



CADMUS



Overview of the 2018 Residential IECC Code Change Proposals

Eric Makela

Cadmus Group

3/23/2016

Over Code Change Proposal Observations



2016 GROUP B COMMITTEE ACTION HEARINGS

APRIL 17, 2016 – APRIL 27, 2016
KENTUCKY INTERNATIONAL
CONVENTION CENTER
LOUISVILLE, KY

- 191 residential code change proposals
- Majority focused on strengthening
- New compliance concepts based on the ERI approach



High Level Code Change Proposals

- Restructuring Chapter 4 to clearly differentiate Prescriptive versus Mandatory requirements
- Add new R407 and R408
 - R407 Energy cost index (ECI)
 - R408 Energy use index (EUI)
 - Both based on the R406 Energy rating index (ERI) concept



High Level Code Change Proposals

- Capacity Constraint
 - Limit cooling to 1 ton per 1,000 ft²
 - Limit heating to:
 - Climate Zone 1 & 2: N/A
 - Climate Zone 3 to 5: 20,000 Btu/1,000 ft²
 - Climate Zone 6: 25,000 Btu/1,000 ft²
 - Climate Zone 7 & 8: 30,000 Btu/1,000 ft²



High Efficacy Lighting



- Promote the use of LED light sources:
 - Include LED in the definition of high efficacy lighting
 - Increase bulb efficacy to 75 lu/W
 - Requiring LED bulbs



Table R402.1.2 / R402.1.4

TABLE R402.1.2
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT*

CLIMATE ZONE	FENESTRATION U-FACTOR ^a	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{c, d}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ^e	FLOOR R-VALUE	BASEMENT ^f WALL R-VALUE	SLAB ^g R-VALUE & DEPTH	CRAWL SPACE ^h WALL R-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^b	8/13	19	5/13 ^f	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 ^b	8/13	19	10/13	10, 2 ft	10/13
5 and Marine	0.32	0.55	NR	49	20 or 13+5 ^b	13/17	30 ^g	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 ^b	15/20	30 ^g	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^b	19/21	38 ^g	15/19	10, 4 ft	15/19

- Window U-factors
 - All proposals reduced U-Factors to Energy Star V-5 or V-6 values
 - One proposal used U-factor as a trade-off to wall insulation



Table R402.1.2 / R402.1.4 Walls

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b, e}	CEILING R-VALUE	WOOD FRAME WALL	WOOD FRAME WALL	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE	
					R-VALUE: CAVITY INSULATION ONLY	WOOD FRAME WALL R-VALUE: COMBINATION CAVITY AND CONTINUOUS INSULATION (ci)						WOOD FRAME WALL R-VALUE: CONTINUOUS INSULATION (ci) ONLY
1	NR	0.75	0.25	30	13	-	9ci	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	-	9ci	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^h	13+5 ^h	14ci	8/13	19	5/13 ^f	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 ^h	13+5 ^h	14ci	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13+5 ^h	14ci	13/17	30 ^g	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	30 ⁱ 20+5 or 13+10 ^h	20+5 ^h or 13+10 ^h	19ci	15/20	30 ^g	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	30 ⁱ 20+5 or 13+10 ^h	20+5 ^h or 13+10 ^h	19ci	19/21	38 ^g	15/19	10, 4 ft	15/19



Air Sealing



- Table R402.4.1.1 Air Barrier and Insulation Installation
 - Over 20 proposals focused on clarifying exactly how insulation should be installed and how air sealing should be performed



Air Sealing



- Reference RESNET/ICC Standard 380-2016
- Require 3 and 5 ACH50 for Prescriptive and allow trade-off in Performance
- Alternative testing method for multiple dwelling unit buildings



