

POTENTIAL LOOK OF 2021 IECC RESIDENTIAL PROVISIONS



Jim Meyers
Energy Codes 2019
May 29, 2019



First Look

- ❑ Residential hearings April 28, 2019 to May 3, 2019
- ❑ Approximately 300 proposals
- ❑ Participants from Alaska, Hawaii, CONUS
- ❑ Themes
- ❑ New items



DMW Magazine

TENTATIVE ORDER OF DISCUSSION 2019 PROPOSED CHANGES TO THE INTERNATIONAL ENERGY CONSERVATION CODE – RESIDENTIAL AND INTERNATIONAL RESIDENTIAL CODE - ENERGY			
<p>The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.</p> <p>Proposed change numbers that are indicated are those which are being heard out of numerical order. Indentation does not necessarily indicate that one change is related to another. Proposed changes may be presented for purposes of discussion at the hearing, at the discretion of the staff. Items that some code change proposals may not be included on this list, as they are being heard by another committee. Note also that RE1-1-RE2-2 are moved to later in the hearing order to allow grouping consideration of proposed changes to Chapters 1 and 3 near the beginning of the consideration of Chapters 1 and 3 of the ICC-Commercial Provisions.</p>			
RE116-19	RE42-19	RE17-19	RE103-19
RE18-19	RE43-19	RE23-19	RE01-19
RE31-19	RE44-19	RE25-19	RE07-19
CE42-19 Part B	RE45-19	RE26-19	CE03-19 Part B
CE21-19 Part B	RE46-19	RE27-19	RE02-19
CE16-19 Part B	RE47-19	RE28-19	RE04-19
RE18-19	RE48-19	RE29-19	CE08-19 Part B
RE19-19	CE49-19 Part B	RE30-19	RE06-19
RE20-19	RE50-19	RE31-19	RE09-19
RE21-19	RE51-19	RE32-19	RE05-19
RE22-19	RE52-19	RE33-19	CE11-19 Part B
RE23-19	RE53-19	RE34-19	CE14-19 Part B
RE24-19	RE54-19	RE35-19	CE16-19 Part B
RE25-19	RE55-19	RE36-19	RE08-19
RE26-19	RE56-19	RE37-19	RE03-19
RE27-19	RE57-19	RE38-19	RE10-19
RE28-19	RE58-19	RE39-19	RE11-19
RE29-19	RE59-19	RE40-19	RE12-19
RE30-19	RE60-19	RE41-19	RE13-19
RE31-19	CE19-19 Part B	RE42-19	RE14-19
RE32-19	RE61-19	RE43-19	RE15-19
RE33-19	RE62-19	RE44-19	RE16-19
RE34-19	RE63-19	RE45-19	RE17-19
RE35-19	RE64-19	RE46-19	RE18-19
RE36-19	RE65-19	RE47-19	RE19-19
RE37-19	RE66-19	RE48-19	RE20-19
RE38-19	RE67-19	RE49-19	RE21-19
RE39-19	RE68-19	RE50-19	RE22-19
RE40-19	RE69-19	RE51-19	RE23-19
RE41-19	RE70-19	RE52-19	RE24-19
CE50-19 Part B	RE71-19	RE53-19	RE25-19
	RE72-19	RE54-19	RE26-19
	RE73-19	RE55-19	RE27-19
	RE74-19	RE56-19	RE28-19
	RE75-19	RE57-19	RE29-19
		RE58-19	RE30-19
		RE59-19	RE31-19
		RE60-19	RE32-19
		RE61-19	RE33-19
		RE62-19	RE34-19
		RE63-19	RE35-19
		RE64-19	RE36-19
		RE65-19	RE37-19
		RE66-19	RE38-19
		RE67-19	RE39-19
		RE68-19	RE40-19
		RE69-19	RE41-19
		RE70-19	RE42-19
		RE71-19	RE43-19
		RE72-19	RE44-19
		RE73-19	RE45-19
		RE74-19	RE46-19
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			RE00-19

