

# ICAA·2022

turn up  
the heat

Sheraton Grand Wild Horse Pass | Phoenix | September 21-24



**Johns Manville**  
A Berkshire Hathaway Company

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## UNDERSTANDING THE UPDATED IECC CODES

# Disclaimer

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The information provided in this seminar is not to be used as a substitute for professional engineering design and/or documentation required by building code, contract or applicable law.

Please refer to manufacturer's specific application guides, instructions and guarantee requirements on all projects.



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# JR Babineau

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Research Manager, Building Sciences

- 25 years at JM
- Based in Denver, CO
- Prior experience in Building and Mechanical Insulation, Building Science, Acoustics, Solar, and Testing of Materials and Systems
- P.E in Colorado
- Industry involvement:
  - ASTM
  - ASHRAE
  - US DOE
  - NAIMA
  - SFC



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# Topics

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- Code changes, focus on envelope
- Review compliance path options
- Additional measures and energy credits
- New climate zone maps
- 2024 IECC proposals
- Insulation in the IRA



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# 2021 IECC Residential & Commercial Codes



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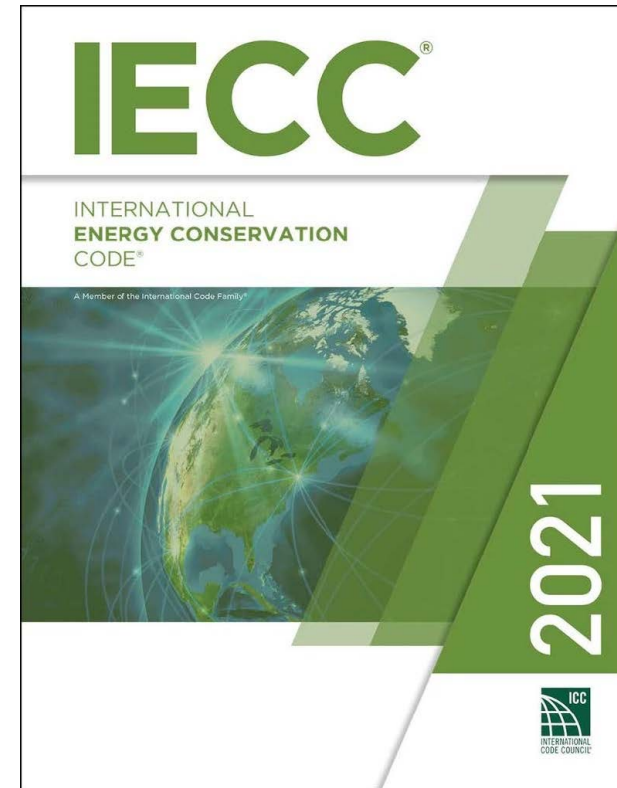
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# 2021 IECC

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- National model energy code
- Revised every 3 years
- Residential chapters
- Commercial chapters



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# Code Energy Savings

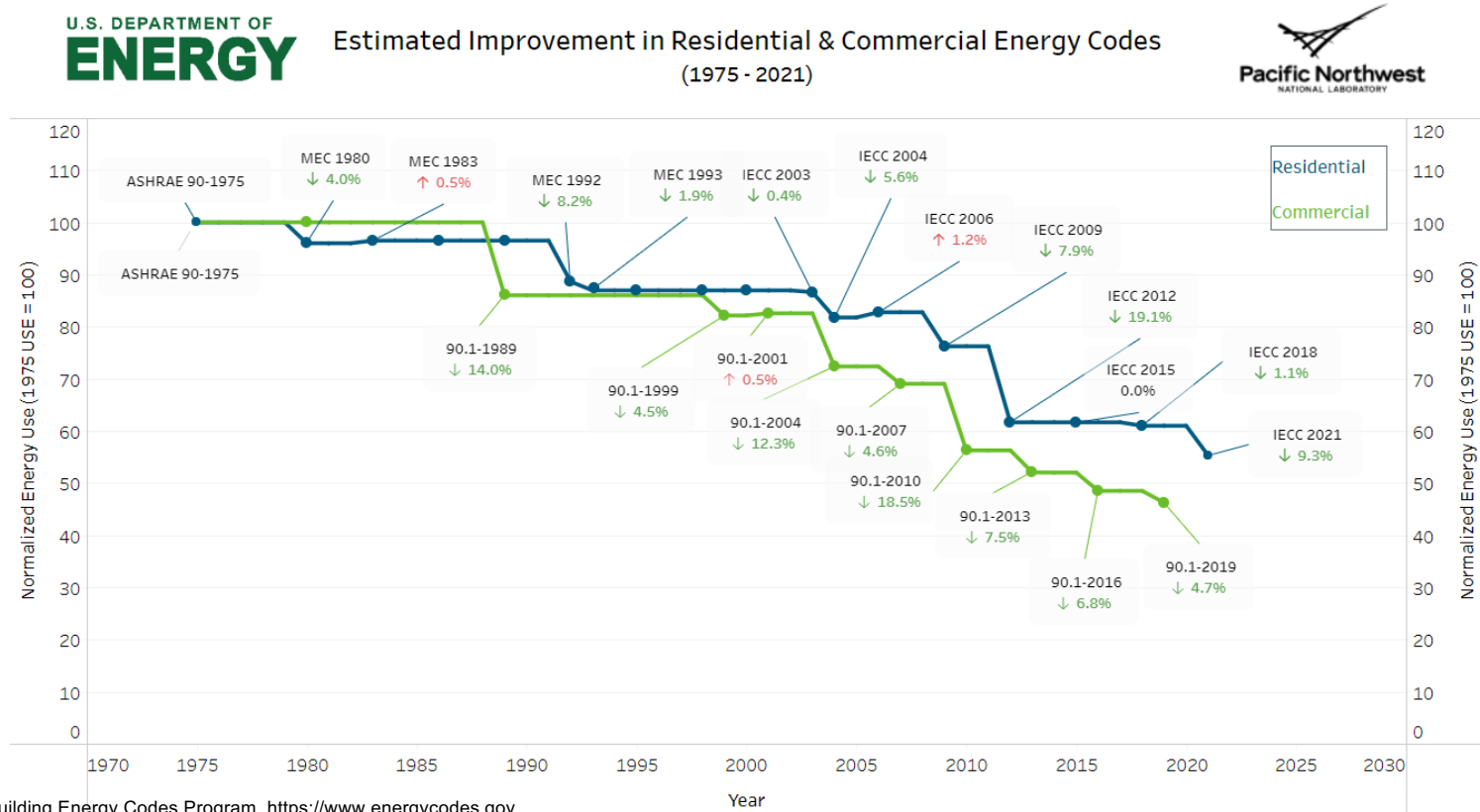


Image courtesy US DOE Building Energy Codes Program, <https://www.energycodes.gov>