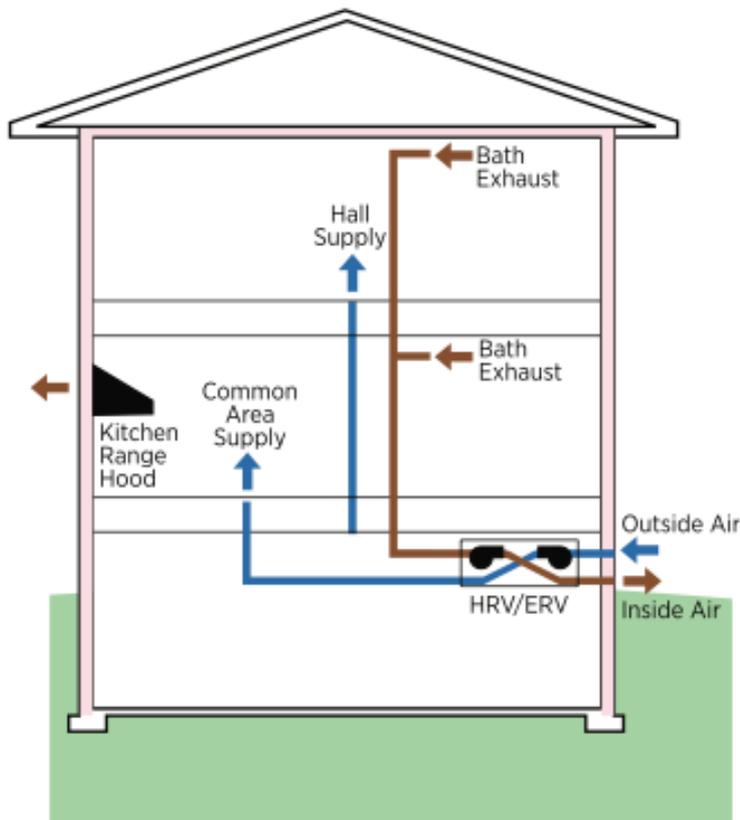
Duct Sealing and Insulation



- Reference RESNET/ICC Standard 380-2016
- Allow ducts to be installed buried in attic insulation
- Require duct leakage to the outdoors with maximum of 60 cfm/100 ft² for houses less than 1,200 ft²



Ventilation



- Combine ASHRAE 62.2 with IMC 403.3
- Provide maximum ventilation rate based on the following:
 - Exhaust only
 - 1440 X exhaust air rates for toilet rooms and kitchens
 - Outdoor air supply
 - 1440 X 15 CFM X number of occupants
 - Ventilation Air Change Rate
 - $24 \times 0.3 (V_{\text{floor}} \times 8 \text{ ft})$



Performance Approach

Performance Report

Property
L.W. Smith
2342 Waybee Ave.
Denver, CO 80333

Weather: Denver, CO
HighEfficiency.blg

Organization
L.A. Rates
303 222 1111
H.L. Scorer

Builder
WeeBeeGood Builders

HERS
Confirmed
4/12/95
Rating No: XYZ-22233
Rater ID: 5031546



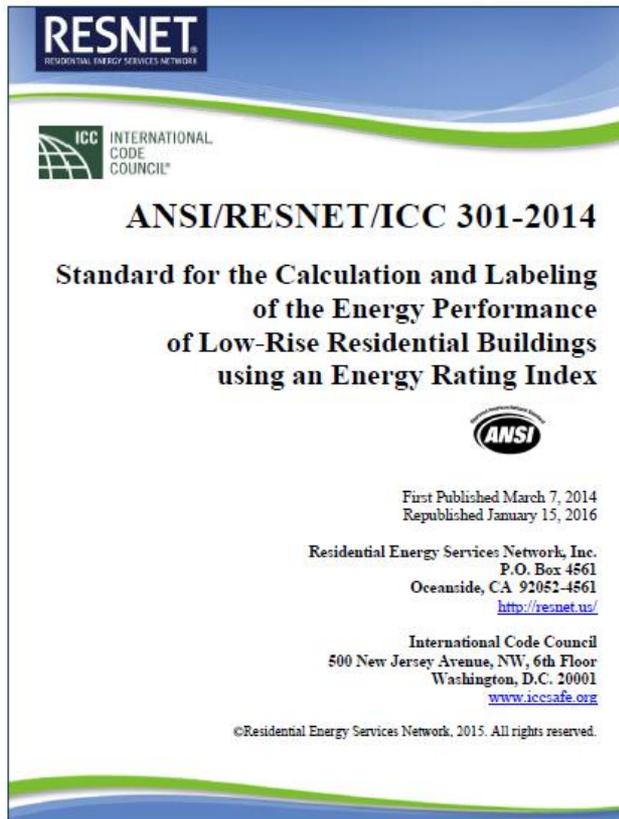
	2009 IECC	HighEfficiency.blg	DIFF	%DIFF
Annual Load(MMBtu/yr)				
Heating	53.1	13.5	39.5	74.5%
Cooling	21.5	19.2	2.4	11.0%
Water Heating	16.3	7.4	8.9	54.8%
Annual Consumption(MMBtu/yr)				
Heating	42.9	12.9	30.0	70.0%
Cooling	5.9	5.8	0.2	2.9%
Water Heating	16.6	7.4	9.3	55.8%
Lights & Appliances	34.9	34.1	0.8	2.3%
Photovoltaics	-0.0	-5.3	5.3	
Total	100.4	54.8	45.6	45.4%
Annual Energy Cost (\$/yr)				
Heating	573	172	401	70.0%
Cooling	139	135	4	2.9%
Water Heating	389	172	217	55.8%
Lights & Appliances	818	800	19	2.3%
Photovoltaics	-0	-124	124	
Service Charges	120	120		
Total	2040	1275	765	37.5%
Design Loads (kBtu/hr)				
Space Heating	55.0	32.0	23.0	41.8%
Space Cooling	30.2	22.8	7.4	24.5%
Utility Rates				
Electricity	Default Electric Provider			
Gas	Default Gas Provider			

REMRate - Residential Energy Analysis and Rating Software v14.7
This information does not constitute any warranty of energy cost or savings.
© 1985-2013 Architectural Energy Corporation, Boulder, Colorado.