Themes

□ Clean-up, Clarify, Compliance

□ Increased efficiency

□ Trade-offs and options

□ ERI

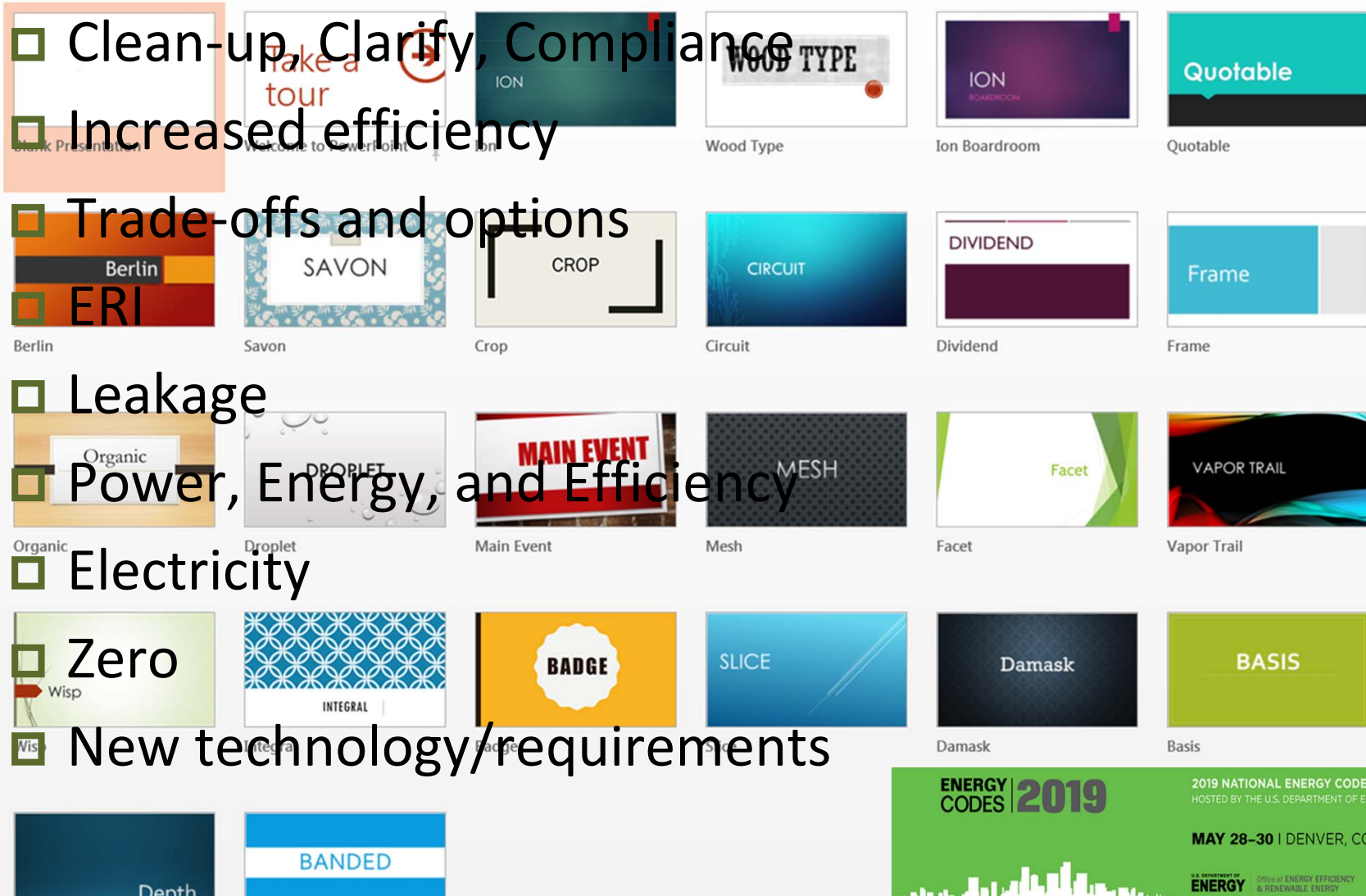
□ Leakage

□ Power, Energy, and Efficiency

□ Electricity

□ Zero

□ New technology/requirements



Clarify Code

- ❑ From “+” to “and” (RE28)
- ❑ Compliance certificate
- ❑ TDD added to definition (RE6)
- ❑ Air barrier and insulation table
- ❑ Document compliance path (CE13)

