RECPI-5-21

IECC®: R502.1, R502.2, R502.2.1 (New), R502.2.1.1 (New), R502.2.2 (New), R502.2.2.1 (New), R502.2.3 (New), R502.2.3.1 (New), R502.3, R502.3.1, R502.3.2, R502.3.3, R502.3.4

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2021 International Energy Conservation Code

Revise as follows:

R502.1 General. *Additions* to an existing *building*, *building* system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction ~~without requiring the unaltered portion of the existing *building* or *building* system to comply with this code~~. *Additions* shall not create an unsafe or hazardous condition or overload existing *building* systems. ~~An *addition* shall be deemed to comply with this code where the *addition* alone complies, where the existing *building* and *addition* comply with this code as a single building, or where the *building* with the *addition* does not use more energy than the existing *building*. *Additions* shall be in accordance with Section R502.2 or R502.3.~~
A RESNET, BPI, or other approved informative energy audit shall be performed prior to the commencement of construction of any addition to baseline the efficiency of the existing structure and add opportunities for additional cost-effective energy upgrades during the construction phase of the addition.

R502.2 ~~Change in space conditioning~~ Compliance. ~~Any unconditioned or low-energy space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.~~ An addition shall be deemed to comply with this code where one of the following compliance options is sections R502.2.1, R502.2.2 or R502.2.3 is used.

Exceptions:

1. ~~Where the simulated performance option in Section R405 is used to comply with this section, the annual energy cost of the *proposed design* is permitted to be 110 percent of the annual energy cost otherwise allowed by Section R405.2.~~ The existing building was constructed to the 2009 International Energy Conservation Code or later or
2. ~~Where the Total UA, as determined in Section R402.1.5, of the existing building and the *addition*, and any *alterations* that are part of the project, is less than or equal to the Total UA generated for the existing *building*.~~ The addition does not exceed 200 square feet.
3. ~~Where complying in accordance with Section R405 and the annual energy cost or energy use of the *addition* and the existing *building*, and any *alterations* that are part of the project, is less than or equal to the annual energy cost of the existing *building*. The *addition* and any *alterations* that are part of the project shall comply with Section R405 in its entirety.~~

Add new text as follows:

R502.2.1 Existing Building plus addition (Prescriptive compliance). Prescriptive compliance verification using sections R402.1.4 or R402.1.5 shall demonstrate that the addition alone complies with this code including section R402.4 air leakage testing.

Exception:
Where the measured air leakage rate exceeds 5.0 air changes per hour or 0.28 cubic feet per minute (CFM) per square foot of dwelling unit enclosure area when tested in accordance with Section R402.4.1.2 a diagnostic evaluation using smoke tracer or infrared imaging shall be conducted while the building is pressurized or depressurized along with a visual inspection of the air barrier. Any leaks noted shall be sealed where such sealing can be made without destruction of existing or new building components. An additional report identifying the corrective actions taken to seal leaks and the pre and post blower door results, shall be submitted to the code official and the building owner and shall be deemed to comply with the requirements of this section.

R502.2.1.1 Reporting.

1. Documentation showing that an energy audit was performed on the structure before submitting for building permit.
2. For permitting: A plan set documenting the proposed R-values to be installed per Section R402.1.4 or a Section R402.1.5 Total UA compliance report.
3. For Certificate of Occupancy: Blower door compliance report

R502.2.2 Existing plus addition compliance (Total Building Performance). Total building performance Section R405 compliance verification shall demonstrate that the existing building plus the addition uses no more energy than the existing building did prior to the addition. This method requires the project to create cost compliance verification at three stages as outlined in Section R502.2.2.1.

R502.2.2.1 Reporting.

1. Documentation showing that an energy audit was performed on the structure before submitting for building permit.
2. For permitting: A baseline total building performance cost compliance report of the existing structure prior to construction.

3. For permitting: Projected total building performance cost compliance report of the existing building plus the addition based on the proposed design for the building in it entirety.
4. For Certificate of Occupancy: A final confirmed total building performance cost compliance report shall be submitted prior to final inspection.
5. For Certificate of Occupancy: Blower door compliance report

R502.2.3 Existing plus addition compliance (Energy Rating Index Alternative). Using equation 5-1, the Energy Rating Index target for the existing building plus the addition shall be calculated (ERI-t). The addition shall be designed and constructed to achieve the ERI target score. This method requires the project to obtain an Energy Rating Index score without onsite power production (OPP) used in the calculation, and to report to the code official as outlined in Section R502.2.3.1.

