

What's Up with the 2024 IECC?

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Robby Schwarz & Nathan Kahre

Speakers

Nathan Kahre

Nathan Kahre works for NAHB as Senior Program Manager of Codes and Standards. Nathan is a building science and energy codes expert focused on improving the application of energy codes and above-code programs. After attending the graduate program at Appalachian State University, Nathan worked for Thrive Home Builders and EnergyLogic in Colorado. In his former roles, Nathan experienced firsthand the real-world struggles that builders, designers, and raters face when complying with energy codes and above-code programs.

Robby Schwarz

Robby Schwarz has been a champion of the applied building science industry for over 25 years. He Founded BUILDTank, Inc. in 2020 to be a practical building think tank whose mission is to use what we learn by applying building science in the field to affect meaningful change in the construction industry. To chase issues that hold the industry back and generate ideas and innovations that move sustainable building into mainstream building.

Learning Objectives

1. Learn how the 2024 IECC development process changed.
2. Identify major changes between the 2021 and 2024 IECC.
3. Understand the federal reactions to the 2024 IECC.
4. 2021 vs. 2024 IECC. Which code should your jurisdiction adopt?

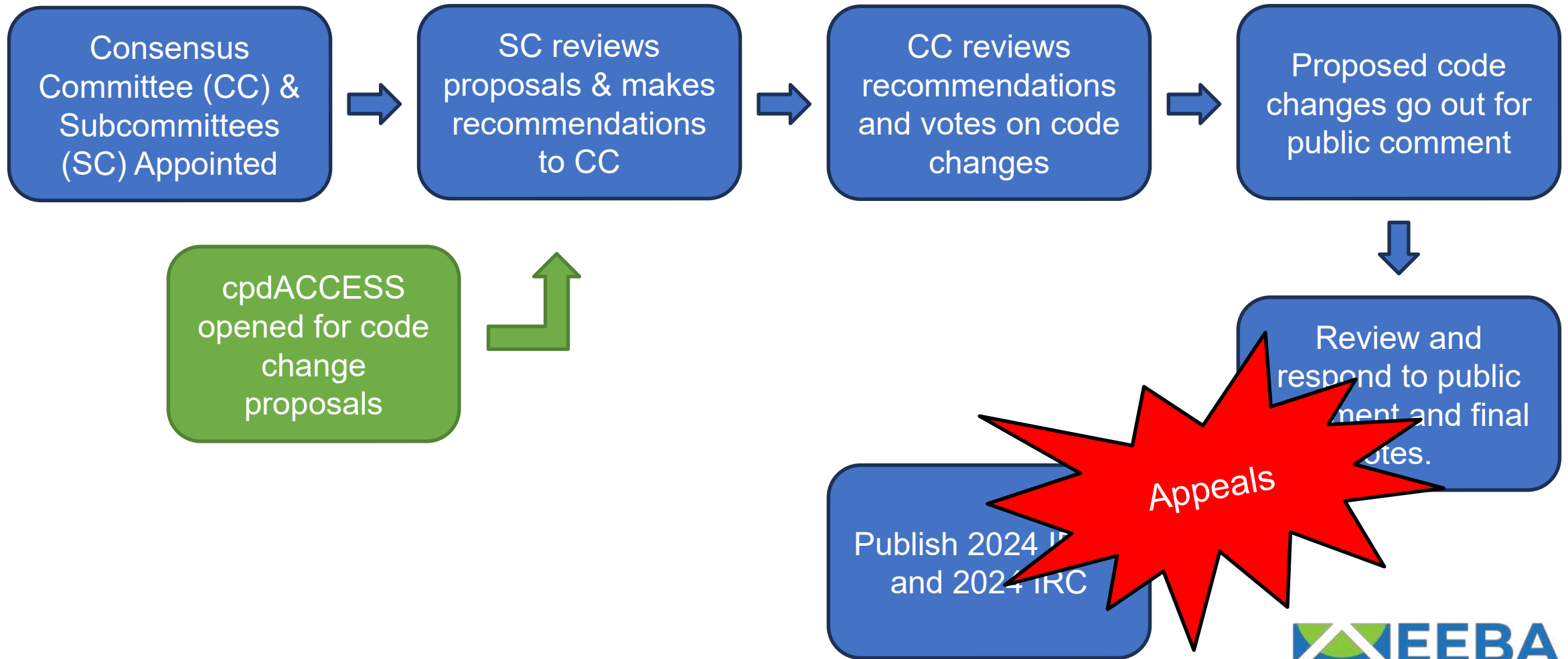


2024 IECC Development Process

2024 IECC Development Process

- Pendulum swing in response to governmental vote in 2021 development.
- Switch from traditional code development process to consensus standard development process. Similar to ASHRAE 90.1 and 90.2.
- 2024 IECC Residential Consensus Committee included 48 members.