CLIMATE ZONE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE
30	13	3/4
38	13	4/6
38	20 or 13+5 ^h	8/13
49	20 or 13+5 ^h	8/13
49	20 or 13+5 ^h	13/1
49	20+5 ^h or 13+10 ^h	15/2

CLIMATE ZONE	WOODFRAME WALL R-VALUE	MASS WALL R-VALUE
30	13	
38	13	
38	20 or 13+5 ^h	
49	13&5ci ^h	
49	20 or 13+5 ^h	
49	13&5ci	



Energy Efficiency Certificate				
Insulation Rating		R-Value		R-Value
Ceiling/Roof		R-		R-
Walls	Frame	R-	Mass	R-
	Basement	R-	Crawl space	R-
Floors	Over unconditioned space	R-	Slab edge	R-
Ducts	Attic	R-	Other	R-
Air Leakage Test Results				
Blower door	ACH/50 Pa.	Duct testing		Cfm/100 ft ²
Fenestration Rating		NFRC U-Factor		NFRC SHGC
Window	U-			
Opaque door	U-			
Skylight	U-			
Equipment Performance		Type	Efficiency	
Heating system				AFUE
Cooling system				SEER
Water heater				EF
Indicate if the following have been installed (an efficiency shall not be listed)				

Clarify Code

- (Mandatory) and (Prescriptive) CE42
- Removed
- Added tables

R402.2 (IRC N1102.2) Specific insulation requirements (Prescriptive). In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through R402.2.13.

R402.3 (IRC N1102.3) Fenestration (Prescriptive). In addition to the requirements of Section R402, fenestration shall comply with Sections R402.3.1 through R402.3.5.

R402.4 (IRC N1102.4) Air leakage (Mandatory). The *building thermal envelope* shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.5.

R402.5 (IRC N1102.5) Maximum fenestration U-factor and SHGC (Mandatory). The area-weighted average maximum fenestration U-factor permitted using tradeoffs from Section R402.1.5 or R405 shall be 0.48 in *Climate Zones 4 and 5* and 0.40 in *Climate Zones 6 through 8* for vertical fenestration, and 0.75 in *Climate Zones 4 through 8* for skylights. The area-weighted average maximum fenestration SHGC permitted using

Add new text as follows:

TABLE R406.2 (IRC N1106.2)
REQUIREMENTS FOR ENERGY RATING INDEX

Section ^a	Title
General	-
R401.3	Certificate
Building Thermal Envelope	
R402.1.1	Vapor Retarder
R402.4	Air Leakage
R406.3	Building Thermal Envelope
Systems	
R403.1	Controls
R403.3 except sections R403.3.1, R403.3.4, R403.3.6, and R403.3.7	Ducts
R403.4	Mechanical system piping insulation
R403.5.1	Heated water circulation and temperature maintenance systems
R403.6	Mechanical ventilation
R403.7	Equipment sizing and efficiency ratings

Efficiency Requirements

- ❑ Fenestration u-factors and SHGC (RE35)
 - 0.40 to 0.35 U in CZ 2 and 0.32 to 0.30 in CZ 3
- ❑ Fenestration U-Factors (RE24, D)
- ❑ Hot water (RE162-19)
 - Compactness of hot water systems



Efficiency Requirements

- Hot water (RE162-19)
 - Compactness of hot water systems (Sec R405 only)



