab Insulation & Depth	None	None	R-10 2ft	R-10 4ft	R-10 4ft	R-10 4ft	R-10 4ft	R-10 4ft	R-10 4ft
Window U-Factor	0.40	0.40	0.30	0.30	0.27	0.27	0.27	0.27	0.27
Window SHGC	0.25	0.25	0.25	0.30	0.30	0.30	0.30	0.30	0.30
Door (U-Factor / SHGC)	Opaque: U-Factor: 0.17 / SHGC: Any; ≤½ lite Door: U-Factor: 0.25 / SHGC: 0.25; >½ lite Door: U-Factor: 0.30								
>½ lite Door (SHGC)	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40	0.40
Infiltration									
Infiltration Rate (ACH50)	3	3	3	3	3	3	3	3	3
Mechanical Vent. Type	Supply	Supply	Supply	Supply	Exhaust	Exhaust	Exhaust	Exhaust	Exhaust

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Key Efficiency Features of National Version 3.2 Reference Design

Non-Enclosure Measures

2021 IECC Climate Zone	1	2	3	4	4C	5	6	7	8
Heating and Cooling Systems									
Air Conditioning (SEER2)	15.2	15.2	15.2	15.2	13.3	13.3	13.3	13.3	13.3
Gas Furnace (AFUE)	80	80	80	90	95	95	95	95	95
Heat Pump (HSPF2 / SEER2)	7.8 / 15.2								
HVAC Grade	Airflow Grade: II; Watt Draw Efficiency Grade: II; Refrigerant Grade: III								
Thermostat Type	Programmable								
Duct Location, Leakage, & Insulation	Location: 100% Conditioned Space; Leakage to Outside: 0 CFM; Insulation: Not Present								
Water Heating									
Gas: Efficiency (UEF) & Capacity (Gal.)	0.90 & 0 (Instantaneous)								
Electric: Efficiency (UEF) & Capacity (Gal.)	2.20 & 60								
Lighting & Appliances									
Lighting	100% LED Lighting								
Refrigerators, Dishwashers, Ceiling Fans	Efficiency Equal to ENERGY STAR Product (Labeled product recommended, but not required)								

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ENERGY STAR ERI Target for National Version 3.2

- National Version 3.2 ENERGY STAR Reference Design results in a target of ~45-55.
- While the ENERGY STAR Reference Design features are not mandatory, it will be hard to hit the target without these key features:
  - 2021 IECC insulation levels or equivalent
  - Ducts in conditioned space
  - Instant gas or heat pump water heater

Trade-Off Examples: CZ 2

- 2,400 sq. ft., 2-story home, slab on grade, with heat pump, in Phoenix.

Measure	v3.2 Reference Design	Adjusted Shell	High Efficiency HVAC	High Efficiency DHW	HVAC Grading
Ceiling (R-value)	R-49	R-38	R-38	R-38	R-38
Windows (U / SHGC)	0.40 / 0.25	0.32 / 0.25	0.32 / 0.25	0.32 / 0.25	0.35 / 0.25
Above-Grade Walls (R-value)	R-13	R-13	R-13	R-13	R-13
Slab Insulation (R-value)	None	None	None	None	None
Infiltration (ACH50)	3	4	4	4	5
Duct Location	Cond. Space	Cond. Space	Cond. Space	Cond. Space	Cond. Space
DHW (UEF)	2.20	2.20	0.92	3.30	0.92
Heat Pump (HSPF / SEER)	9.2 / 16	9.2 / 16	9.2 / 18	9.2 / 16	9.2 / 16
HVAC Grade - Airflow / Watt Draw / Charge	2 / 2 / 3	2 / 2 / 3	3 / 3 / 3	3 / 3 / 3	1 / 1 / 1
Lighting (% LED)	100%	100%	100%	100%	100%
ES ERI Target	50	50	50	50	50
Rated Home ERI	49	49	48	48	48

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Trade-Off Examples: CZ 4

- 2,400 sq. ft., 2-story home, cond. basement, with gas furnace, in Baltimore.

Measure	v3.2 Reference Design	Adjusted Shell	High Efficiency HVAC	High Efficiency DHW	HVAC Grading
Ceiling (R-value)	R-60	R-49	R-49	R-49	R-49
Windows (U / SHGC)	0.30 / 0.30	0.25 / 0.30	0.25 / 0.30	0.25 / 0.30	0.25 / 0.30
Above-Grade Walls (R-value)	R-20 + R-5	R-21	R-21	R-21	R-21
Foundation Walls (R-value)	R-13	R-13	R-13	R-13	R-13
Infiltration (ACH50)	3	3	3.5	3.25	3
Duct Location	Cond. Space	Cond. Space	Cond. Space	Cond. Space	Cond. Space
DHW (UEF)	0.90	0.90	0.90	0.95	0.90
Furnace & AC (AFUE / SEER)	90 / 16	90 / 16	95 / 16	90 / 16	90 / 14
HVAC Grade - Airflow / Watt Draw / Charge	2 / 2 / 3	2 / 2 / 3	3 / 3 / 3	3 / 3 / 3	1 / 1 / 1
Lighting (% LED)	100%	100%	100%	100%	100%
ES ERI Target	52	52	52	52	52
Rated Home ERI	51	52	50	51	52

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Trade-Off Examples: CZ 6

- 2,400 sq. ft., 2-story home, cond. basement, with gas furnace, in St. Paul.

Measure	v3.2 Reference Design	Adjusted Shell	High Efficiency HVAC	High Efficiency DHW	HVAC Grading
Ceiling (R-value)	R-60	R-49	R-49	R-49	R-49
Windows (U / SHGC)	0.27 / 0.30	0.25 / 0.30	0.25 / 0.30	0.25 / 0.30	0.25 / 0.30
Above-Grade Walls (R-value)	R-20 + R-5	R-21	R-21	R-21	R-21
Foundation Walls (R-value)	R-19	R-21	R-21	R-21	R-21
Infiltration (ACH50)	3	3	3.25	3.25	3.25
Duct Location	Cond. Space	Cond. Space	Cond. Space	Cond. Space	Cond. Space
DHW (UEF)	0.90	0.90	0.90	0.95	0.90
Furnace & AC (AFUE / SEER)	95 / 14	95 / 14	96 / 14	95 / 14	95 / 14
HVAC Grade - Airflow / Watt Draw / Charge	2 / 2 / 3	2 / 2 / 3	3 / 3 / 3	3 / 3 / 3	1 / 1 / 1
Lighting (% LED)	100%	100%	100%	100%	100%
ES ERI Target	50	50	50	50	50
Rated Home ERI	49	50	50	50	50

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More Stringent Thermal Backstop

Thermal Backstop

Effective Insulation Levels and Window Performance ('Thermal Backstop')

- The thermal backstop is the minimum amount of insulation and minimum window performance that must be met.
- Regardless of ERI, a home cannot have an enclosure worse than this limit.
- But a home can trade off between: ceiling insulation, wall insulation, foundation insulation, windows, and doors.

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Thermal Backstop Examples

- Thermal backstop is the area-weighted U-factor for the enclosure.
  - U-factor x Area, often seen as “Building UA” value.
- Here are some examples calculated for a 2,400 sq. ft., two-story home with 15% window area to floor area ratio.