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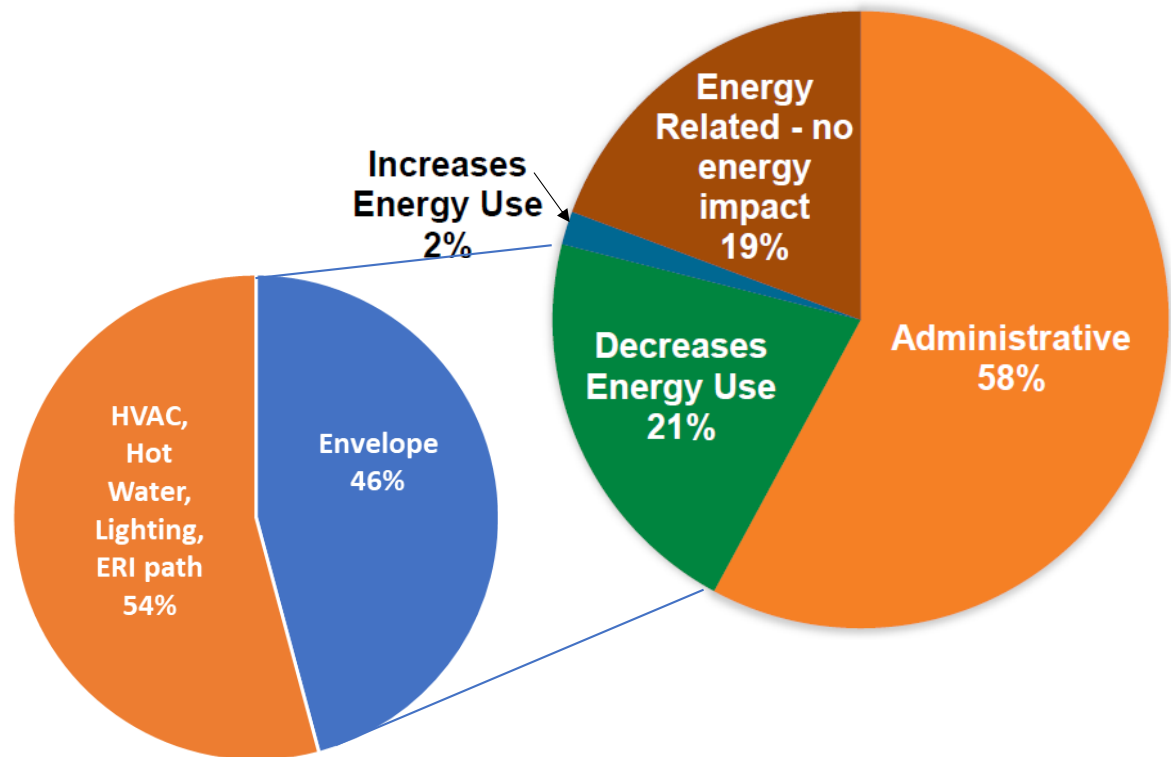
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# 2021 IECC: Residential

- 114 approved changes:

- Envelope
- Lighting
- HVAC
- Hot Water
- Performance & ERI



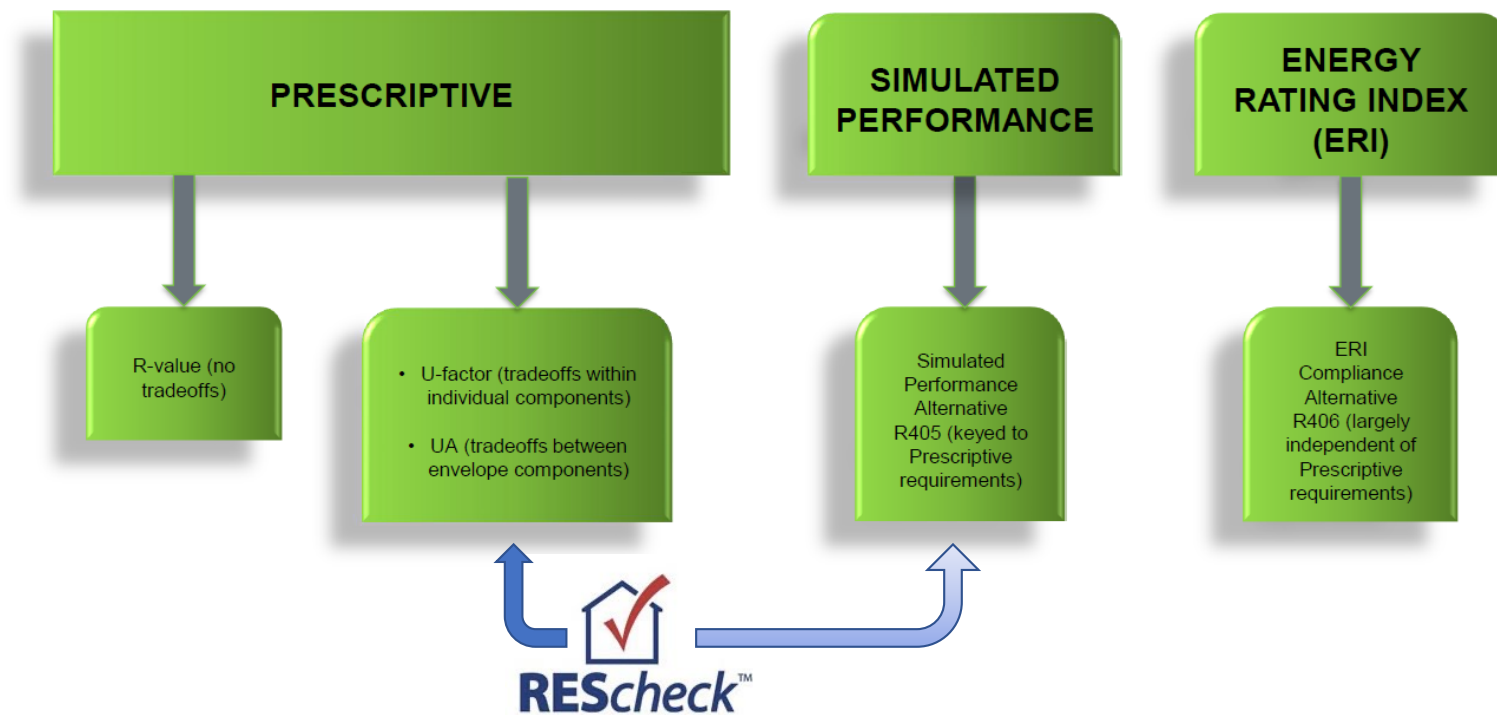
Images courtesy Pacific Northwest National Lab, [energycodes.gov/2020-building-energy-code-webinar-series](https://energycodes.gov/2020-building-energy-code-webinar-series)