1-Story, 3 Bedroom, 2 Bath

1. Conditioned floor space: 1,147 SF
2. Hot water system rectangle: 36x23 = 828
3. Compactness Ratio: $828/1,147 = 72\%$
4. HWDS Factor for 1-Story: 0.0

PROPOSED DESIGN		
As proposed		
Use, in units of gal/day = $\underline{(30 + (10 \times N_{br})) * (1-HWDS)}$		
where:		
N_{br} = number of bedrooms.		
<u>HWDS = factor for the compactness of the hot water distribution</u>		
Compactness Ratio ⁱ		HWDS Factor
1 story	2 or More Stories	
> 60%	>30%	0
>30% to ≤ 60%	>15% to ≤ 30%	0.05
>15% to ≤ 30%	>7.5% to ≤ 15%	0.10
< 15%	< 7.5%	0.15

Trade offs and Options

- New Compliance Alternative (RE17)
 - The Aspen code

TABLE R407.3 (IRC N1107.3)
COOLING AND HEATING LOAD PER SQUARE FOOT

CLIMATE ZONE	COOLING LOAD PER SQUARE FOOT	HEATING LOAD PER SQUARE FOOT
<u>0</u>	<u>10.1 Btuh</u>	<u>3.1 Btuh</u>
<u>1</u>	<u>8.9 Btuh</u>	<u>4.6 Btuh</u>
<u>2</u>	<u>11.6 Btuh</u>	<u>7.3 Btuh</u>
<u>3A and 3B</u>	<u>6.5 Btuh</u>	<u>8.5 Btuh</u>
<u>4A and 4B</u>	<u>7.6 Btuh</u>	<u>8.8 Btuh</u>
<u>3C</u>	<u>3.3 Btuh</u>	<u>5.8 Btuh</u>
<u>4C</u>	<u>6.0 Btuh</u>	<u>7.1 Btuh</u>
<u>5</u>	<u>7.0 Btuh</u>	<u>11.4 Btuh</u>
<u>6</u>	<u>5.5 Btuh</u>	<u>11.6 Btuh</u>
<u>7</u>	<u>4.9 Btuh</u>	<u>13.1 Btuh</u>
<u>8</u>	<u>4.0 Btuh</u>	<u>18.1 Btuh</u>

Trade offs and Options

- ❑ Mechanical equipment tradeoffs (did not pass)
- ❑ Zero cavity option (RE27)
- ❑ Wood frame walls (RE40)
 - R-18 insulation permitted in place of R-20 when wall framing factor $\leq 20\%$, ext walls with 24 inch on center
- ❑ Points based systems did not pass (RE206, RE207, RE208-19)

Trade offs and Options

- ❑ Zero cavity option (RE27)



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Trade offs and Options

- Zero cavity option (RE27)



TABLE R402.1.2 (IRC N1102. INSULATION AND FENESTRATION REQUIREMENTS)

U-Factor	GLAZED FENESTRATION SHGC ^{b, e}	CEILING R-VALUE	WOODFRAME WALL R-VALUE	MASS WALL R-VALUE
0.18	0.25	30	13 or 0+10 ^h	13
0.20	0.25	38	13 or 0+10 ^h	13
0.22	0.25	38	20 or 13+5 ^h or 0+15 ^h	13
0.24	0.40	49	20 or 13+5 ^h or 0+15 ^h	13
0.26	NR	49	20 or 13+5 ^h or 0+15 ^h	13
0.28	NR	49	30 or 20+5 ^h or 13+10 ^h or 0+20 ^h	13
0.30	NR	49	30 or 20+5 ^h or 13+10 ^h or 0+20 ^h	13

Trade offs and Options

- Wood frame walls (RE40)
 - R-18 insulation permitted in place of R-20 when wall framing factor $\leq 20\%$, ext walls with 24 inch on center



APA – Inside View Project

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 Building Energy Codes

Trade offs and Options

- Points based systems did not pass (RE206, RE207, RE208-19)