2024 IECC Development Process *(Continued)*



2024 IECC Appeals

- Significant appeals process with appeals submitted by multiple stakeholders.
- ICC Board of Directors overturned several sections on appeal including:
 - Demand Response
 - Electric Vehicle Charging Infrastructure
 - Solar Readiness
 - Electric Readiness
- Overturned items were removed from the base text and placed in appendices.



Major Changes Between 2021 and 2024 IECC

Major Changes

- **R107** – Inspections and 3rd Party Inspection Agencies.
- **R402.1** – R-Value and U-Factor Tables, Component performance alternative
- **R402.2** – Knee Walls, Floors, Slab on Grade, Basement & Crawlspace Walls
- **R402.5** – Air leakage testing, sampling, and maximum air leakage rates.
- **R403** – Heat pump supplementary heat controls, duct leakage testing, Recovery ventilation in CZ 6, intermittent exhaust controls, electric resistance space heating limits
- **R404** – Interior lighting controls, exterior lighting controls, REC documentation
- **R405** – TC Backstop, Energy Cost Requirements, Mechanical and Plumbing Equipment in Reference Design, Duct Location in Reference Design
- **R406** – TC Backstop, Change in ERI, ERI with Solar
- **R408** – Points requirement, Expansion in Measures

Administrative Changes

- R107.2.2 – Framing and air barrier rough-in inspections
- R107.2.6 – Insulation and fenestration rough-in inspections
- R107.4 – Approved third-party inspection agencies
- R303.1.2 – Insulation mark installation

R402.1 – U-Factor and R-Value Tables

CLIMATE ZONE	0	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7 AND 8
Vertical fen. U-factor	0.50	0.50	0.40	0.30	0.30	0.28	0.28	0.27
Skylight U-factor	0.60	0.60	0.60	0.53	0.53	0.50	0.50	0.50
Glazed vertical fen. SHGC	0.25	0.25	0.25	0.25	0.40	NR	NR	NR
Skylight SHGC	0.28	0.28	0.28	0.28	0.40	NR	NR	NR
Ceiling R-value	30	30	38	38	49	49	49	49
Insulation entirely above roof deck	25ci	25ci	25ci	25ci	30ci	30ci	30ci	35ci
Wood-framed wall R-value	13 or 0&10ci	13 or 0&10ci	13 or 0&10ci	20 or 13&5ci or 0&15ci	30 or 20&5ci or 13&10ci or 0&20ci	30 or 20&5ci or 13&10ci or 0&20ci	30 or 20&5ci or 13&10ci or 0&20ci	30 or 20&5ci or 13&10ci or 0&20ci
Mass wall R-value	3/4	3/4	4/6	8/13	8/13	13/17	15/20	19/21
Floor R-value	13 or 7+5ci or 10ci	13 or 7+5ci or 10ci	13 or 7+5ci or 10ci	19 or 13+5ci or 15ci	19 or 13+5ci or 15ci	30 or 19+7.5ci or 20ci	30 or 19+7.5ci or 20ci	38 or 19+10ci or 25ci
Basement wall R-value	0	0	0	5ci or 13	10ci or 13	15ci or 19 or 13&5ci	15ci or 19 or 13&5ci	15ci or 19 or 13&5ci
Unheated slab R-value & depth	0	0	0	10ci, 2 ft	10ci, 3 ft	10ci, 3 ft	10ci, 4 ft	10ci, 4 ft
Heated slab R-value & depth	R-5ci edge and R-5 full slab	R-5ci edge and R-5 full slab	R-5ci edge and R-5 full slab	R-10ci, 2ft and R-5 full slab	R-10ci, 3ft and R-5 full slab	R-10ci, 3ft and R-5 full slab	R-10ci, 4ft and R-5 full slab	R-10ci, 4ft and R-5 full slab
Crawl space wall R-value	0	0	0	5ci or 13	10ci or 13	15ci or 19 or 13&5ci	15ci or 19 or 13&5ci	15ci or 19 or 13&5ci

R402.1 – U-Factor and R-Value Tables *(continued)*

- F-factor added to U-factor table for Heated and Unheated Slab
 - U-Factor is for above grade walls and floors, roofs, and fenestrations
 - F-Factor is for slab on grade
 - C-Factor is for below grade walls
- Total UA Alternative renamed to Component performance Alternative to go along with F-factor change.