ERI-t = [ERI-eb - (ERI-eb - ERI-a) x (%reduction)] x (1-Sa) + ERI-a x Sa **(Equation 5-1)**

where:

ERI-t = The ERI the existing building plus the addition must achieve

ERI-eb = The ERI of the existing building before the addition

ERI-a = The ERI requirement for Table R406.5

Sa = addition conditioned floor area as a percent of total building conditioned floor area after the addition

R502.2.3.1 Reporting.
1. For permitting: A baseline ERI of the existing building (ERI-eb) prior to construction.
2. For permitting using equation 5-1, calculate the ERI of the existing building plus the addition (ERI-t).
3. For permitting design and specification for project.
4. For Certificate of Occupancy: A confirmed ERI report shall be submitted prior to final inspection, that demonstrates that the existing structure plus the addition has achieved the (ERI-t) score calculated from equation 5-1.
5. For Certificate of Occupancy: Blower door compliance report

Revise as follows:

~~**R502.3 Prescriptive compliance.** *Additions* shall comply with Sections R502.3.1 through R502.3.4.~~

R502.3.~~1~~ Building envelope. New *building* envelope assemblies that are part of the *addition* shall comply with Sections R402.1, R402.2, R402.3.1 through R402.3.5, and R402.4.

~~**Exception:** New envelope assemblies are exempt from the requirements of Section R402.4.1.2.~~

R502.3.~~2~~ 4 Heating and cooling systems. HVAC ducts newly installed as part of an *addition* shall comply with Section R403. 1, R403.3 through R403.3.7, R403.7.

Exception: Where ducts from an existing heating and cooling system are extended to an *addition* ~~.~~ that does not exceed 400 square feet.

R502.~~3.3~~ 5 Service hot water systems. New service hot water systems that are part of the *addition* shall comply with Section R403.5.

R502.~~3.4~~ 6 Lighting. New lighting systems that are part of the *addition* shall comply with Section R404.1.

Reason: The additions section R502 struggle with how to determine compliance with the requirements of the IECC as they relate to existing home additions. The existing section R502.1 general spoke loosely to demonstrating compliance but it is not specific enough to guide enforcement well. We therefore stuck language from this section and created a true compliance section for additions in Section R502.2. The new language incorporates the reality that the house is an integrated system and that compliance with the IECC when associated with an existing building requires that the existing building also get evaluated. For example, currently an addition is not exempt from the requirement of air leakage testing yet there is limited to no way to conduct an air leakage test on an addition alone.
This new section R502.2 leverages some existing compliance language but now offers three distinct compliance alternatives that can be used to demonstrate compliance with this section of code.

1. The prescriptive option R502.2.1 allows the use of the R-value table or the Total UA alternative approach and focuses on the addition alone but includes the R402.4 air leakage section with an exception for meeting the 3 or 5 air changes depending on climate zone. If the code require leakage rate cannot be met this section requires effort be made to make the house as tight as possible. Language was incorporated that was added to the commercial section of the IECC to achieve this.

2. The building performance Section R502.2.2 use cost compliance modeling to demonstrate that the existing building plus the addition uses no more energy than the existing *building* did prior to the addition. This is a current compliance option in the 2021 IECC but it was not clear how one

would demonstrate compliance. The proposed new section of code spells out exactly how to use this compliance option.

3. The last compliance option uses an ERI score equation to create a weighted ERI score using the existing building plus the addition. The ERI target score is the score the addition plus the existing home must achieve to demonstrate compliance.

Regardless of the compliance path chosen the new addition must conform to the provisions of IECC as those provisions relate to new construction. In addition, we felt that it was important in an energy code to require an informative energy audit be performed on the existing home prior to construction of the addition in order to offer an opportunity to incorporate cost effective addition efficiency and comfort measures during the construction of the addition if the homeowner deemed it appropriate.

Additions on existing building like alterations are perhaps one of the primary opportunities to reduce national energy consumption, yet Chapter 5 currently does little to address this need. There are many opportunities to cost-effectively improve energy efficiency of the existing building stock using reasonable criteria as outlined in the above proposal.

This proposal strikes a balance in a practical and cost-effective manner for addressing manageable energy efficiency upgrades at the same time an addition is being proposed on an existing building. It is clear that the intent of the existing IECC chapter 5 is to ensure that energy use of the existing building plus the addition uses no more energy than the building did prior to the addition. This proposal now offers a means by which compliance for this statement can be verified. It does so by providing flexibility and choice of what to address in the existing structure while offering a logical way to enforce the base code on the addition. This was not possible in the past because the base energy code addresses the house in its entirety not sections of the house in isolation.

The existing Section **R502.2 Change in space conditioning** in the additions chapter 5 Existing homes has no reference to additions. Is speaks to a general condition of changing a low energy space during an alteration to become a conditioned space. This is not an addition, so it was broken out into a separate proposal REPI-143 (a) and moved to sectionR501 General in new R501.7 as an overarching general requirement rather than one specific to additions.

Cost Impact: The code change proposal will increase the cost of construction.
Cost of construction will increase with this proposal primarily due to the cost of demonstrating compliance. However, there was no true means developed in the past existing home additions section to demonstrate compliance other than a vague visual inspection. This approach truly quantifies compliance while offering an opportunity to address issues with the existing structure.