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# 2021 IECC: Residential



Images courtesy Pacific Northwest National Lab, [energycodes.gov/2020-building-energy-code-webinar-series](https://energycodes.gov/2020-building-energy-code-webinar-series)



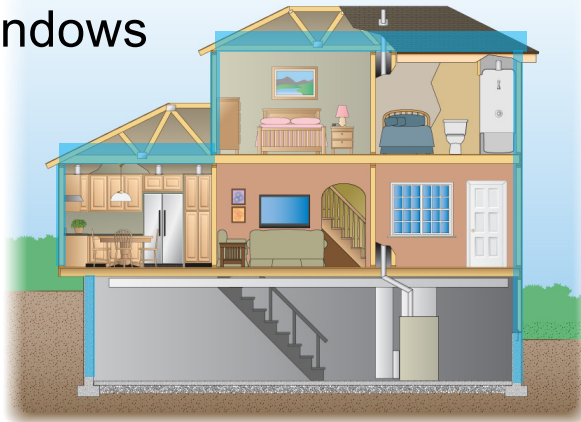
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# 2021 IECC: Residential

## • Prescriptive Envelope:

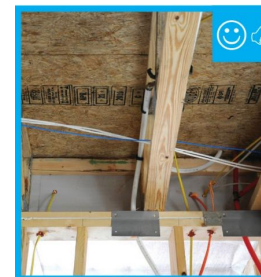
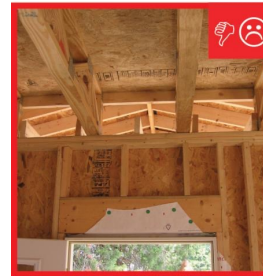
- Attics/ceilings
- Frame walls
- Basement walls
- Slab edges
- Windows



Climate Zone	Ceilings		Wood frame walls		Basement walls	
	2015/2018	2021	2015/2018	2021	2015/2018	2021
1	30	30	13	13 or 0+10	0	0
2	38	49	13	13 or 0+10	0	0
3	38	49	20 or 13+5	20 or 13+5 or 0+15	5/13	5/13
4	49	60	20 or 13+5	20+5 or 13+10 or 0+15	10/13	10/13
5	49	60	20 or 13+5	20+5 or 13+10 or 0+15	10/13	15/19 or 13+5
6	49	60	20+5 or 13+10	20+5 or 13+10 or 0+20	15/19	15/19 or 13+5
7	49	60	20+5 or 13+10	20+5 or 13+10 or 0+20	15/19	15/19 or 13+5
8	49	60	20+5 or 13+10	20+5 or 13+10 or 0+20	15/19	15/19 or 13+5

# 2021 IECC: Residential

- Air leakage
  - Requires BOTH inspection & testing
  - Basic limits unchanged
    - $\leq 5$  ACH, CZ 1-2
    - $\leq 3$  ACH, CZ 3-8
- Air leakage trade-off limits
  - $\leq 5$  ACH, regardless of CZ or compliance path



Some images courtesy Pacific Northwest National Lab, Building America Solutions Center <https://basc.pnnl.gov/>



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# 2021 IECC: Residential

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- Additional Prescriptive Measures, Pick 1:

- Envelope UA improved by 5%
- Efficient HVAC equipment
- Improved hot water efficiency
- More efficient HVAC ducts
- Improved air-sealing & HRV/ERV ventilation



Some images courtesy Pacific Northwest National Lab, [energycodes.gov/2020-building-energy-code-webinar-series](https://energycodes.gov/2020-building-energy-code-webinar-series)