Windows			
U-value	Area	UA	Change in UA
0.35	360	**126**	-
0.30	360	**108**	**-18**
0.25	360	**90**	**-18**

Walls				
R-value	U-Value	Area	UA	Change in UA
13	0.077	1978	**152**	-
15	0.067	1978	**132**	**-20**
19	0.053	1978	**104**	**-28**
21	0.048	1978	**94**	**-10**

Ceilings				
R-value	U-Value	Area	UA	Change in UA
38	0.026	1200	**32**	-
49	0.020	1200	**24**	**-7**
60	0.017	1200	**20**	**-4**

- To improve a home’s UA, these will have the biggest impacts: 1) windows, 2) walls, 3) ceilings.

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Thermal Backstop Limits

ENERGY STAR Version	Thermal Backstop
National Version 3.1	All permits: 100% x UA of the 2009 IECC Prescriptive Path
National Version 3.2	Permits before 01/25: 105% x UA of the 2021 IECC Prescriptive Path Permits on or after 01/25: 100% x UA of the 2021 IECC Prescriptive Path

CZ	Code	Windows	Ceiling	Wall: Cavity + Cont	Frame Floor	Basement Wall	Crawlspace Wall	Slab
1	2009 IECC	1.20	30	13	13	0	0	0
	2021 IECC	0.50	30	13	13	0	0	0
2	2009 IECC	0.65	30	13	13	0	0	0
	2021 IECC	0.40	49	13	13	0	0	0
3	2009 IECC	0.50	30	13	19	13	13	0
	2021 IECC	0.30	49	20	19	13	13	10, 2ft
4	2009 IECC	0.35	38	13	19	13	13	10, 2ft
	2021 IECC	0.30	60	20 + 5	19	13	13	10, 4ft
4C & 5	2009 IECC	0.35	38	20	30	13	13	10, 2ft
	2021 IECC	0.30	60	20 + 5	30	19	19	10, 4ft
6	2009 IECC	0.35	49	20	30	19	13	10, 4ft
	2021 IECC	0.30	60	20 + 5	30	19	19	10, 4ft
7 & 8	2009 IECC	0.35	49	21	38	19	13	10, 4ft
	2021 IECC	0.30	60	20 + 5	38	19	19	10, 4ft

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Thermal Backstop Examples – CZ 1 & 2

- In Climate Zone 1, 2021 IECC is basically the same as the 2009 IECC.
- In Climate Zone 2, for a slab-on-grade home:

Climate Zone	2	
IECC Version	**2009**	**2021**
Ceiling Insulation	30	49
Wall Insulation: Cavity + Cont	13	13
Windows & Doors	0.65	0.40
Frame Floor Insulation	13	13
Basement Wall Insulation	0	0
Crawlspace Wall Insulation	0	0
Slab Insulation	0	0

Scenario Name	2021 IECC	Alt. 1
Ceiling Insulation	49	30
Wall Insulation: Cavity	13	13
Wall Insulation: Continuous	None	None
Window U-factor	0.40	0.30
Door U-factor	0.40	0.17
Frame Floor Insulation	n/a	n/a
Basement Wall Insulation	n/a	n/a
Crawlspace Wall Insulation	n/a	n/a
Slab Insulation & Depth	None	None
Total UA for Home	**452.8**	**412.0**
% better than 2021 IECC		9.0%

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Thermal Backstop Examples – CZ 5

- In Climate Zone 5-8, for a conditioned basement home:

Climate Zone	5	
IECC Version	**2009**	**2021**
Ceiling Insulation	38	60
Wall Insulation: Cavity + Cont	20	20 + 5
Windows & Doors	0.35	0.30
Frame Floor Insulation	30	30
Basement Wall Insulation	13	19
Crawlspace Wall Insulation	13	19
Slab Insulation	10, 2ft	10, 4ft

Scenario Name	2021 IECC	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Ceiling Insulation	60	49	60	49	49
Wall Insulation: Cavity	20	21	21	23	21
Wall Insulation: Continuous	5	None	None	None	None
Window U-factor	0.30	0.29	0.27	0.27	0.25
Door U-factor	0.30	0.17	0.17	0.17	0.17
Frame Floor Insulation	n/a	n/a	n/a	n/a	n/a
Basement Wall Insulation	19	19	21	19	13
Crawlspace Wall Insulation	n/a	n/a	n/a	n/a	n/a
Slab Insulation & Depth	None	None	None	None	None
Total UA for Home	**381.2**	**395.6**	**378.4**	**378.7**	**379.2**
% better than 2021 IECC		-3.8%	0.7%	0.7%	0.5%

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Thermal Backstop Examples – CZ 3

- In Climate Zone 3, for a slab-on-grade home:

Climate Zone	3	
IECC Version	**2009**	**2021**
Ceiling Insulation	30	49
Wall Insulation: Cavity + Cont	13	20
Windows & Doors	0.50	0.30
Frame Floor Insulation	19	19
Basement Wall Insulation	13	13
Crawlspace Wall Insulation	13	13
Slab Insulation	0	10, 2ft

Scenario Name	2021 IECC	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Ceiling Insulation	49	49	49	49	49
Wall Insulation: Cavity	20	15	15	21	15
Wall Insulation: Continuous	None	3	3	None	3
Window U-factor	0.30	0.30	0.28	0.29	0.25
Door U-factor	0.30	0.17	0.17	0.17	0.17
Frame Floor Insulation	n/a	n/a	n/a	n/a	n/a
Basement Wall Insulation	n/a	n/a	n/a	n/a	n/a
Crawlspace Wall Insulation	n/a	n/a	n/a	n/a	n/a
Slab Insulation & Depth	10, 2ft	None	R5, 2ft	None	None
Total UA for Home	**343.3**	**360.5**	**337.6**	**342.6**	**342.5**
% better than 2021 IECC		-5.0%	1.7%	0.2%	0.2%

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Thermal Backstop Examples – CZ 4

- In Climate Zone 4, for a home with a slab:

Climate Zone	4	
IECC Version	**2009**	**2021**
Ceiling Insulation	38	60
Wall Insulation: Cavity + Cont	13	20 + 5
Windows & Doors	0.35	0.30
Frame Floor Insulation	19	19
Basement Wall Insulation	13	13
Crawlspace Wall Insulation	13	13
Slab Insulation	10, 2ft	10, 4ft

Scenario Name	2021 IECC	Alt. 1	Alt. 2	Alt. 3
Ceiling Insulation	60	49	60	49
Wall Insulation: Cavity	20	21	23	21
Wall Insulation: Continuous	5	None	None	None
Window U-factor	0.30	0.29	0.27	0.24
Door U-factor	0.30	0.17	0.17	0.17
Frame Floor Insulation	n/a	n/a	n/a	n/a
Basement Wall Insulation	n/a	n/a	n/a	n/a
Crawlspace Wall Insulation	n/a	n/a	n/a	n/a
Slab Insulation & Depth	10, 4ft	10, 4ft	10, 4ft	10, 4ft
Total UA for Home	**303.2**	**317.9**	**300.3**	**299.9**
% better than 2021 IECC		-4.8%	1.0%	1.1%