R402.2 – Specific insulation requirements

- Attic knee walls
- Alternative configurations for slabs, crawlspace wall, and basement wall.
- “In accordance with the proposed design or the rated design, as applicable”



R402.5 – Air Leakage

- Change in air leakage rate:
 - Climate Zone 0-2: 4.0 ACH₅₀
 - Climate Zone 3-5: 3.0 ACH₅₀
 - Climate Zone 6-8: 2.5 ACH₅₀
- Shell area leakage rates of 0.27 CFM₅₀/SF for:
 - Duplexes & Townhomes
 - R-2 occupancy
 - Single family buildings ≤ 1,500 SF
- Shell area must adjust if using guarded testing



R403 Systems

- Heat pump supplementary heat now includes fossil fuel systems.
- Duct Design Required
- ERV or HRV Required in Climate Zone 6
- Electric Resistance space heating limits
- Additional controls required for exhaust fans in bathrooms:
 - Timer
 - Occupant Sensor Control
 - Humidity Control
 - Contaminant Control



R403.3.8 – Maximum Duct System Leakage

EQUIPMENT AND DUCT CONFIGURATION	DUCT SYSTEMS SERVING MORE THAN 1,000 FT ² OF CONDITIONED FLOOR AREA		DUCT SYSTEMS SERVING 1,000 FT ² OR LESS OF CONDITIONED FLOOR AREA
	CFM/100 FT ²		CFM
	Number of ducted returns		
	<3	≥3	Any
Space conditioning equipment is not installed	3	4	30
All components of the duct system are installed	4	6	40
Space conditioning equipment is not installed, but the ductwork is located entirely in conditioned space	6	8	60
All components of the duct system are installed and entirely located in conditioned space.	8	12	80

Unit Sampling

- Allowed for blower door (R402.5.1.2.1), duct leakage (R403.3.9), and ventilation testing (R403.6.4).
- Building must have 8 or more dwelling units.
- Must test the greater of 7 units or 20% of dwelling units, including a top floor unit, ground floor unit, middle floor unit, and unit with the largest CFA.
- For each failure, 2 additional units and the corrected unit must be tested.

Interior Lighting

- 100% of lighting must meet efficacy.
 - Luminaires > 45 lumens per watts
 - Lamps > 65 lumens per watts
- Lighting controls split between habitable spaces and other specific locations
 - Manual dimmer or automatic shut off control for habitable spaces
 - Only automatic shut off control for typically unoccupied areas



R408 Additional Efficiency Requirements

- New format using a system of measures/credits
- Minimum 10 credits must be achieved in addition to meeting all mandatory requirements
- Minimum 2 measures must be implemented
- Over 50 measures available in these categories:

Heating Equipment	ERV/HRV
Cooling Equipment	Appliances
Water Heating Equipment	On-Site Renewable
Ducts in Conditioned Space	Insulation
Reduced Air Leakage	Fenestration

R408 Additional Efficiency Requirements

(continued)

Measure Number	Measure Description	Credit Value								
		CZ 0 & 1	CZ 2	CZ 3	CZ 4A & 4B	CZ 4C	CZ 5	CZ 6	CZ 7	CZ 8
R408.2.1.1(1)	≥ 2.5% Reduction in total TC	0	0	0	1	1	1	1	1	1
R408.2.1.1(2)	≥ 5% Reduction in total TC	0	1	1	2	1	2	2	2	2
R408.2.1.1(3)	≥ 7.5% Reduction in total TC	0	1	2	2	2	2	3	3	3
R408.2.1.1(4)	≥ 10% Reduction in total TC	1	1	2	3	3	4	4	5	5
R408.2.1.1(5)	≥ 15% Reduction in total TC	1	2	2	4	4	5	6	7	8
R408.2.1.1(6)	≥ 20% Reduction in total TC	2	4	4	5	6	7	8	9	11
R408.2.1.1(7)	≥ 30% Reduction in total TC	3	6	6	8	8	11	12	13	16

No restrictions on which (non-additive) measures can be combined

R408 Additional Efficiency Requirements

(continued)

- Does not apply to Simulated Performance or ERI Pathways.
- Each credit equals approximately 1% improvement in efficiency of the home. Performance and ERI compliance values were adjusted accordingly to allow maximum flexibility.