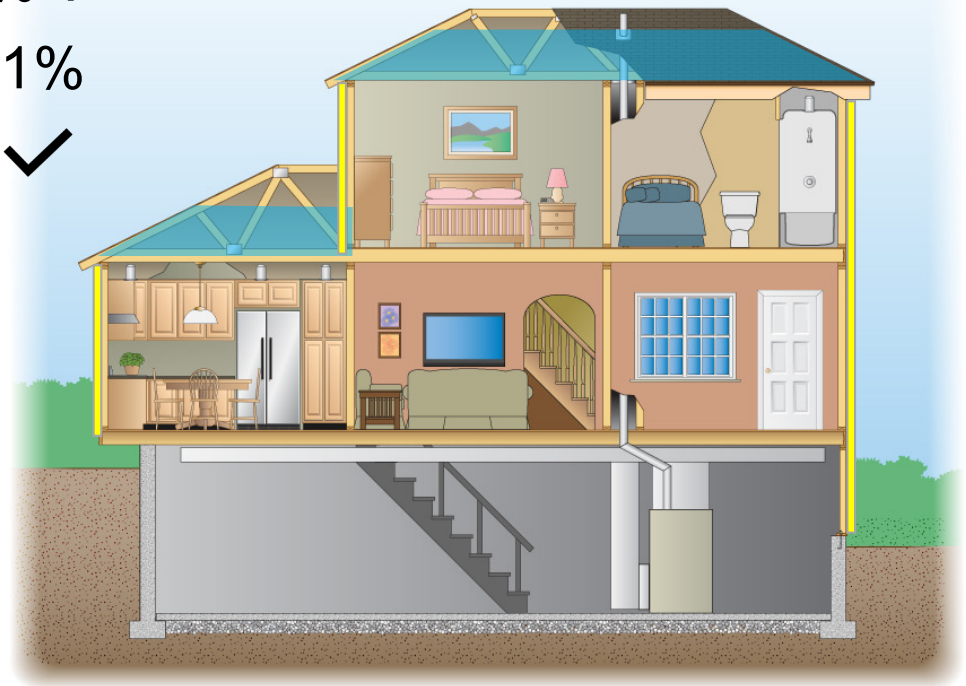


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# 2021 IECC: Residential

- How to improve Envelope UA by 5% ?
- Attic R-49 → R-60 only improves ~1%
- Adding ~R-3 continuous insulation ✓



Some images courtesy Pacific Northwest National Lab, [energycodes.gov/2020-building-energy-code-webinar-series](https://energycodes.gov/2020-building-energy-code-webinar-series)



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# 2021 IECC: Residential

- Performance Path:
  - Envelope backstop = 2009 IECC
  - “Additional Measures” or 5% better than reference home
- ERI Path:
  - Envelope backstops (2018 IECC or  $\leq 15\%$  worse than 2021 IECC)
  - 5% max credit from renewables
  - “Additional measures” or 5% less than target

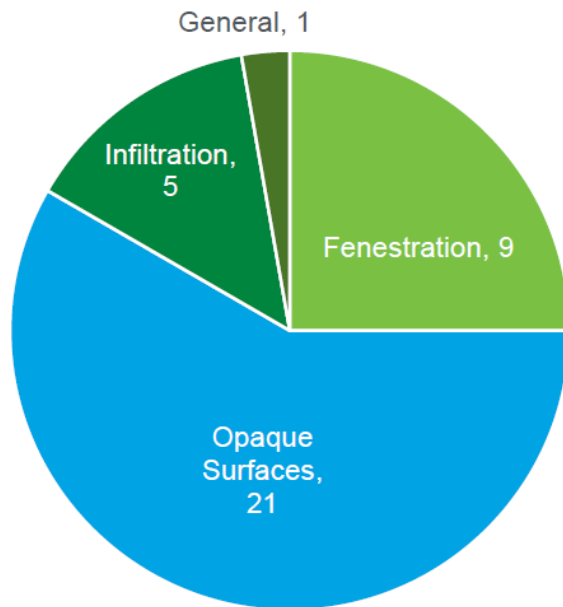
Climate Zone	2018 IECC	2021 IECC (same as 2015 IECC)
1	57	52
2	57	52
3	57	51
4	62	54
5	61	55
6	61	54
7	58	53
8	58	53



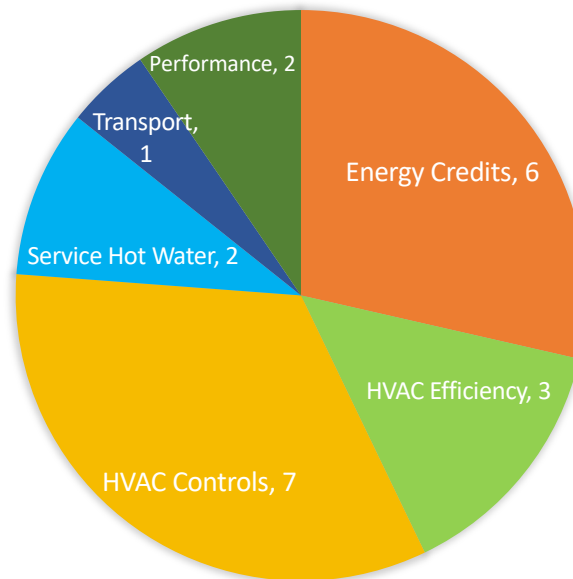
# 2021 IECC: Commercial

## Approved Changes

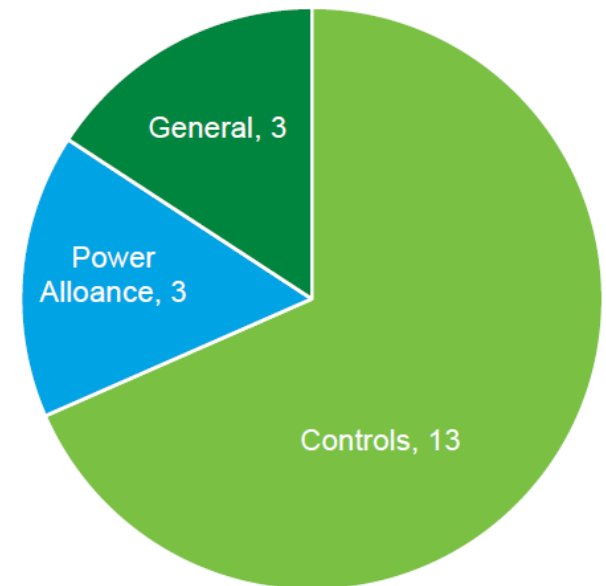
### Envelope



### HVAC, Water, Energy Credits, Performance



### Lighting



Images courtesy Pacific Northwest National Lab, [energycodes.gov/2020-building-energy-code-webinar-series](https://energycodes.gov/2020-building-energy-code-webinar-series)