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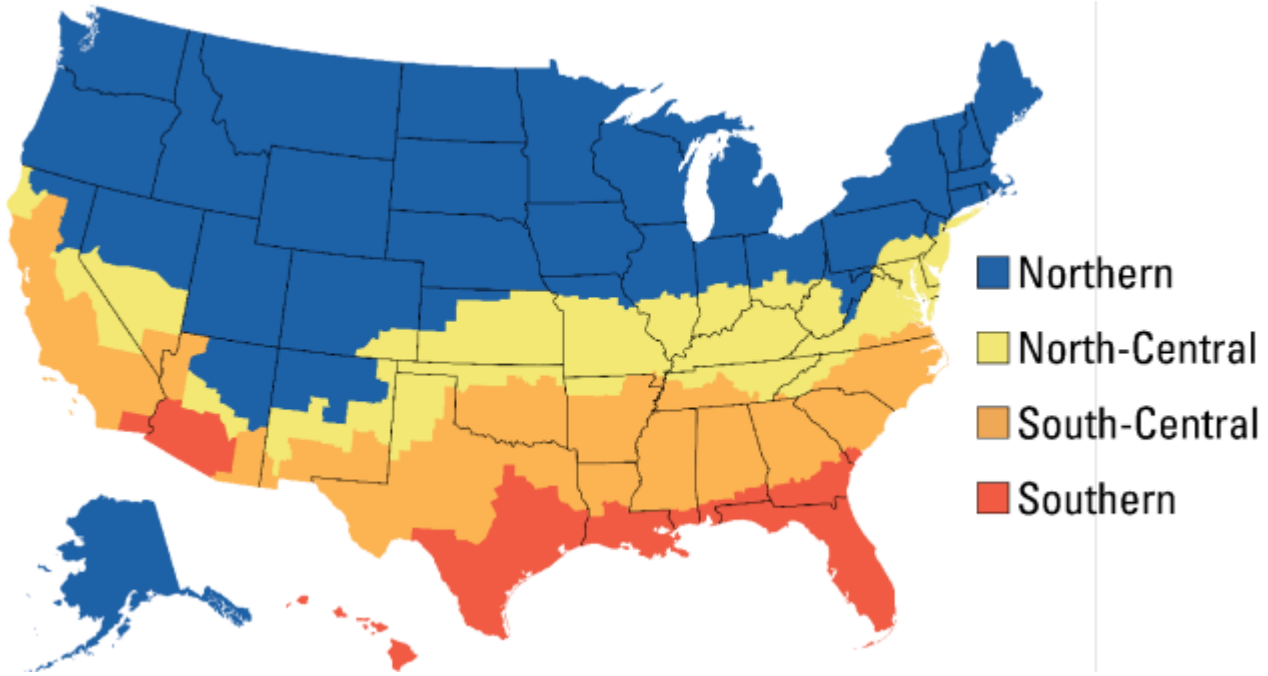
Thermal Backstop: More Efficient Windows Coming

- New specification for ENERGY STAR Residential Windows, Doors, & Skylights went into effect in October 2023.
- In 2020, 84% of windows sold in the US were ENERGY STAR certified. Therefore, expecting many windows will meet this new specification.

Windows

Climate Zone	U-Factor[1]	SHGC[2]	
Northern	≤ 0.22	≥ 0.17	Prescriptive
	= 0.23	≥ 0.35	Equivalent Energy Performance
	= 0.24		
	= 0.25	≥ 0.40	
	= 0.26		
North-Central	≤ 0.25	≤ 0.40	
South-Central	≤ 0.28	≤ 0.23	
Southern	≤ 0.32	≤ 0.23	



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More Stringent Infiltration Backstop

Rev. 14 adds a new mandatory air leakage ‘backstop’

- Homes that meet mandatory air sealing measures should be reasonably tight.
- An energy rating already requires that enclosure leakage rate be measured.
- An enclosure leakage rate ‘backstop’ objectively ensures that all certified homes meet our intent.
- This ‘backstop’ is the worst rate allowable in a certified home.

Added a new mandatory air leakage ‘backstop’

4.2 Rater-measured air leakage of Dwelling or Dwelling Unit meets one of the following: [16]		
4.2.1	For all Versions except those noted below:	≤ 4.5 ACH50
	For National v3.2 and CA v3.4:	≤ 4.0 ACH50 (see exception in Fn. 17) [17]
	For National v3.3 and CA v3.5:	≤ 3.5 ACH50 (see exception in Fn. 17) [17]
4.2.2 As an alternative, for a Dwelling with ≤ 1,500 sq. ft. of Conditioned Floor Area, a Townhouse, or an attached Dwelling Unit, air leakage is ≤ 0.30 CFM50 per sq ft. of Dwelling Unit Compartmentalization Boundary area.		

- ~85% of single-family homes with confirmed rating met this target in 2023.
- ~70% of single-family homes with confirmed rating met this target in 2023.

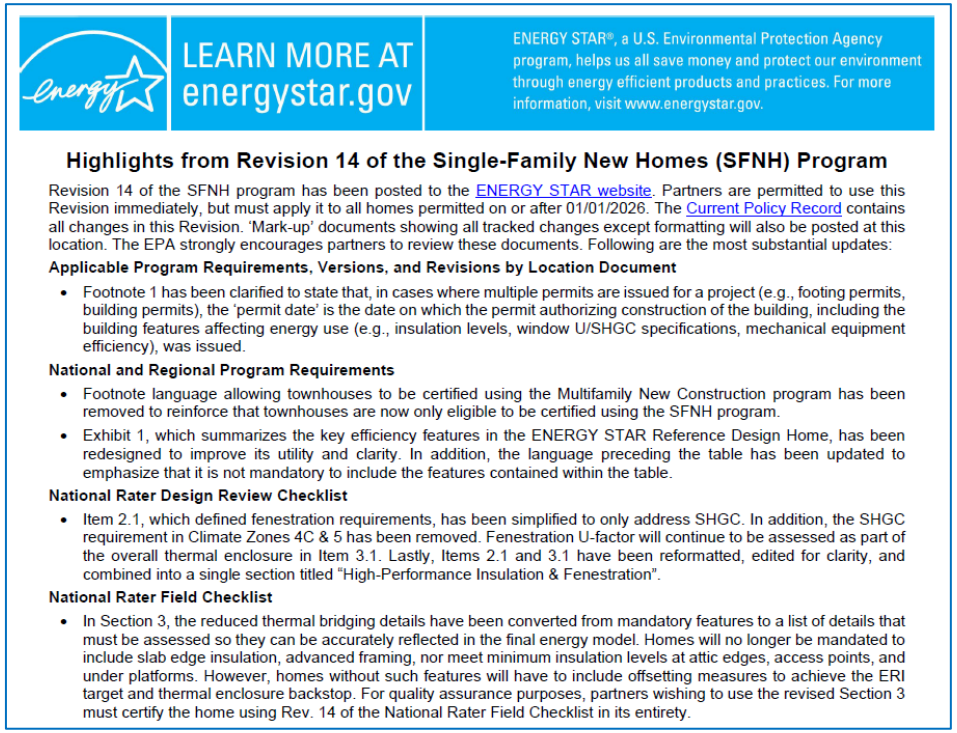
Added a new mandatory air leakage ‘backstop’

4.2 Rater-measured air leakage of Dwelling or Dwelling Unit meets one of the following: [16]		
4.2.1	For all Versions except those noted below: For National v3.2 and CA v3.4: For National v3.3 and CA v3.5:	≤ 4.5 ACH50 ≤ 4.0 ACH50 (see exception in Fn. 17) [17] ≤ 3.5 ACH50 (see exception in Fn. 17) [17]
4.2.2	As an alternative, for a Dwelling with ≤ 1,500 sq. ft. of Conditioned Floor Area, a Townhouse, or an attached Dwelling Unit, air leakage is ≤ 0.30 CFM50 per sq ft. of Dwelling Unit Compartmentalization Boundary area.	

- Less stringent limit applies to small dwellings, townhouses, and attached dwelling units (i.e., duplex).

Implementation of Revision 14

- Released 01/15/25.
- Updated program documents at: www.energystar.gov/newhomesrequirements.
- One-page highlights document, tracked-changes documents, and updated Policy Record will be available at: www.energystar.gov/newhomespolicyrecord
- Implementation date of 01/01/2026.
  - You can use Rev. 14 for any home.
  - You must use Rev. 14 for any home permitted after 01/01/26.



