

Appendix RB Zero Energy Residential Appendix

IECC: RB (New), (New), RB102 (New), RB103 (New), TABLE RB103.2 (New)

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2018 International Energy Conservation Code

Add new text as follows:

RB **ZERO ENERGY RESIDENTIAL BUILDING PROVISIONS**

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

User note:

The purpose of this appendix is to provide a net zero energy code as a jurisdictional prerogative. It facilitates the use of the RESNET/ICC 301 Energy Rating Index to achieve zero net energy without directly altering IECC provisions except where provided. Sound building science principles that affect moisture flow, heat flow, ultraviolet radiation, and ozone that are relevant to high performance houses should be considered in addition to adopting this appendix. This appendix only addresses the energy performance through the ERI rating of low-rise residential buildings.

RB102 COMPLIANCE (Note: language to replace R401.2 Compliance)

Existing *residential buildings* shall comply with Chapter 5. New *residential buildings* shall comply with Section RB103.

RB103 ZERO ENERGY RESIDENTIAL BUILDINGS RB103.1 General. New *residential buildings* shall comply with Section RB103.

RB103.2 Energy Rating Index Zero Energy Score. Compliance with this section requires that the *rated design* be shown to have a score less than or equal to the values in Table RB103.2 when compared to the *ERI reference design* determined in accordance with RESNET/ICC 301 for each of the following:

1. ERI value not including net onsite power production calculated in accordance with RESNET/ICC 301, and
2. ERI value including net onsite power production calculated in accordance with RESNET/ICC 301

TABLE RB103.2
MAXIMUM ENERGY RATING INDEX^a

CLIMATE ZONE	ENERGY RATING INDEX not including onsite power	ENERGY RATING INDEX including onsite power (as proposed)
<u>1</u>	<u>43</u>	<u>0</u>
<u>2</u>	<u>45</u>	<u>0</u>
<u>3</u>	<u>47</u>	<u>0</u>
<u>4</u>	<u>47</u>	<u>0</u>
<u>5</u>	<u>47</u>	<u>0</u>
<u>6</u>	<u>46</u>	<u>0</u>
<u>7</u>	<u>46</u>	<u>0</u>
<u>8</u>	<u>45</u>	<u>0</u>

^aThe building shall meet the mandatory requirements of Section R406.2, and the building thermal envelope shall be greater than or equal to the levels of efficiency and SHGC in Table R402.1.2 or Table R402.1.4. of the 2015 *International Energy Conservation Code*.

Reason Statement: This proposal provides cities and states an appendix to the residential section of the 2021 IECC that would result in a residential building that has zero energy consumption over the course of a year. Jurisdictions would have the prerogative to adopt the appendix in support of policy goals related to energy efficiency and renewable energy. The provisions contained in this appendix are not mandatory unless specified as such in the jurisdiction's adopting ordinance.

Why is this needed?

States and cities across the country are pursuing policies to reduce the energy consumption of buildings. More than 270 cities and counties and 10 states are signatories to the “We Are Still In” commitment supporting climate action to meet the goals of the Paris climate accord. Thus far, seventy cities have committed to being powered by 100% renewable energy and more are joining all the time. The building energy code is an important policy tool for jurisdictions as they pursue these types of policy goals.

Many of these energy and climate-related goals have a target year of 2030, so the time is ripe to provide this option in the model energy code. While jurisdictions already can modify the model code to meet their needs, many do not have the in-house expertise to develop and vet this type of code language. Integrating a zero energy building pathway into the 2021 IECC as a jurisdictional option will make the model energy code a more robust policy tool. Use of appendices in the IECC have proven successful with the solar provisions in the 2018 IECC appendices.

Including a zero energy building appendix in the model energy code can smooth the transition to zero energy for builders. Rather than jurisdictions going alone— leading to a patchwork of zero energy residential code approaches—a single IECC appendix would provide consistent national language across the residential industry for manufacturers, builders and trades. Builders can standardize their construction practices across jurisdictions and states to meet these requirements. This makes education, incentive programs, and implementation significantly more straightforward and cost-effective.

How the Zero Energy appendix works

While there are a number of definitions of “zero energy buildings” (also referred to as “zero net energy,” “net zero energy,” or simply, “net zero”), the Appendix is based on the Energy Rating Index (ERI) compliance path found in section R406 of the 2018 IECC. In principle, the proposal works as follows:

1. Required ERI values are based on a highly efficient energy use performance level before considering on-site power generation.
2. The remaining energy use, on an annual level, is satisfied with on-site power generation.

The Energy Rating Index scores are set for a highly efficient level of energy consumption, which importantly, is still cost effective for the homeowner. These scores, which range from 42 to 48 based on climate zone, were calculated based on a thorough analysis of HERS scores nationwide, a survey of HERS scores for model high-performance home, modeling done for ASHRAE 90.2, and the U.S. DOE Zero Energy Ready Home program.

On-site renewable energy capacity is then required to meet the remaining energy use, resulting in an Energy Rating Index score of zero. Software required in the RESNET 301 standard can easily generate an ERI score of the home before and after the inclusion of renewable energy (known as Onsite Power Production in HERS). All renewable energy is required to be on-site. The minimum envelope backstops required in section R406 are also required in this appendix. Homes may use any fuel in accordance with RESNET 301 to comply with the Appendix.

Bibliography: Presentation: 90.2 Compliance Requirements. Results from EnergyGauge 5.0 Simulations and Economic Analysis SSPC 90.2 Orlando Meetings January 25-26, 2016. P. Fairey. Florida Solar Energy Center. ASHRAE Standard 90.2018. Energy Efficient Design of Low-Rise Residential Buildings

Cost Impact: The code change proposal will increase the cost of construction. If adopted by the state or jurisdiction, complying with this appendix will increase the first cost of construction but the Energy Rating Index values, before the addition of onsite power production, that have been selected were found to be cost effective based on information presented to the ASHRAE Standard 90.2 committee. All of the ERI scores without onsite power production have been found to have Savings/Investment Ratios (SIR) of greater than 1.0.