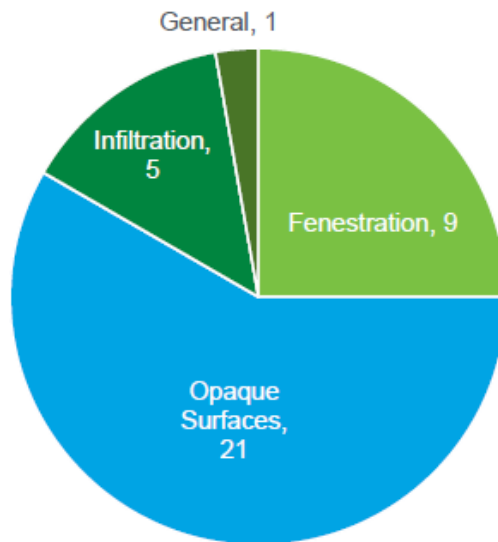
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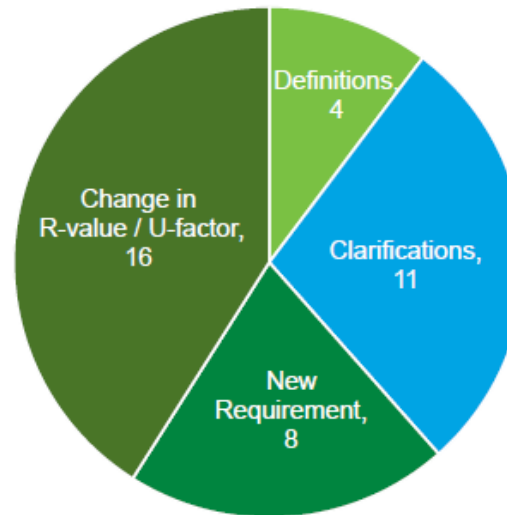
# 2021 IECC: Commercial

## Envelope Changes

By Component



By Change Type



Images courtesy Pacific Northwest National Lab, [energycodes.gov/2020-building-energy-code-webinar-series](https://energycodes.gov/2020-building-energy-code-webinar-series)



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# 2021 IECC: Commercial

## • Prescriptive Envelope:


- Metal building roofs
- Walls
- Floors
- Roof insulation above-deck must be  $\geq 2$  layers w/ seams offset



R-value Updates vs. 2018 IECC (only new values listed)								
Climate Zone	Metal Building Roofs	Attic & Other	Metal Building Walls	Metal Framed Walls	Wood Framed Walls	Below-grade Walls	Mass Floors	Framed Floors
1								R-13
2								
3								
4		R-49				R-10ci (Group R)	R-14.6ci	
5		R-49	R-13+ R-14ci	R-13+ R-10 ci	R-13+ R-7.5ci or R-20+3.8ci	R-10ci (Group R)	R-14.6ci	
6			R-13+ R-14ci	R-13+ R-12.5ci		R-10ci	R-16.7ci	R-38
7		R-60	R-13+ R-17ci	R-13+ R-12.5ci		R-15ci	R-20.9ci	R-38
8	R-25+ R-11+ R-11LS	R-60	R-13+ R-19.5ci	R-13+ R-18.8ci	R-13+ R-18.8ci	R-15ci	R-23ci	R-38

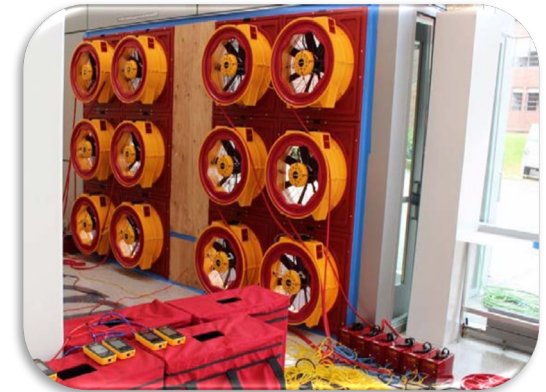
# 2021 IECC: Commercial

- Envelope
  - Certificate required (similar to residential)
  - Air tightness & air leakage testing



# 2015 IECC Energy Efficiency Certificate

Insulation Rating	R-Value	
Above-Grade Wall	26.00	
Below-Grade Wall	15.00	
Floor	35.00	
Ceiling / Roof	41.00	
Ductwork (unconditioned spaces):		
Glass & Door Rating	U-Factor	SHGC
Window	0.25	
Door	0.70	
Skylight	0.50	



Images courtesy Pacific Northwest National Lab, [energycodes.gov/2020-building-energy-code-webinar-series](https://energycodes.gov/2020-building-energy-code-webinar-series)

# 2021 IECC: Commercial

- Performance Path
  - 80% of baseline building
- Energy Credits
  - Credits vs. “pick one”
  - Credits vary by climate zone & building type
  - 10 credits  $\approx$  2.5% savings

Group B (Office) Examples

	0	1	2	3	4	5	6	7	8
Heat 5%	NA	NA	NA	NA	NA	1	1	NA	1
Cool 5%	6	6	5	4	3	2	2	2	1
Heat 10%	NA	NA	NA	NA	NA	2	2	NA	1
Cool 10%	11	11	10	9	5	4	4	3	3
Lighting	9	8	9	9	8	7	6	7	6
Light controls	2	2	2	2	2	2	1	1	1
Renewables	9	9	9	9	9	9	9	9	9
DOAS	4	4	4	3	5	5	7	5	3
HPWH	NA	NA	NA	NA	NA	NA	NA	NA	NA
Envelope	1	4	2	4	7	10	11	14	16
Air leakage	2	1	1	4	8	11	15	11	6