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Highlights from Revision 14 of the Single-Family New Homes (SFNH) Program

Revision 14 of the SFNH program has been posted to the ENERGY STAR website. Partners are permitted to use this Revision immediately, but must apply it to all homes permitted on or after 01/01/2026. The Current Policy Record contains all changes in this Revision. 'Mark-up' documents showing all tracked changes except formatting will also be posted at this location. The EPA strongly encourages partners to review these documents. Following are the most substantial updates:

Applicable Program Requirements, Versions, and Revisions by Location Document

- Footnote 1 has been clarified to state that, in cases where multiple permits are issued for a project (e.g., footing permits, building permits), the 'permit date' is the date on which the permit authorizing construction of the building, including the building features affecting energy use (e.g., insulation levels, window U/SHGC specifications, mechanical equipment efficiency), was issued.

National and Regional Program Requirements

- Footnote language allowing townhouses to be certified using the Multifamily New Construction program has been removed to reinforce that townhouses are now only eligible to be certified using the SFNH program.
- Exhibit 1, which summarizes the key efficiency features in the ENERGY STAR Reference Design Home, has been redesigned to improve its utility and clarity. In addition, the language preceding the table has been updated to emphasize that it is not mandatory to include the features contained within the table.

National Rater Design Review Checklist

- Item 2.1, which defined fenestration requirements, has been simplified to only address SHGC. In addition, the SHGC requirement in Climate Zones 4C & 5 has been removed. Fenestration U-factor will continue to be assessed as part of the overall thermal enclosure in Item 3.1. Lastly, Items 2.1 and 3.1 have been reformatted, edited for clarity, and combined into a single section titled "High-Performance Insulation & Fenestration".

National Rater Field Checklist

- In Section 3, the reduced thermal bridging details have been converted from mandatory features to a list of details that must be assessed so they can be accurately reflected in the final energy model. Homes will no longer be mandated to include slab edge insulation, advanced framing, nor meet minimum insulation levels at attic edges, access points, and under platforms. However, homes without such features will have to include offsetting measures to achieve the ERI target and thermal enclosure backstop. For quality assurance purposes, partners wishing to use the revised Section 3 must certify the home using Rev. 14 of the National Rater Field Checklist in its entirety.

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Quiz

- What's the key differences between National Version 3.1 and National Version 3.2?
  - A. A more stringent ERI target.
  - B. A more stringent ERI target, a new thermal backstop, and a new infiltration backstop.
  - C. Battery storage required in every home.

Quiz

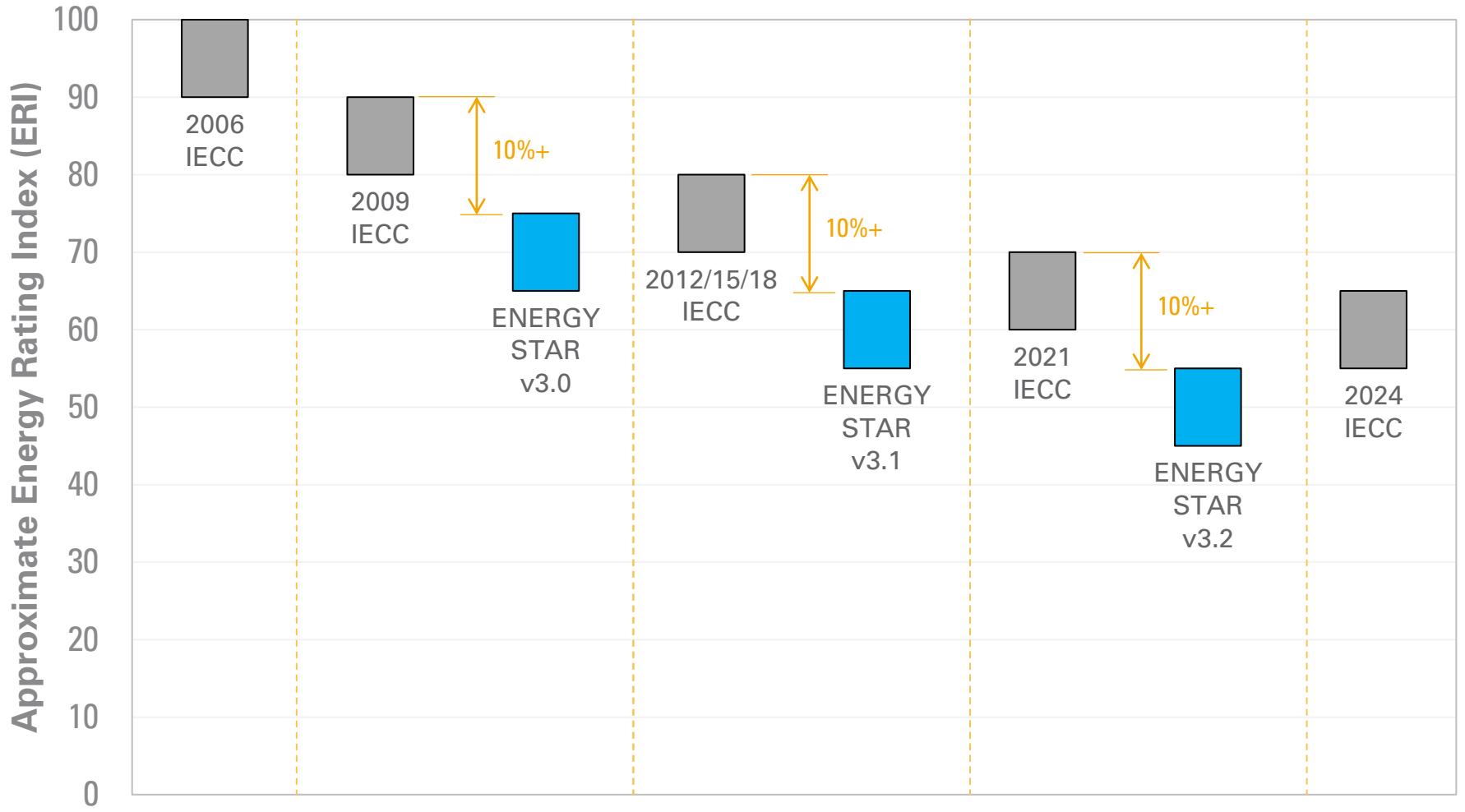
- What's the typical range of ERI targets for National Version 3.2?
  - A. ~ 0-10
  - B. Exactly 50 for every home
  - C. ~ 45-55

Quiz

- Which homes have to meet a thermal backstop equal to 100% x 2021 IECC UA?
  - A. All homes certified using National v3.2
  - B. All homes certified using National v3.2 if permitted after 01/01/2025
  - C. All homes certified (using any version) if permitted after 01/01/2025

Introducing SFNH National Version 3.3

Rationale for developing SFNH National v3.3



Goals for SFNH National v3.3

1. Deliver at least 10% savings relative to the 2024 IECC in all climate zones
2. Update the ‘thermal backstop’
3. Advance the ‘infiltration backstop’ introduced in Rev. 14

Goal 1.
Deliver ≥ 10% savings over 2024 IECC

Home configurations modeled

- To define National Version 3.3, we created a new ENERGY STAR Reference Design.
- The parameters below were modeled in 128 cities, totaling 1,024 home configurations:

Key House Parameters Consistent Across Climate Zones

Parameter	Value
Foundation types	Slab, Crawlspace, Conditioned and Unconditioned Basement
Number of stories above grade	Two
Conditioned floor area per floor (sq. ft.)	1,188
Total above-grade conditioned floor area (sq. ft.)	2,376
Ceiling height (ft.)	8.5
Bedrooms	3
Window area (% of floor area) & distribution	15%, Evenly distributed
Space heating, cooling, and water heating configurations	A: Electric air-source heat pump & electric DHW B: Gas furnace, AC, & gas DHW

- Consistent with DOE's methodology for evaluating residential codes.