R405 Simulated Building Performance

- Key Changes:
 - Envelope Backstop
 - Energy Cost Compliance
 - Equipment In Reference Home
 - Ductwork in Reference Home

Envelope Backstop

- Sets an envelope backstop based on total building thermal envelope thermal conductance.
- Allows flexibility while also ensuring envelope items that impact long term performance of the home are not missed.
- Utilizes equations below:

For Climate Zone 0-2:

For Climate Zones 3-8:

E

Annual Energy Cost

Design	IECC 2018 Performance	As Designed
Heating	\$529	\$474
Cooling	\$258	\$246
Water Heating	\$435	\$435
Mechanical Ventilation	\$46	\$18
SubTotal - Used to determine compliance	\$1,269	\$1,173
Lights & Appliances w/out Ventilation	\$763	\$763
Onsite generation	\$0	\$0
Total	\$2,032	\$1,936

R405.3 Source Energy Exception: The proposed home uses 7.53 MBtu LESS source energy than the reference home.

Requirements

✓	R405.3	Performance-based compliance passes by 7.6%	The proposed house meets the IECC 2018 Performance reference energy bill requirement by \$95.92 (7.53 MBtu).
✓	R402.4.1.2	Air Leakage Testing	Air sealing is 3.00 ACH at 50 Pa. It must not exceed 3.00 ACH at 50 Pa.
✓	R402.5	Area-weighted average fenestration SHGC	Area-weighted average fenestration SHGC is 0.4. The maximum allowed value is [No Limit].
✓	R402.5	Area-weighted average fenestration U-Factor	
✓	R404.1	Lighting Equipment	At least 90.0% of fixtures shall be high-efficacy lamps, currently 100.0% are high-efficacy.
✓	R403.6.1	Mechanical Ventilation Efficacy	
✓	R403.3.3	Duct Testing	
✓	Mandatory Checklist	Mandatory code requirements that are not checked by Ekotrope must be met.	2018 IECC Mandatory Checklist must be checked as complete.
✓	IRC M1505.4.3	Mechanical Ventilation Rate	
✓	R405.2	Duct Insulation	All ducts outside the thermal envelope must be insulated to at least R6.0.

Design exceeds requirements for IECC 2018 Performance compliance by 7.6%.

Reference Home Equipment Changes

- Impacts:
 - Heat Pumps
 - Furnaces
 - A/Cs
 - Water
 - In all projects, the reference home equipment efficiency in the pre-2024 IECC is being replaced by the 2024 IECC minimum efficiency in the reference home equipment.
- You get credit for installing high performance equipment!
- efficiency in
equipment efficiency in

Ductwork in Reference Home

- Sets standard duct locations based on home foundation and number of stories.
- Allows for additional credit for all ducts in conditioned space.

Foundation Type	Slab on grade	Unconditioned crawl space	Basement or conditioned crawl space
Duct location (supply and return)	One-story building: 100% in unconditioned attic. All other: 75% in unconditioned attic and 25% inside conditioned space.	One-story building: 100% in unconditioned crawl space. All other: 75% in unconditioned crawl space and 25% inside conditioned space.	75% inside conditioned space and 25% unconditioned space.

R406 Energy Rating Index

- Key Changes:
 - Envelope Backstop – Same as R405
 - Removed ventilation change from RESNET 301
 - Adds with and without solar compliance options

R406 Maximum Energy Rating Index

CLIMATE ZONE	ENERGY RATING INDEX NOT INCLUDING OPP	ENERGY RATING INDEX WITH OPP
0 and 1	51	35
2	51	34
3	50	33
4	53	40
5	54	43
6	53	43
7	52	46
8	52	46