- Add equipment efficiency trade-offs with a backstop
- Change from annual energy cost to 30 year useful life of the building, on a present value basis
- Allow for on-site renewables



ERI Approach



- Reference RESNET/ICC 301 as a basis for the ERI approach
- Delete the ERI approach completely or change the ERI calculation methodology
- Change the “backstop” to
 - Total 2009 UA
 - 2015 Prescriptive requirements
 - 2015 Total UA X 1.15



ERI Approach

2015 IECC Target ERI by Climate Zone

Climate Zones 1-2: 52

Climate Zone 3: 51

Climate Zone 4: 54

Climate Zone 5: 55

Climate Zones 6: 54

Climate Zones 7-8: 53

- Increase the ERI scores by a ≈ 1.29 multiplier
- Increase the ERI scores to “consensus values” minus 1 to 2 points
- Decrease the ERI scores 1 to 3 points to account for water heating



Compliance Approach “Add-ons”

- Flex Points
 - Comply with baseline code and then select 5 Flex Points

**TABLE R407.3.1(N1107.3.1)
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY**

<u>Measure Number</u>	<u>Measure Description</u>	<u>Flex Point Value</u>								
		<u>CZ 1</u>	<u>CZ 2</u>	<u>CZ 3</u>	<u>CZ 4</u>	<u>CZ 4C</u>	<u>CZ 5</u>	<u>CZ 6</u>	<u>CZ 7</u>	<u>CZ 8</u>
<u>1a</u>	<u>≥ 2.5% reduction in total UA ^b</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>4</u>
<u>1b</u>	<u>≥ 5% reduction in total UA ^b</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>5</u>	<u>5</u>
<u>1c</u>	<u>≥ 7.5% reduction in total UA ^b</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>8</u>
<u>1d</u>	<u>≥ 10% reduction in total UA ^b</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>10</u>
<u>2a</u>	<u>≥ 10% reduction in glazed fenestration area-weighted average SHGC</u>	<u>2</u>	<u>1</u>	-	-	-	-	-	-	-
<u>2b</u>	<u>≥ 20% reduction in glazed fenestration area-weighted average SHGC</u>	<u>4</u>	<u>1</u>	-	-	-	-	-	-	-



CE 230-16 / Proposed Sec. C406

2015 Washington State Energy Code Development Standard Energy Code Proposal Form

Code being amended: X [Commercial](#) Provisions [Residential](#) Provisions
(A MS Word version of the code is linked to the name)

Code Section # Revise Section C401.2; Add New Section 406

Brief Description: Provides package options in the energy code.

APPROVED

SECTION C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS

C406.1 Requirements. Buildings shall comply with no less than two of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Reserved
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Increased lamp efficacy in dwelling units in accordance with Section C406.10.

Renewable Code Change Proposals



Renewables in Energy Codes – California Loading Order

PUC-regulated utilities must procure resources to serve demand according to this order:

- Energy Efficiency & Conservation
- Demand Response
- Renewable Resources & Distributed Generation
- Clean Conventional Generation

Renewables in Energy Codes - Concerns

01/25/16 :

Daniel Bresette

Building Energy Codes Are Conservation Codes, Not Generation Codes

The Alliance to Save Energy sees these developments as troubling. There ought not to be any permissible substitute for energy efficiency in building energy codes duly adopted by state or local governments.



ERI and Renewables



- Disallow credit for renewables
- Allow full credit for renewables



Renewable Limitations

TABLE R406.4.1 (N1106.4.1)
Maximum Energy Rating Index Without Renewable Energy

<u>CLIMATE ZONE</u>	<u>ENERGY RATING INDEX</u>
<u>1</u>	<u>57</u>
<u>2</u>	<u>57</u>
<u>3</u>	<u>57</u>
<u>4</u>	<u>61</u>
<u>5</u>	<u>61</u>
<u>6</u>	<u>61</u>
<u>7</u>	<u>58</u>
<u>8</u>	<u>58</u>



TABLE R406.4.1 (N1106.4.1)
Credit for On-site Power Production

<u>ENERGY RATING INDEX</u>	<u>PERCENT CREDIT FOR ON-SITE POWER PRODUCTION^a</u>
<u>65 and above</u>	<u>0</u>
<u>64</u>	<u>5</u>
<u>63</u>	<u>10</u>
<u>62</u>	<u>15</u>
<u>61</u>	<u>20</u>
<u>60</u>	<u>25</u>
<u>59</u>	<u>30</u>
<u>58</u>	<u>35</u>
<u>57</u>	<u>40</u>
<u>56</u>	<u>45</u>
<u>55</u>	<u>50</u>
<u>54</u>	<u>55</u>
<u>53</u>	<u>60</u>
<u>52</u>	<u>65</u>
<u>51</u>	<u>70</u>
<u>50</u>	<u>75</u>

Renewable Limitations

- Limit credit for renewable credit based on ERI target



Commercial Building Codes - Renewables Limitations?

- 2015 IECC - Unlimited tradeoff of EE with “non-depletable energy sources collected on site”
- Current limit in 90.1-2013 Chapter 11 is 5%; Appendix g does not have limits
- CE 251 proposal for 2018 IECC is to limit tradeoff to 10%
- Applies to the modeling rules in Section C407



CADMUS



Eric Makela

Senior Associate

(208) 863-6924



Eric.Makela@Cadmusgroup.com