# Climate Zones & Adoption

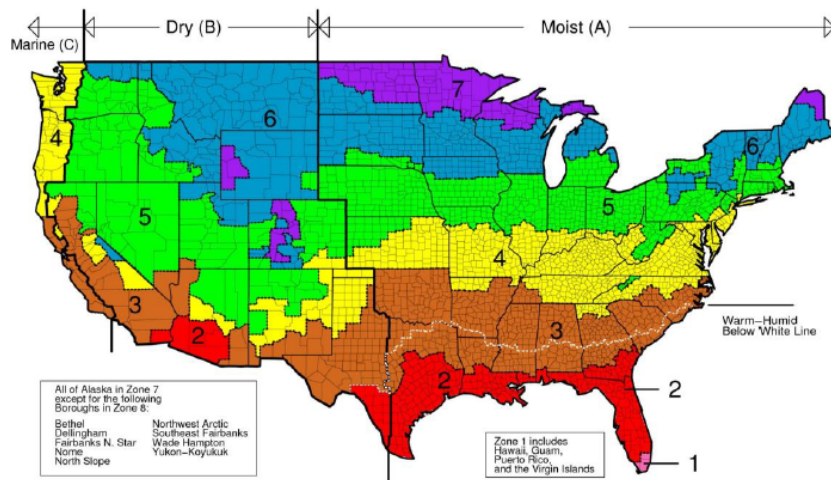


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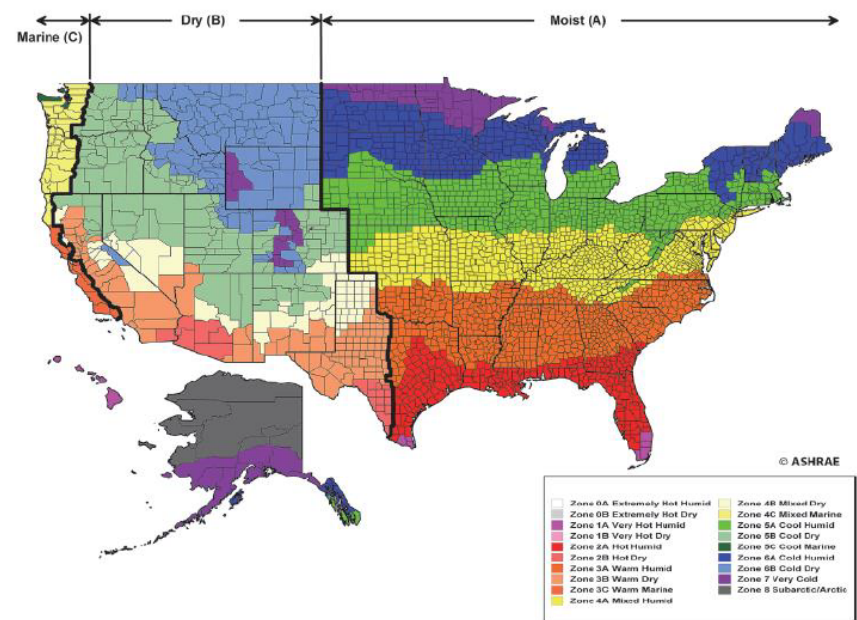
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# 2021 IECC: Climate Zones

Climate Zones for 2018 IECC



Climate Zones for 2021 IECC



ASHRAE Standard 169-2013 reassigned counties to climate zones based on new climatic data

Images courtesy Pacific Northwest National Lab, [energycodes.gov/2020-building-energy-code-webinar-series](https://energycodes.gov/2020-building-energy-code-webinar-series)

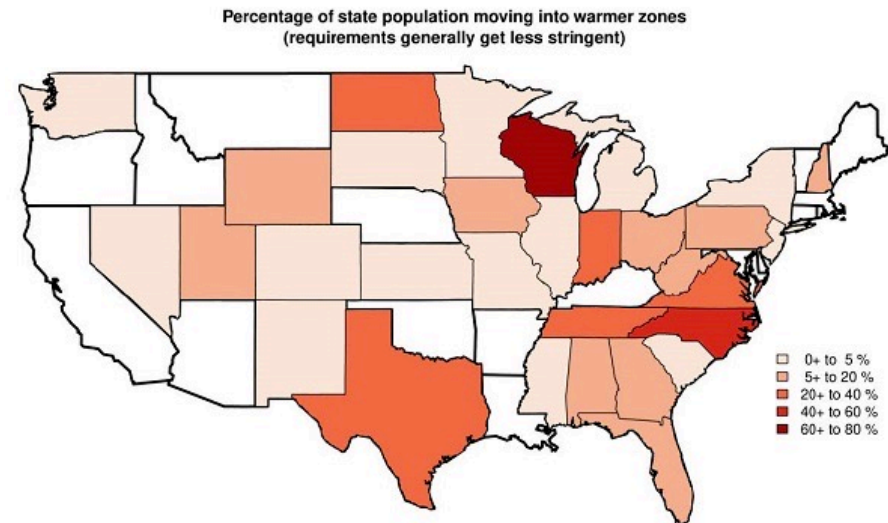
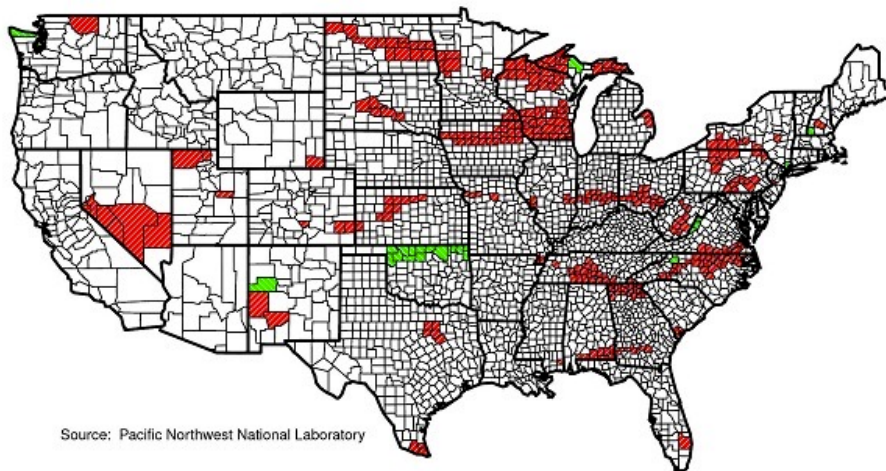