Federal Reactions to 2024 IECC

DOE Determination

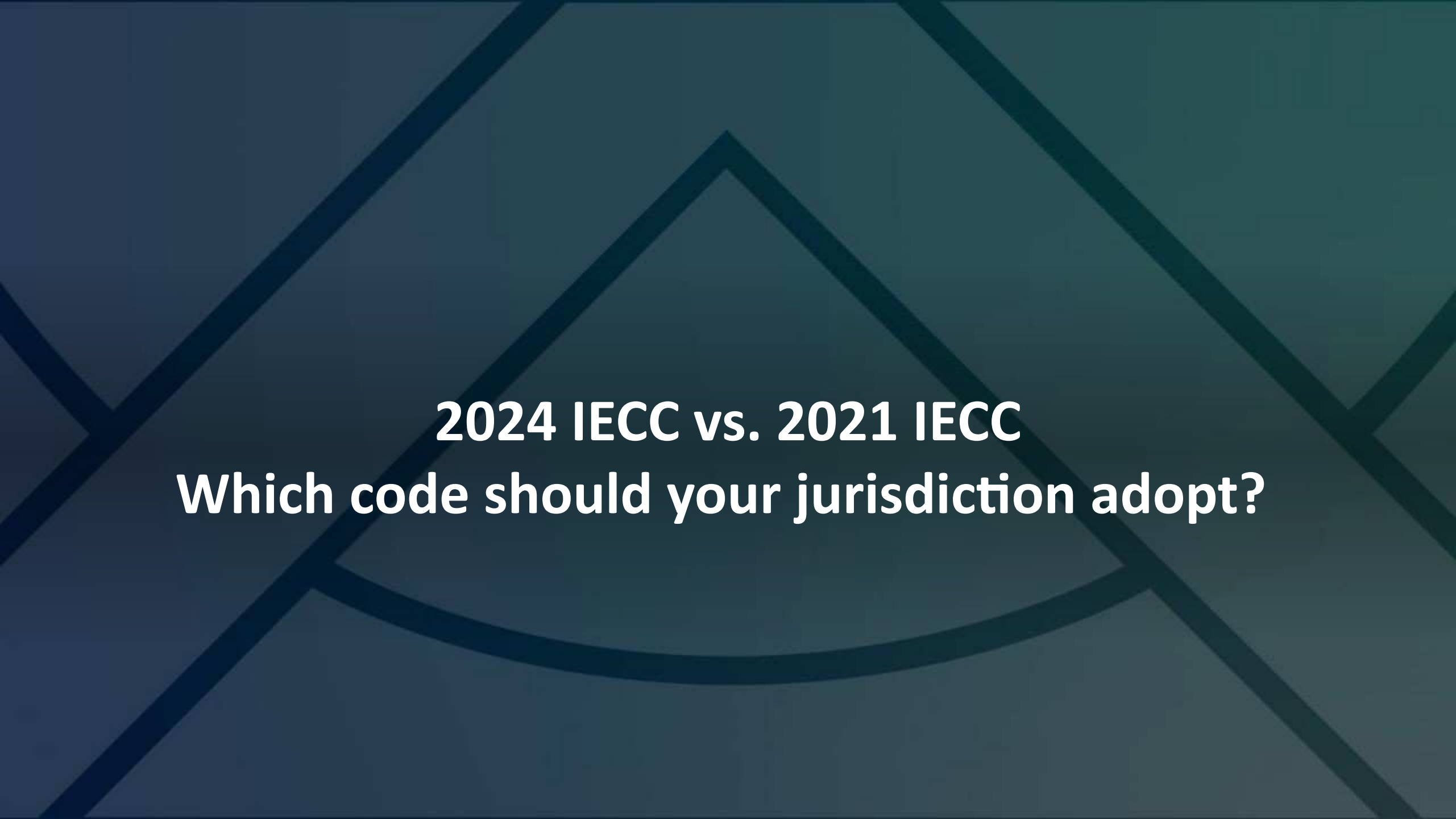
- Final analysis not currently published
- Initial assessment (before appeals) was 6-8% improvement over 2021 IECC and 40% more efficient than 2006
- May not see final determination until after election

HUD/USDA Energy Efficiency Standards

- FHA-insured and USDA single family programs will be required to implement 2021 IECC by November 2025.
- HUD will accept 2024 IECC as an alternative pathway contingent on a final determination from DOE

IRA Funding

- Updated ALRD for Building Code Funding includes 2024 IECC as a qualifying building code.
- Formula funding will only allow adoption of 2024 IECC with approved amendments.
- Competitive funding may allow adoption of 2024 IECC with both strengthening and weakening amendments if code remains more efficient than 2021 IECC.



2024 IECC vs. 2021 IECC
Which code should your jurisdiction adopt?

What factors determine adoption?

- Climate zone
- Local construction practices
- Typical compliance pathways
- Adoption process – Unamended vs. Amended
- Other I-Code Impacts

2021 vs. 2024 Pros and Cons

- Robby will take 2021
- Nathan will take 2024



Thank You for Attending