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Key features of the National v3.3 Reference Design

Enclosure Measures

Climate Zone Type	Hot and Mixed Climates				Cold Climates				
2021 IECC Climate Zone	**1**	**2**	**3**	**4**	**4C**	**5**	**6**	**7**	**8**
Thermal Enclosure									
Ceiling, Wall, & Floor Insulation Grade	I								
Ceiling Insulation	R-30	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49
Wall Insulation: Cavity + Continuous	R-13	R-13	R-20	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5
Frame Floor Insulation	R-13	R-13	R-19	R-19	R-30	R-30	R-30	R-38	R-38
Slab Insulation & Depth	None	None	R-10 2ft	R-10 3ft	R-10 3ft	R-10 3ft	R-10 4ft	R-10 4ft	R-10 4ft
Window U-Factor	0.32	0.32	0.28	0.25	0.25	0.25	0.25	0.25	0.25
Window SHGC	0.23	0.23	0.23	0.30	0.30	0.30	0.30	0.30	0.30
Door (U-Factor/ SHGC)	Opaque: U-Factor: 0.17 / SHGC: Any; ≤½ lite Door: U-Factor: 0.25 / SHGC: 0.25; >½ lite Door: U-Factor: 0.30								
>½ lite Door (SHGC)	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40	0.40
Infiltration and Mechanical Ventilation									
Infiltration Rate (ACH50)	3	3	3	3	3	3	2.5	2.5	2.5
Mechanical Vent. Type	Supply	Supply	Supply	Supply	Exhaust	Exhaust	HRV	HRV	HRV

Less stringent than SFNH National v3.2 More stringent than SFNH National v3.2

ENERGY STAR

Key features of the National v3.3 Reference Design

Non-Enclosure Measures

2021 IECC Climate Zone	1	2	3	4	4C	5	6	7	8
Heating and Cooling Systems									
Air Conditioning (SEER2)	15.2	15.2	15.2	15.2	13.3	13.3	13.3	13.3	13.3
Gas Furnace (AFUE)	80	80	90	95	95	95	95	95	95
Heat Pump (HSPF2)	7.8	7.8	7.8	7.8	7.8	8.0	8.0	8.0	8.0
Heat Pump (SEER2)	15.2								
HVAC Grade	Airflow Grade: I; Watt Draw Efficiency Grade: II; Refrigerant Grade: III								
Thermostat Type	Programmable								
Duct Location, Leakage, & Insulation	Location: 100% Conditioned Space; Leakage to Outside: 0 CFM; Insulation: Not Present								
Water Heating									
Gas: Efficiency (UEF) & Capacity (Gal.)	0.95 & 0 (Instantaneous)								
Electric: Efficiency (UEF) & Capacity (Gal.)	2.20 & 60	2.20 & 60	2.20 & 60	2.20 & 60	3.30 & 60	2.20 & 60	2.20 & 60	2.20 & 60	2.20 & 60
Showerhead & Faucet Flow Rate	Standard	Standard	Standard	Standard	Low Flow	Standard	Standard	Standard	Standard
Lighting & Appliances									
Lighting	100% LED Lighting								
Dishwashers & Ceiling Fans	Efficiency Equal to ENERGY STAR Product (Labeled product recommended, but not required)								

Less stringent than SFNH National v3.2 More stringent than SFNH National v3.2

ENERGY STAR

Performance of the National v3.3 Reference Design

- Results in an ERI between 45-50 for ~70% of homes that were modeled.
  - Based on initial modeling; final range may vary by software program.
  - Contrasts with 45-55 for most homes certified using National v3.2.

ERI Range	% of Homes Modeled
< 45	6%
45 to < 50	69%
50 to < 55	24%
≥ 55	0%

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Goal 2.
Evaluate thermal backstop

Thermal backstop for National v3.3

- Aligned with the performance paths of the 2024 IECC.

Climate Zone	Thermal Backstop
1-2	≤ 108% of the total TC per 2024 IECC prescriptive insulation levels
3-8	≤ 115% of the total TC per 2024 IECC prescriptive insulation levels

- "TC" means "Thermal Conductance". Same concept as "UA" except that heat loss from slab edges is better accounted for.
- More flexibility when designing thermal envelope, though the more stringent ENERGY STAR ERI targets in this program version must be met.

Goal 3.
Advance infiltration backstop

Advancing the infiltration backstop

- For National v3.3, the backstop advances to 3.5 ACH50. Note that the alternative limit for small dwellings, townhouses, and attached dwelling units remains unchanged.

National Program Version	Proposed Infiltration Backstop
National v3.1	4.5 ACH50
National v3.2	4.0 ACH50
National v3.3	3.5 ACH50*

- *If permitted before 01/01/2027, leakage limit of 4.0 ACH50 applies.
- As an alternative, for dwellings ≤1,500 sq. ft. of conditioned floor area, Townhouses, and attached Dwelling Units, air leakage is permitted to be ≤ 0.30 CFM50 per sq. ft. of Dwelling Unit enclosure area.

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Implementation of SFNH National v3.3

- Released 01/15/2025.
- Will be implemented in states that adopt the 2024 IECC or equivalent, but will not be required for certification in any state before 01/01/2028.
- Available for optional use prior to 01/01/2028.
- Based on the timelines prescribed in the tax code, EPA anticipates that it will become the minimum eligible versions required for the § 45L Tax Credit in 2028.
- More training to come in the year ahead!