**TABLE R407.2 (IRC N1107.2)
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY**

Measure Number	Measure Description	Flex Point Value									
		Climate Zone 1	Climate Zone 2	Climate Zone 3	Climate Zone 4	Climate Zone 4Ca	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8	
		1a	≥ 2.5% reduction in total UA ^b	1	1	2	2	2	2	3	4
1b	≥ 5% reduction in total UA ^b	3	3	3	3	3	4	5	5	5	
1c	≥ 7.5% reduction in total UA ^b	5	5	5	5	5	6	7	8	8	
2a	≥ 10% reduction in glazed vertical fenestration area-weighted average SHGC	2	1	-	-	-	-	-	-	-	
2b	≥ 20% reduction in glazed vertical fenestration area-weighted average SHGC	4	1	-	-	-	-	-	-	-	
3a	≤ 3 ACH50 air leakage rate with ERV or HRV installed ^c	2	4	5	7	7	7	7	8	8	
3b	≤ 2 ACH50 air leakage rate with ERV or HRV installed ^c	2	5	7	9	9	9	10	11	11	

ERI

- UA using the prescriptive U-factors from Table R402.1.4 multiplied by 1.15 in accordance with Equation 4-1. The area-weighted maximum fenestration SHGC permitted in Climate Zones 1 through 3 shall be 0.30. (RE150)
 - $UA_{\text{Proposed design}} \leq 1.15 \times UA_{\text{Prescriptive reference design}}$ (Equation 4-1)

SECTION R406 ENERGY RATING INDEX COMPLIANCE ALTERNATIVE

R406.1 Scope. This section establishes criteria for compliance using an Energy Rating Index (ERI) analysis.

R406.2 Mandatory requirements. Compliance with this section requires that the provisions identified in Sections R401 through R404 indicated as “Mandatory” and Section R403.5.3 be met. The *building thermal envelope* shall be greater than or equal to levels of efficiency and *Solar Heat Gain Coefficients* in Table 402.1.1 or 402.1.3 of the 2009 *International Energy Conservation Code*.

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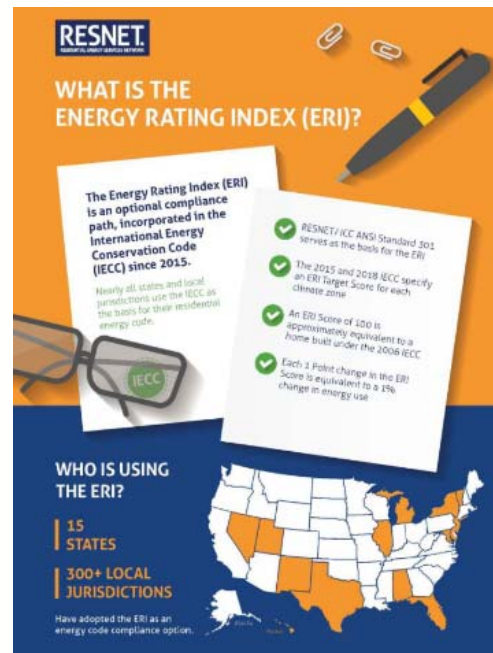
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Building Energy Codes

ERI

- ❑ Compliance documentation at Permit and C of O
- ❑ Reduction in ERI scores including renewables (RE190, D)
- ❑ Zero energy Appendix (RE223, D)



Leakage

- New air leakage option for small and attached units (RE88)
- Air leakage rate of 0.30 cfm/ft² of enclosure area (ceiling, floors, walls)
- Applies to attached single and multifamily buildings AND homes \leq 1500 ft²