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# 2021 IECC: Climate Zones

- ~10% of U.S. counties
- Most moved to warmer CZ



Images courtesy Pacific Northwest National Lab, [energycodes.gov/2020-building-energy-code-webinar-series](https://energycodes.gov/2020-building-energy-code-webinar-series)

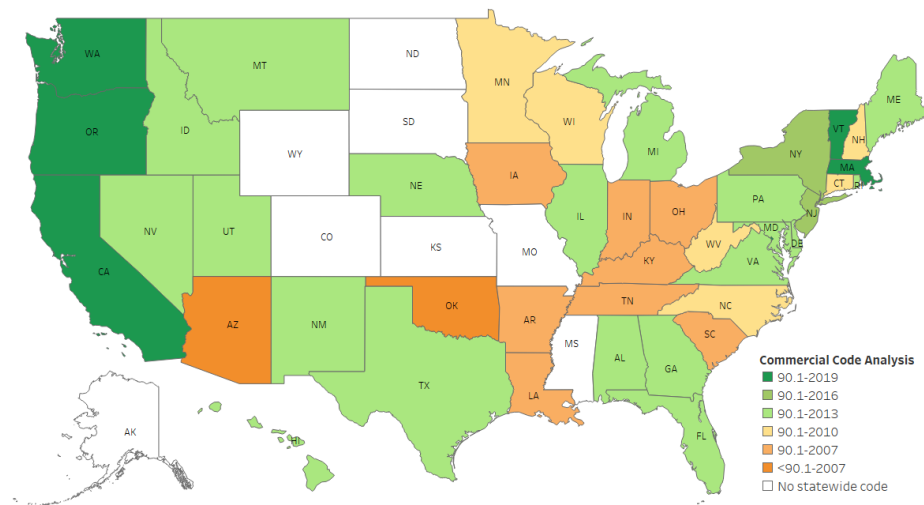


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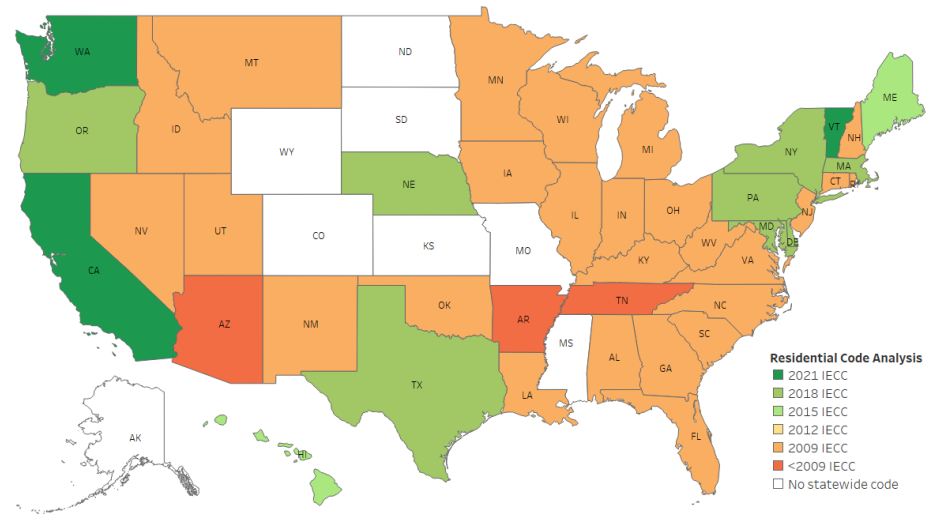
# Code Adoption

Commercial Buildings



Updated as of 06/30/22

Residential Buildings



Updated as of 06/30/22

Images courtesy US DOE Building Energy Codes Program, <https://www.energycodes.gov/status/commercial>



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# 2024 IECC: Code Development



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# 2024 IECC Updates

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- The 2024 IECC will be the next revision of the national model energy code.
- Requirements for the next revision:
  - The 2024 IECC must be more energy efficient than the 2021 IECC.
  - A zero-energy compliance path must be provided.
  - Identify a “glide” compliance path toward zero-energy in 2030.



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# 2024 IECC: Consensus Committee Process

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- 2024 IECC will be the first code cycle developed by a consensus committee model.
- Committee membership represents a diverse array of experience in building types and energy efficiency strategies and also includes racial, gender and socio-economic diversity.
- Committee membership is balanced across interest groups.

-  Builder
-  Consumer
-  Government Regulator
-  Manufacturer
-  Public Segment
-  Standards Promulgator/Testing Laboratory
-  User
-  Utility