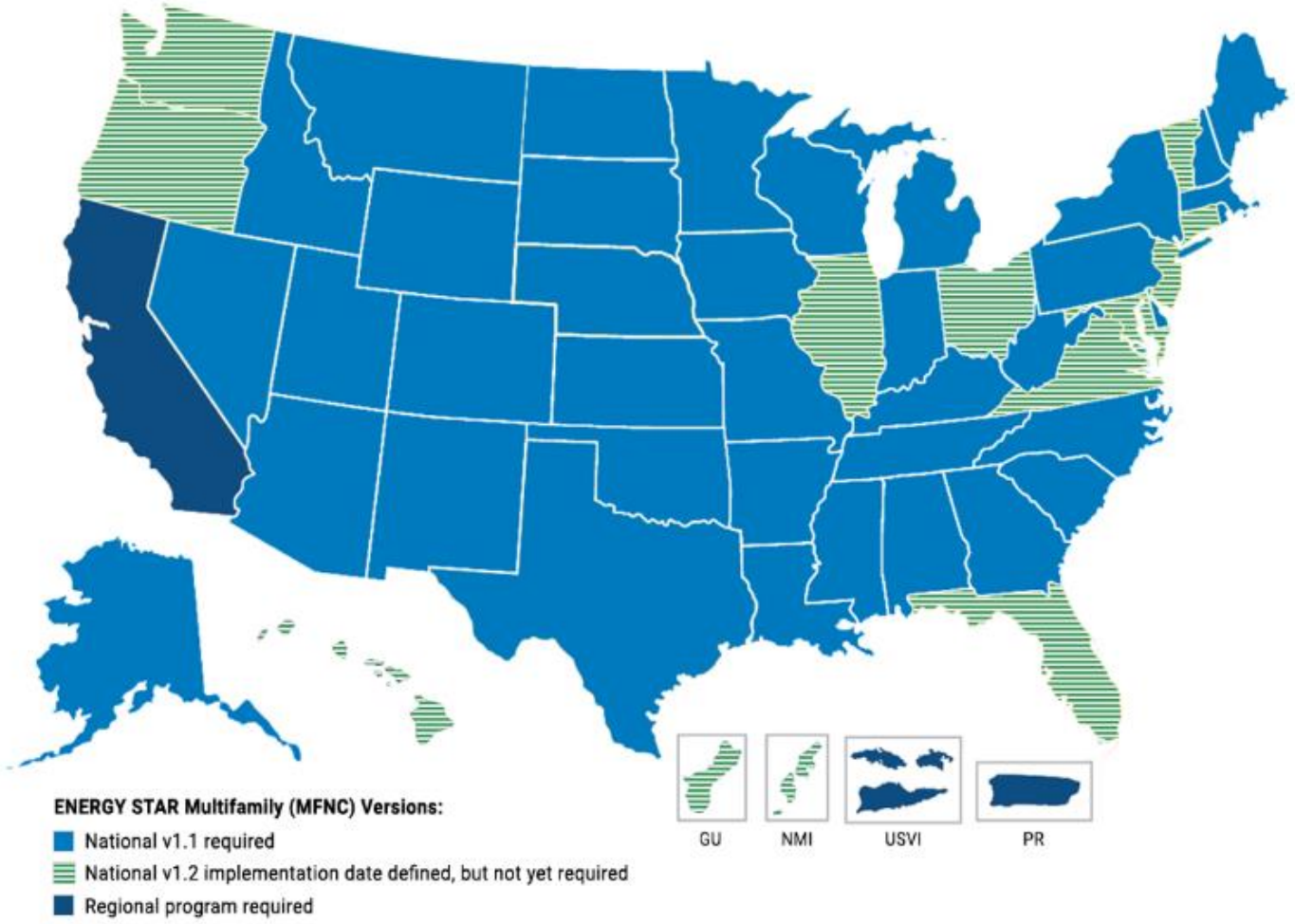
Multifamily New Construction (MFNC)

Poll

- How familiar are you with Multifamily New Construction (Any Version)?
  - A. It is a stranger to me. This is the first time I'm hearing of it.
  - B. We're generally acquainted. I have a basic understanding.
  - C. We're best buds. I'm already assessing whether buildings comply.

Preparing for MFNC National Version 1.2

Where is National Version 1.2 required?



- For ENERGY STAR certification:
  - In CT, FL, GU, HI, IL, MD, NMI, NJ, OH, OR, VA, VT, WA for permits on or after 01/01/2027.
- For the § 45L federal tax credit for dwelling units acquired in 2027 in all states except CA.
- As a prerequisite for DOE ZERH Multifamily v2.

Differences between National v1.1 and v1.2

- There are only two differences between National v1.1 and v1.2:
    1. A more stringent performance target
    2. A more stringent thermal backstop

More Stringent Performance Target

MFNC Performance Target by Path

- ERI Path:
  - Performance target based on the MFNC ENERGY STAR Reference Design modeled in ERI software (similar to SFNH).
  - ENERGY STAR Reference Design measures are not mandatory for dwelling units, but if not used, other measures must be selected to hit the target.
    - Just like prior versions, some common space measures are mandatory.
- ASHRAE Path:
  - Performance target based on savings over ASHRAE 90.1 using Appendix G modeling.
- Prescriptive Path:
  - ENERGY STAR Reference Design measures are mandatory in dwelling units and common spaces.

Key Efficiency Features of National Version 1.2 Reference Design

Enclosure Measures

Climate Zone Type	Hot and Mixed Climates				Cold Climates				
2021 IECC Climate Zone	**1**	**2**	**3**	**4**	**4C**	**5**	**6**	**7**	**8**
Thermal Enclosure									
Ceiling, Wall, & Floor Insulation Grade	I								
Attic Ceiling Insulation	R-30	R-49	R-49	R-60	R-60	R-60	R-60	R-60	R-60
Wood-Framed Wall Insulation: Cavity + Continuous	R-13	R-13	R-20	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5
Frame Floor Insulation	R-13	R-13	R-19	R-19	R-30	R-30	R-30	R-38	R-38
Mass Floor Insulation	NR	R-8.3	R-10	R-16.7	R-16.7	R-16.7	R-16.7	R-20.9	R-23
Slab Insulation & Depth	None	None	R-10 2ft	R-10 4ft	R-10 4ft	R-10 4ft	R-10 4ft	R-10 4ft	R-10 4ft
Window U-Factor	0.40	0.40	0.30	0.30	0.27	0.27	0.27	0.27	0.27
Window SHGC	0.25	0.25	0.25	0.30	0.30	0.30	0.30	0.30	0.30
Door (U-Factor / SHGC)	Opaque: U-Factor: 0.17 / SHGC: Any; ≤½ lite Door: U-Factor: 0.25 / SHGC: 0.25; >½ lite Door: U-Factor: 0.30								
>½ lite Door (SHGC)	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40	0.40
Infiltration									
Infiltration Rate (CFM50/ft2 of enclosure)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Mechanical Vent. Type	Supply	Supply	Supply	Supply	Exhaust	Exhaust	Exhaust	Exhaust	Exhaust

ENERGY STAR

Key Efficiency Features of National Version 1.2 Reference Design

Non-Enclosure Measures

2021 IECC Climate Zone	1	2	3	4	4C	5	6	7	8
Heating and Cooling Systems									
Air Conditioning (SEER2)	15.2	15.2	15.2	15.2	13.3	13.3	13.3	13.3	13.3
Gas Furnace (AFUE)	80	80	80	90	95	95	95	95	95
Heat Pump (HSPF2 / SEER2)	7.8 / 15.2								
HVAC Grade	Airflow Grade: II; Watt Draw Efficiency Grade: II; Refrigerant Grade: III								
Thermostat Type	Programmable								
Duct Location, Leakage, & Insulation	Location: 100% Conditioned Space; Leakage to Outside: 0 CFM; Insulation: Not Present								
Water Heating									
Gas: Efficiency (UEF) & Capacity (Gal.)	0.90 & 0 (Instantaneous)								
Electric: Efficiency (UEF) & Capacity (Gal.)	1.49 & 60								
Fixtures	WaterSense								
Lighting & Appliances									
Lighting	100% LED Lighting								
Refrigerators and Dishwashers	ENERGY STAR								

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National Version 1.2 Performance Targets

- ENERGY STAR v1.2
  - ERI Path: ERI target is ~45-55
  - ASHRAE Path: ≥15% savings over ASHRAE 90.1-2019
  - Prescriptive Path: Version 1.2 ENERGY STAR Reference Design is mandatory
- It will be hard to hit the performance targets without these key features:
    - 2021 IECC insulation levels or equivalent
    - Ducts in conditioned space
    - Instant gas or heat pump water heater

More Stringent Thermal Backstop

Thermal Backstop

- Under National Version 1.1, the thermal backstop is primarily tied to the 2009 IECC prescriptive path.
- Under National Version 1.2, the thermal backstop is more stringent and aligned with the 2021 IECC prescriptive path.*
  - *For buildings permitted before 01/01/25, 105% x 2021 IECC UA is allowed.