2019

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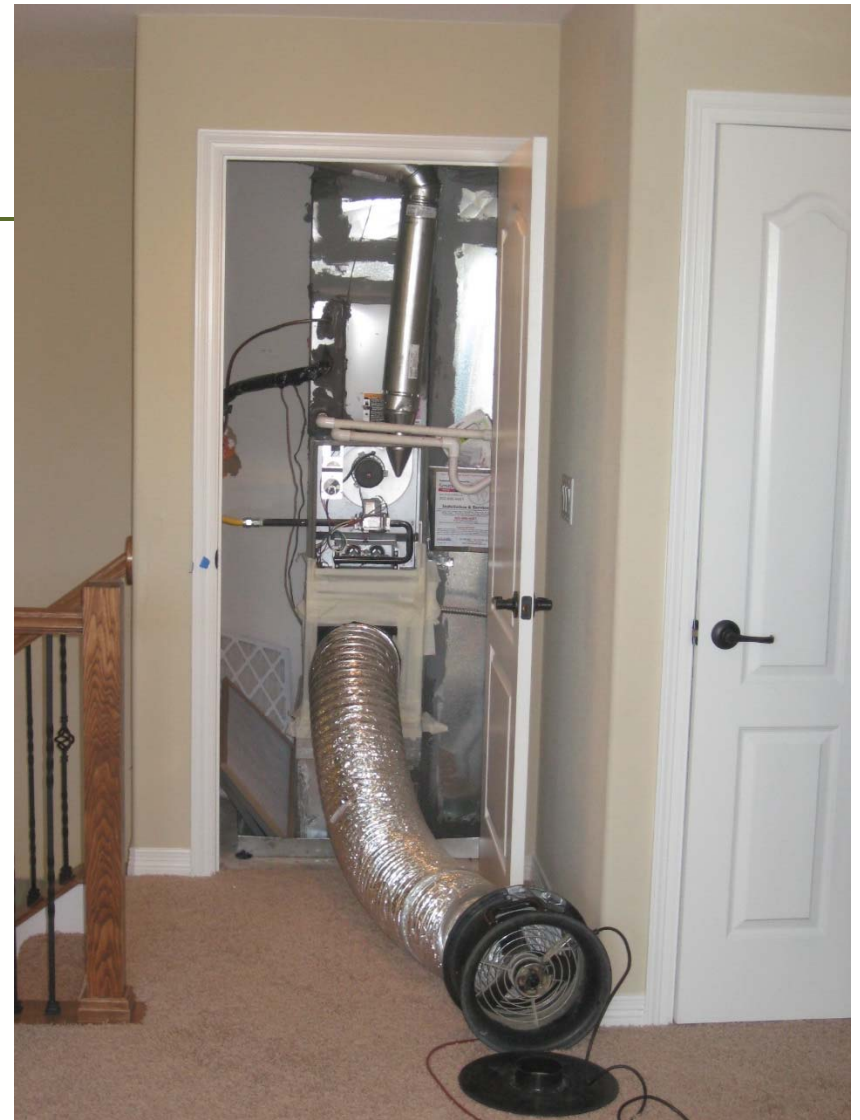
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 Building Energy Codes

Duct Leakage

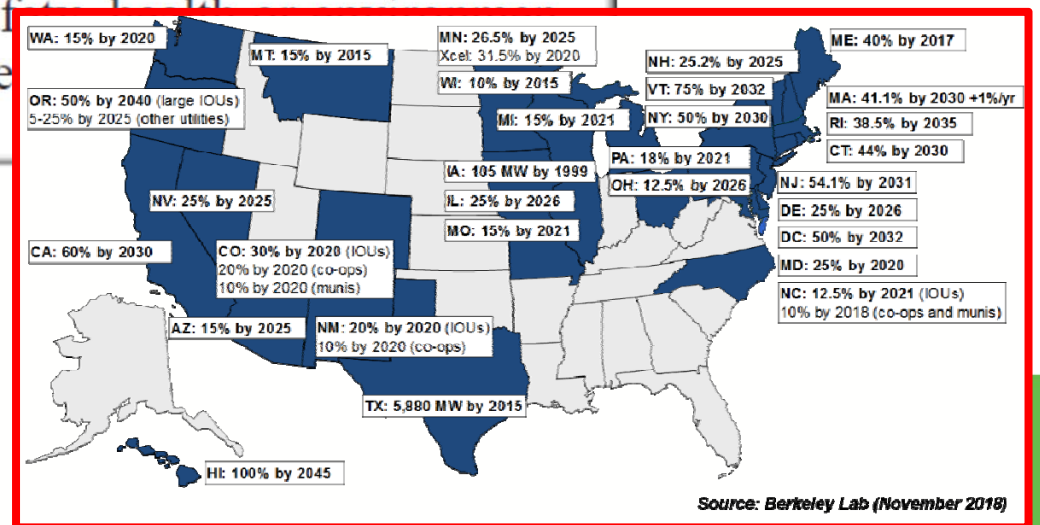
- ❑ Duct leakage testing when located within building envelope (RE112)
- ❑ Maximum total leakage rate of 8.0 cfm with any compliance path (RE115)
- ❑ Duct leakage test to outside conditioned space (RE119)