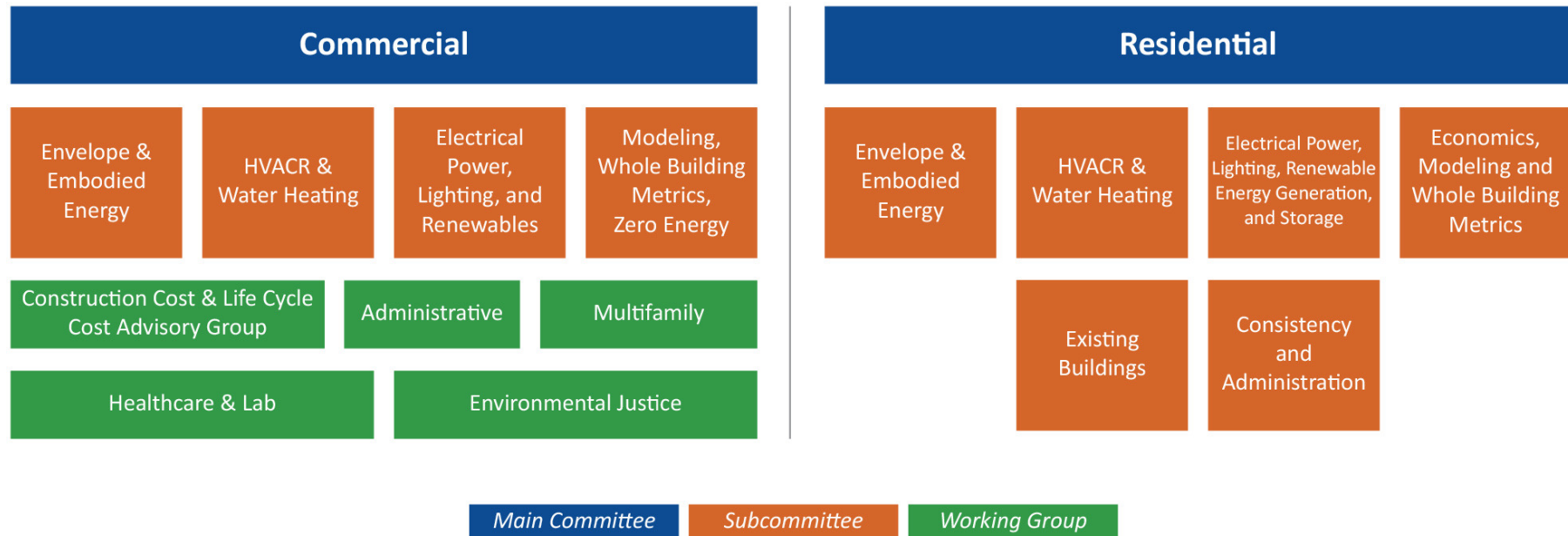


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# 2024 IECC Consensus Committees

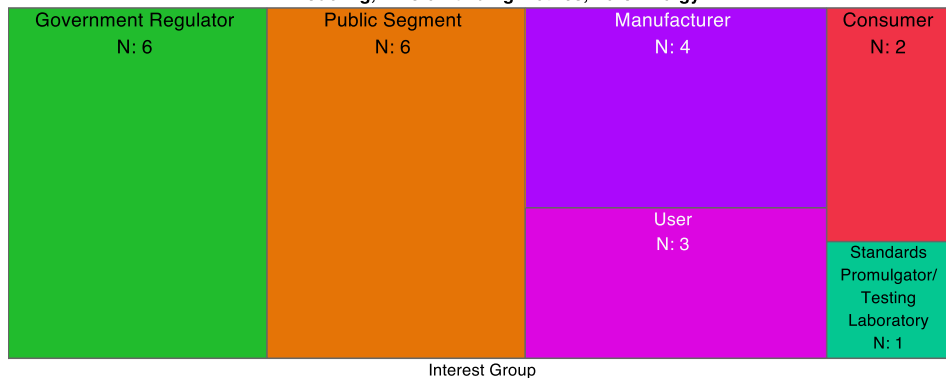
- Two consensus committees have been formed, one for the commercial energy code and one for the residential code.



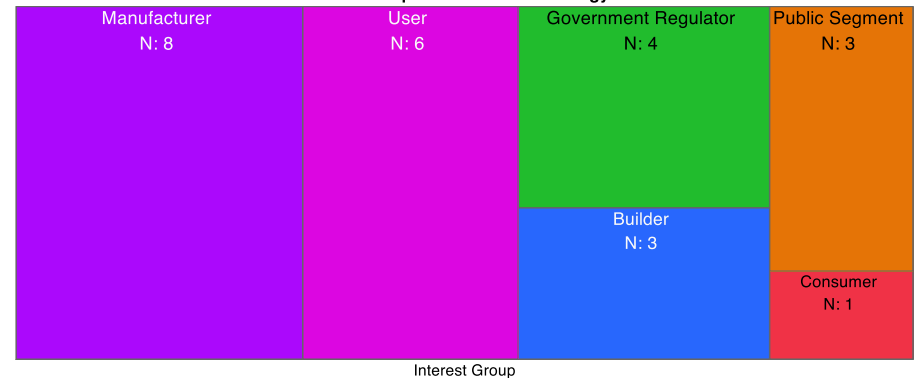
# 2024 IECC: Committee Balance

- Committee membership is balanced across different interest groups.
  - Examples of Commercial Committee roster balance:

Modeling, Whole Building Metrics, Zero Energy



Envelope and Embodied Energy



■ Builder ■ Consumer ■ Gov't Regulator ■ Manufacturer ■ Public Segment ■ Standards /Testing Lab ■ User ■ Utility



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# 2024 IECC Proposals

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## Headed for Public Comment

- Many clarifications
- Proposed rollbacks (residential attics)
- Proposed trade-offs
- Credits in Residential (instead of Pick-1)
- More credits required in Commercial



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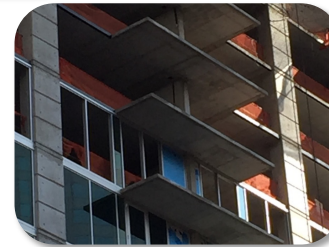
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# Keys to Success

- Communication between teams/trades
- Know local requirements
- Clear SOW
- Become the expert

Future...

- More air sealing & testing
- More continuous insulation
- More attention to install quality
- More attention to thermal bridges (commercial)



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# The Future...

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## Inflation Reduction Act of 2022

- Tax credits 25c, 45L, and 179D
  - 30%/\$1200, \$2500/\$5000, \$0.50/ft<sup>2</sup> + \$0.02/ft<sup>2</sup>
- Rebates for home efficiency & electrification
  - \$2000/50% for 20-35% savings
  - \$1600 for insulation & air sealing (electrification program)
- Contractor training (thru states) \$200M
- Code adoption and zero-energy codes (thru states) \$1B







# QUESTIONS?



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