Thermal Backstop

- For insulation, either the Residential Chapter or the Commercial chapter insulation values may be used.
  - Multifamily Workbook must be used to document UA if using Commercial chapter

Table 2: For National Version 1.2

Options by Path	Thermal Backstop Target	Opaque Assemblies (including opaque doors and opaque spandrel panels)		Fenestration (including fully & partially glazed doors and skylights)		
		Dwelling Units	Common Spaces	Residential dwelling unit doors and windows (i.e., not classified "Class AW")	Structural dwelling unit windows and doors that are classified as "Class AW" and all skylights	Common Space
Prescriptive, Residential Option	≤ 100% of total UA	ENERGY STAR MF Reference Design	2021 IECC R402.1.2	ENERGY STAR MF Reference Design	Windows and Doors ENERGY STAR MF Reference Design for "Class AW" Skylights 2021 IECC C402.4	ENERGY STAR MF Reference Design for "Class AW"
Prescriptive, Commercial Option	≤ 100% of total UA		2021 IECC C402.1.2 "All Other" Column			
ERI, Residential Option	≤ 100% of total UA	2021 IECC R402.1.2	2021 IECC R402.1.2	2021 IECC R402.1.2	2021 IECC C402.4	ENERGY STAR MF Reference Design for "Class AW"
ERI, Commercial Option	≤ 100% of total UA	2021 IECC C402.1.2 "Group R" Column	2021 IECC C402.1.2 "All Other" Column			
ASHRAE, Residential Option	≤ 100% of total UA	2021 IECC R402.1.2	2021 IECC R402.1.2	2021 IECC R402.1.2	2021 IECC C402.4	2021 IECC C402.4
ASHRAE, Commercial Option	≤ 100% of total UA	2021 IECC C402.1.2 "Group R" Column	2021 IECC C402.1.2 "All Other" Column			

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Introducing MFNC National Version 1.3

Goals for MFNC National v1.3

1. Deliver at least 10% savings relative to the 2024 IECC in all climate zones
2. Update the ‘thermal backstop’

Goal 1.
Deliver ≥ 10% savings over 2024 IECC

Dwelling unit configurations modeled

- To define National Version 1.3, we created a new ENERGY STAR Reference Design.
- 18 units in a low-rise building with the parameters below were modeled in 9 cities:

Key Dwelling Unit Parameters Consistent Across Climate Zones

Parameter	Value
Foundation type	Slab
Number of stories above grade	One
Conditioned floor area (sq. ft.)	1,200
Ceiling height (ft.)	8.5
Bedrooms	2
Window area (% of wall area) & distribution	23%, of exterior walls
Space heating, cooling, and water heating configurations	A: Electric air-source heat pump & electric DHW B: Gas furnace, AC, & gas DHW

Key features of the National v1.3 Reference Design

Enclosure Measures

Climate Zone Type	Hot and Mixed Climates				Cold Climates				
2021 IECC Climate Zone	**1**	**2**	**3**	**4**	**4C**	**5**	**6**	**7**	**8**
Thermal Enclosure									
Ceiling, Wall, & Floor Insulation Grade	I								
Attic Ceiling Insulation	R-30	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49
Wood-framed Wall Insulation: Cavity + Continuous	R-13	R-13	R-20	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5	R-20 + R-5
Frame Floor Insulation	R-13	R-13	R-19	R-19	R-30	R-30	R-30	R-38	R-38
Mass Floor Insulation	NR	R-8.3	R-10	R-16.7	R-16.7	R-16.7	R-16.7	R-20.9	R-23
Slab Insulation & Depth	None	None	R-10 2ft	R-10 3ft	R-10 3ft	R-10 3ft	R-10 4ft	R-10 4ft	R-10 4ft
Window U-Factor	0.32	0.32	0.28	0.25	0.25	0.25	0.25	0.25	0.25
Window SHGC	0.23	0.23	0.23	0.30	0.30	0.30	0.30	0.30	0.30
Door (U-Factor/ SHGC)	Opaque: U-Factor: 0.17 / SHGC: Any; ≤½ lite Door: U-Factor: 0.25 / SHGC: 0.25; >½ lite Door: U-Factor: 0.30								
>½ lite Door (SHGC)	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40	0.40
Infiltration and Mechanical Ventilation									
Infiltration Rate (CFM50/ft2 of enclosure)	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Mechanical Vent. Type	Supply	Supply	Supply	Supply	Exhaust	Exhaust	HRV	HRV	HRV

Less stringent than MFNC National v1.2 More stringent than MFNC National v1.2

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Key features of the National v1.3 Reference Design

Non-Enclosure Measures

2021 IECC Climate Zone	1	2	3	4	4C	5	6	7	8
Heating and Cooling Systems									
Air Conditioning (SEER2)	15.2	15.2	15.2	15.2	13.3	13.3	13.3	13.3	13.3
Gas Furnace (AFUE)	80	80	90	95	95	95	95	95	95
Heat Pump (HSPF2)	7.8	7.8	7.8	7.8	7.8	8.0	8.0	8.0	8.0
Heat Pump (SEER2)	15.2								
HVAC Grade	Airflow Grade: I; Watt Draw Efficiency Grade: II; Refrigerant Grade: III								
Thermostat Type	Programmable								
Duct Location, Leakage, & Insulation	Location: 100% Conditioned Space; Leakage to Outside: 0 CFM; Insulation: Not Present								
Water Heating									
Gas: Efficiency (UEF) & Capacity (Gal.)	0.95 & 0 (Instantaneous)								
Electric: Efficiency (UEF) & Capacity (Gal.)	2.50 & 60	2.50 & 60	2.50 & 60	2.50 & 60	3.30 & 60	2.50 & 60	2.50 & 60	2.50 & 60	2.50 & 60
Showerhead & Faucet Flow Rate	WaterSense								
Lighting & Appliances									
Lighting	100% LED Lighting								
Refrigerators and Dishwashers	ENERGY STAR								

Less stringent than SFNH National v3.2 More stringent than SFNH National v3.2

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National Version 1.3 Performance Targets

- ENERGY STAR v1.3
  - ERI Path: ERI target is ~40-50
  - ASHRAE Path: ≥15% savings over ASHRAE 90.1-2022
  - Prescriptive Path: Version 1.3 ENERGY STAR Reference Design is mandatory

Goal 2.
Evaluate thermal backstop

Thermal backstop for National v1.3

- Aligned with the performance paths of the 2024 IECC Residential chapter, or the 2024 IECC Commercial Chapter.
  - Multifamily Workbook must be used to document UA if using Commercial chapter

Climate Zone	Thermal Backstop – Residential Chapter Option	Thermal Backstop – Commercial Chapter Option
1-2	≤ 108% of the total TC per 2024 IECC residential prescriptive insulation levels	≤ 100% of the total TC per 2024 IECC commercial insulation levels
3-8	≤ 115% of the total TC per 2024 IECC residential prescriptive insulation levels	

- "TC" means "Thermal Conductance". Same concept as "UA" except that heat loss from slab edges is better accounted for.
- More flexibility when designing thermal envelope, though the more stringent ENERGY STAR performance targets in this program version must be met.