Power, Energy and Efficiency

- Intent of code expand to include renewables (many, D)
- Sets limits of RE production with RPS (RE194, D)

R101.3 Intent. This code shall regulate the design and construction of *buildings* for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety and health requirements contained in other codes.



Power, Energy and Efficiency

- ❑ Compliance certificate to include Renewable Energy (RE205)
- ❑ Solar PV Appendix (CE263)
 - New appendix (RB) when solar is required
 - Discusses energy *benefits*
 - Community solar, leases, PPA's
- ❑ REC's – renewable energy certificates (RE204, D)
- ❑ Onsite renewable energy = reduction in energy use (RE156, D)



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Electricity

- ❑ Electric Readiness for appliances, ready circuits (RE147, D)
- ❑ Lighting controls in residential (RE145, D)
- ❑ High efficacy lighting, 65, 70 lumens per watt (D)
- ❑ Exterior lighting controls (RE149)



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Building Energy Codes

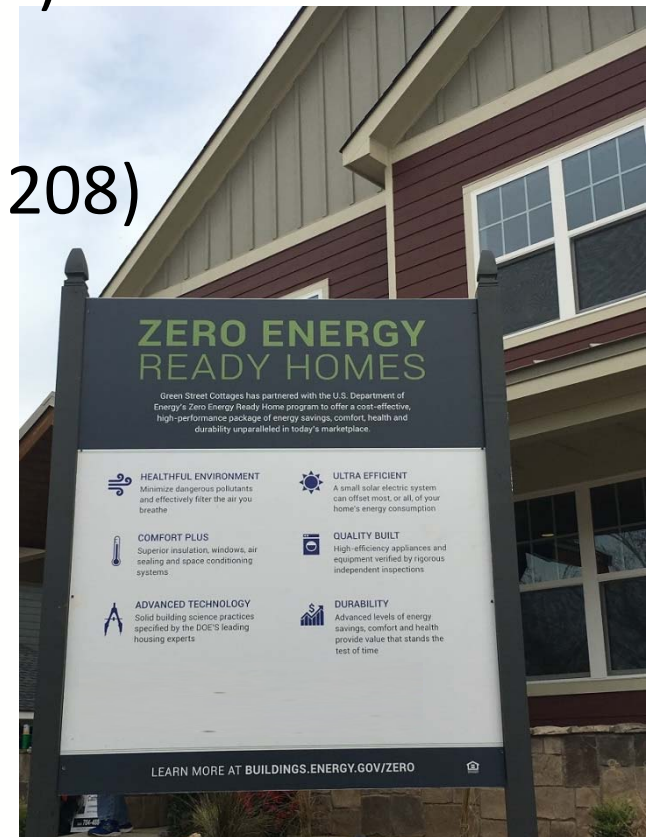
Zero (Net) Energy & Stretch

- ❑ Zero energy Appendix RB (RE223, D)
- ❑ ASHRAE 90.2 (RE224, D)
- ❑ Points based systems (RE206, 207, 208)