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Thermal backstop for National v1.3

- Aligned with the performance path of the 2024 IECC Residential chapter, or the 2024 IECC Commercial Chapter.
  - Multifamily Workbook must be used to document UA if using Commercial chapter

Table 3: For National Version 1.3

Options by Path	Thermal Backstop Target	Opaque Assemblies (including opaque doors and opaque spandrel panels)		Fenestration (including fully & partially glazed doors and skylights)		
		Dwelling Units	Common Spaces	Residential dwelling unit doors and windows (i.e., not classified "Class AW")	Structural dwelling unit windows and doors that are classified as "Class AW" and all skylights	Common Space
Prescriptive, Residential Option	≤ 100% of total TC	ENERGY STAR MF Reference Design	2024 IECC Table R402.1.2	ENERGY STAR MF Reference Design	Windows and Doors ENERGY STAR MF Reference Design for "Class AW" Skylights 2024 IECC C402.5	ENERGY STAR MF Reference Design for "Class AW"
Prescriptive, Commercial Option	≤ 100% of total TC		2024 IECC C402.1.2 "All Other" Column			
ERI, Residential Option	In CZ 1-2, ≤ 108% of total TC In CZ 3-8, ≤ 115% of total TC	2024 IECC R402.1.2	2024 IECC R402.1.2	2024 IECC R402.1.2	2024 IECC C402.5	ENERGY STAR MF Reference Design for "Class AW"
ERI, Commercial Option	≤ 100% of total TC	2024 IECC C402.1.2 "Group R" Column	2024 IECC C402.1.2 "All Other" Column			
ASHRAE, Residential Option	In CZ 1-2, ≤ 108% of total TC In CZ 3-8, ≤ 115% of total TC	2024 IECC R402.1.2	2024 IECC R402.1.2	2024 IECC R402.1.2	2024 IECC C402.5	2024 IECC C402.5
ASHRAE, Commercial Option	≤ 100% of total TC	2024 IECC C402.1.2 "Group R" Column	2024 IECC C402.1.2 "All Other" Column			

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ENERGY STAR's Conference Track

Catch our other sessions!

ENERGY STAR: Multifamily New Construction (MFNC) Revision 5
Tuesday 2:30 PM at Joshua Tree – Rebecca Hudson, Gayathri Vijayakumar (SWA)

Level up with ENERGY STAR NextGen: Program Updates and Rater Training
Tuesday 4:00 PM at Joshua Tree – Zak Shadid, Dylan Tindall (the BER)

Thank you!

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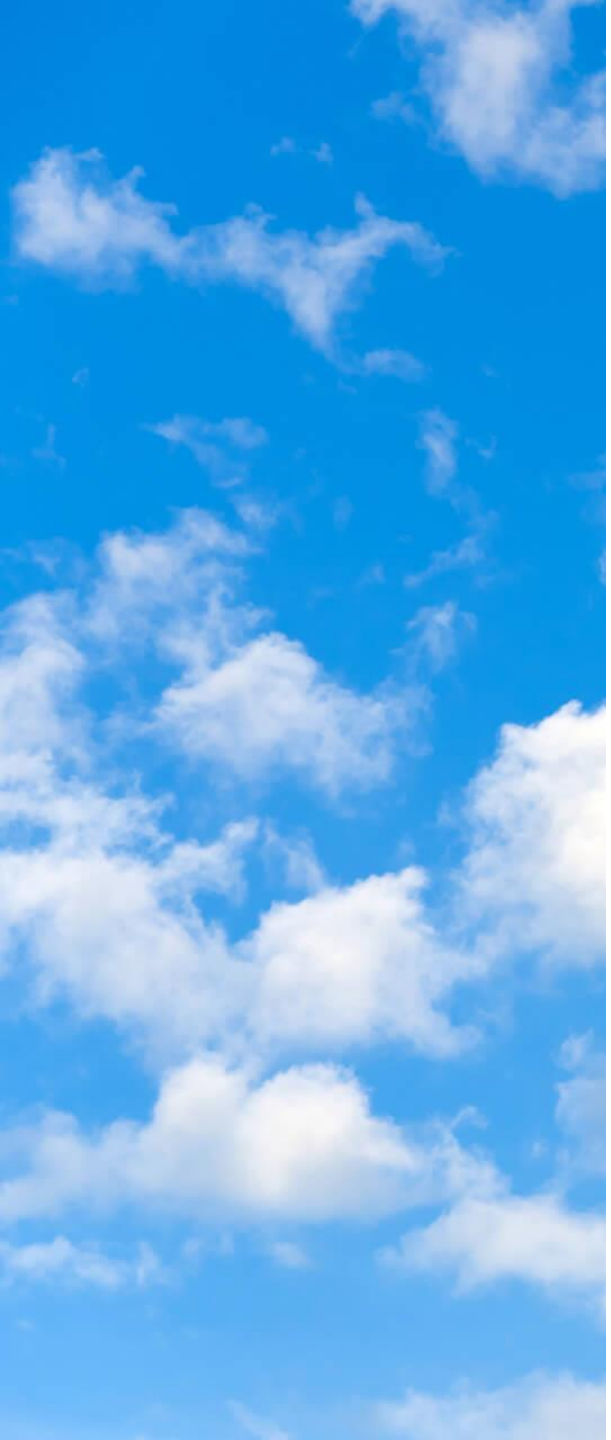
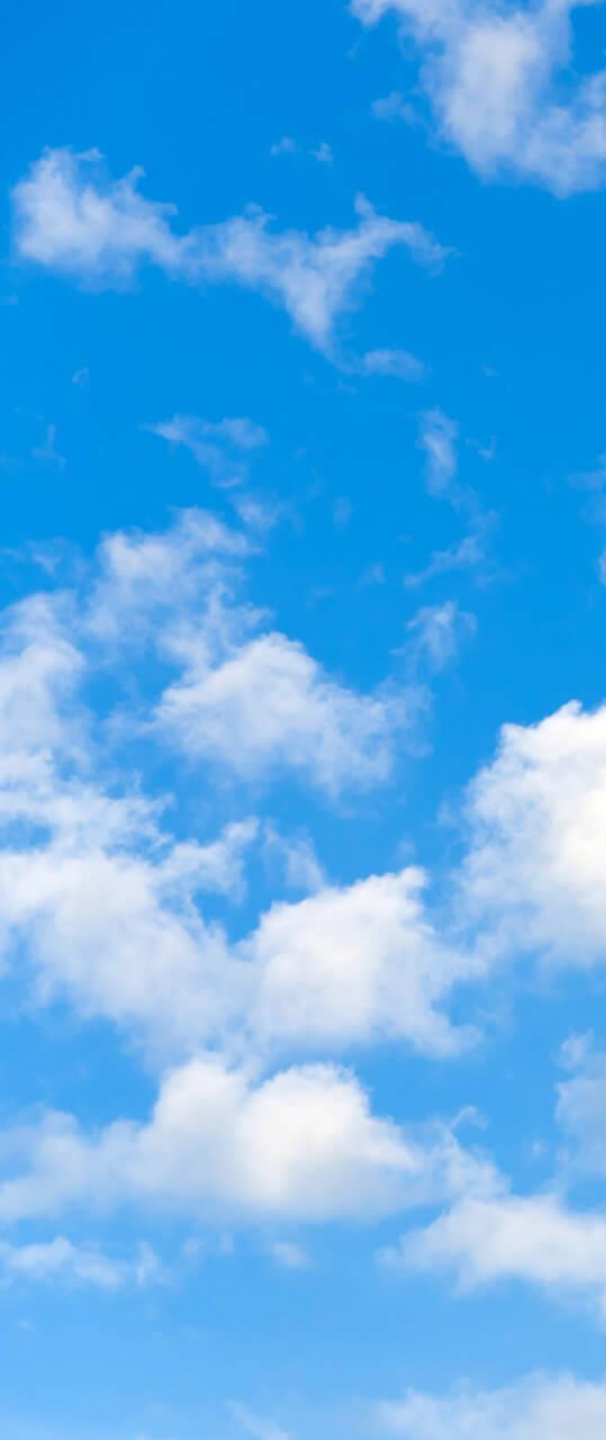


Questions?



ENERGY STAR Residential New Construction

Web & Email:

Single Family:	www.energystar.gov/newhomesrequirements
Multifamily:	www.energystar.gov/mfnc
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