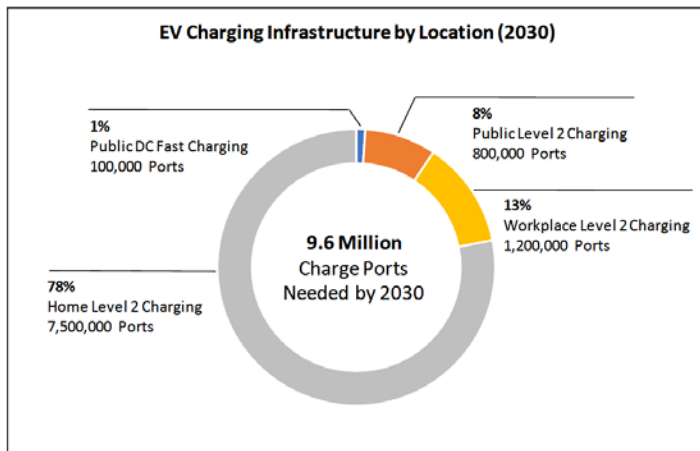
ANSI/ASHRAE/IES Standard 90.2-2018
(Supersedes ANSI/ASHRAE/IES Standard 90.2-2007)

Energy-Efficient Design of Low-Rise Residential Buildings



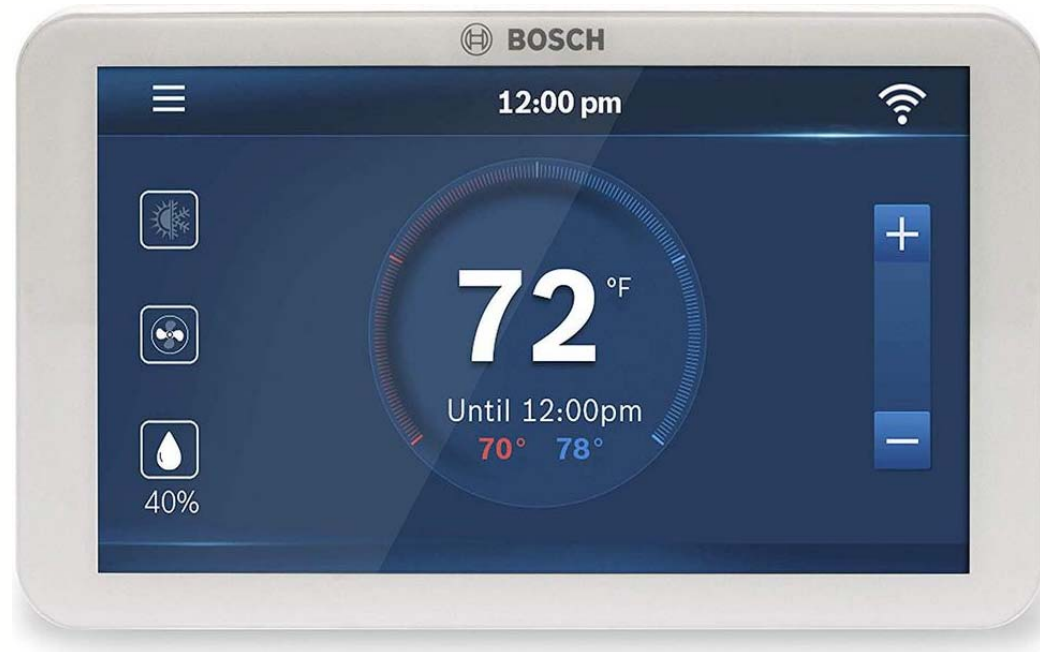
New Requirements

- CE217 EV Infrastructure – EV Ready parking space, EV Capable parking space (CE217, D – approved for commercial)



New Requirements/Tech

- Connected thermostats (RE8, D)



Thanks

- Jim Meyers
- jmeyers@swenergy.org



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