**REPI-143 a Modification #1**

**Add new section as follows:**

**SECTION R501 GENERAL**

**R501.1 Scope.** The provisions of this chapter shall control the *alteration*, *repair*, *addition* and change of occupancy of existing *buildings* and structures.

**R501.1.1 General.** Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing *building* or *building* system lawfully in existence at the time of adoption of

this code. Unaltered portions of the existing *building* or *building* supply system shall not be required to comply with this code.

**R501.2 Compliance.** *Additions*, *alterations*, *repairs* or changes of occupancy to, or relocation of, an existing *building*, *building* system or portion thereof shall comply with Section R502, R503, R504 or R505, respectively, in this code. Changes where unconditioned space is changed to *conditioned space* shall comply with Section R502.

**R501.3 Maintenance.** *Buildings* and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and systems that are required by this code shall be maintained in conformance to the code edition under which installed. The owner or the owner’s authorized agent shall be responsible for the maintenance of *buildings* and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

**R501.4 Compliance.** *Alterations*, *repairs*, *additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in this code and the *International* *Residential Code*, *International Building Code*, *International* *Existing Building Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical* *Code*, *International Plumbing Code*, *International Property* *Maintenance Code*, *International Private Sewage Disposal* *Code* and NFPA 70.

**R501.5 New and replacement materials.** Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for *repairs*, provided that hazards to life, health or property are not created. Hazardous materials shall not be used where the code for new construction would not allow their use in *buildings* of similar occupancy, purpose and location.

**R501.6 Historic buildings.** Provisions of this code relating to the construction, *repair, alteration*, restoration and movement of structures, and *change of occupancy* shall not be mandatory for *historic buildings* provided that a report has been submitted to the code official and signed by the owner, a *registered design professional*, or a representative of the State Historic Preservation Office or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric or function of the *building*.

**R501.7 Change in space conditioning.** 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.

**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.

~~2. Where, for building envelope compliance purposes only, the Total UA of the existing building or portion thereof undergoing a change in space conditioning~~ ~~and the~~ *~~addition~~*~~, and any~~ *~~alterations~~* ~~that are part of the project complies with Section R402.1.5.~~

~~3. Where complying in accordance with Section R405 and the annual energy cost or energy use of the~~ *~~addition~~* ~~and the existing~~ *~~building~~* ~~with the change in space conditioning, and any~~ *~~alterations~~* ~~that are part of the project, is less than or equal to the annual energy cost of the existing~~ *~~building~~* ~~prior to the change in space conditioning. The~~ *~~addition~~* ~~and any~~ *~~alterations~~* ~~that are part of the project shall comply with Section R405 in its entirety.~~

**Revise as Follows:**

**Move entire Section R502.2 to R501.7 with no change in language**

**SECTION R502 ADDITIONS**

**~~R502.2 Change in Space Conditioning~~** ~~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.~~

**~~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.~~

~~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~~*~~.~~

~~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.~~

**Reason Statement:**

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 moved to a new section in R501 General as an overarching general requirement rather than one specific to additions.

Modification have been made per the direction of the Existing Homes Subcommittee to ensure that the entirety of the code is applied to change of space conditioning project and that the allowed exception only applies to the building thermal envelope. Two Exceptions have been eliminated for the following reasons:

Exception #2

Exception #2 was originally intended to address additions, not general changes in space conditioning. So, now, the revise section it to apply to change in condition spaces general, this section says to comply with Section R402.1.5 (UA Alternative). But, since R402.1.5 is an option in the code for “full compliance” as stated in the charging language there is no need to retain exception #2.

Exception #3

How is exception #3 any different than exception #1 except that exception #1 give 10% leeway? Given that I would suggest deleting Exception #3. In addition, if the entire building was unconditioned then the energy use or annual energy cost would be very low and this exception creates that as a baseline. Thus, this exception does the opposite (increases stringency and reduces flexibility) of exception #1. Finally, since exception #1 is whole building compliance, there is no need to qualify it as applicable to building thermal envelope only.

**Cost** of construction will not be impacted

**REPI-143 b**

**Revise as follows**

**SECTION R502 ADDITIONS**

**R502.1 (N1110.1) 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~~.

**R502.2 (N1110.2) Compliance.** An *addition* shall be deemed to comply with this code where the existing building with the addition complies prescriptively using the Total UA compliance approach listed below in Section R502.2.1 or does not use more energy than the existing building and demonstrates compliance using ~~either~~ the Building Performance energy cost~~, or Energy Rating Index~~ compliance option listed below in Section R502.2.2. Alternatively, existing buildings with an addition may demonstrate compliance using the Energy Rating Index approach outlined below in Section R502.2.3. Existing building envelope and energy features used to demonstrate compliance with this code shall be evaluated per ANSI/RESNET/ICC 301-2022 or ANSI/BPI 1200-S-2017 standards.

**Exceptions:** Unaltered portions of the existing *building* or *building* systems are not required to comply with this code section if:

1. The existing building was constructed to the 2009 building energy code or later or
2. The addition does not exceed 600 square feet
3. ~~the addition is less than 30% of the total conditioned floor area of the existing building or~~
4. ~~the building has undergone a documented energy efficiency upgrades to the envelope within the last 10 years.~~

**(Section R502.2 moved to section R501 in its entirety)**

**~~R502.2 Change in space conditioning.~~** ~~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.~~

**~~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.~~

~~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~~*~~.~~

~~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.~~

**R502.2.1 Existing Building plus addition (Prescriptive compliance).** *~~Additions~~* ~~shall comply~~

~~with Sections R502.3.1 through R502.3.4.~~

Total UA compliance verification in Section R402.1.5 shall demonstrate that the addition complies with this code. A blower door test of the existing building plus the addition shall demonstrate a combined maximum air-leakage rate of 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. ~~, has a total UA that is less than or equal to the Total UA of the existing~~ *~~building~~* ~~prior to the addition~~. This method requires the project to create two Total UA compliance verification and air leakage test reports as outlined in Section R502.2.1.1.

**R502.2.1.1 Reporting.**

1. For permitting: A Total UA compliance ~~benchmark~~ report for the proposed addition. ~~of the existing structure prior to construction.~~
2. For Permitting: A benchmarking air leakage test results report of the existing structure prior to construction.
3. For certificate of occupancy: Total UA compliance report for the confirmed addition, and a confirmed air leakage report for ~~of~~ the existing building plus the addition ~~based on the proposed design~~.

**Section 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 R502.2.2.2.

**R502.2.2.2 Reporting.**

1. For permitting: A baseline total building performance cost compliance report of the existing structure prior to construction.
2. 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 its entirety.
3. For Certificate of Occupancy: A final confirmed total building performance cost compliance report shall be submitted prior to final inspection.

**Section R502.2.3 Existing plus addition compliance (Energy Rating Index Alternative).** An Energy Rating Index score shall demonstrate that the existing building plus the addition has an energy rating index that is 10% better than the existing building did prior to the addition when calculated using the RESNET/ANSI/IECC 301 standard. ~~uses no more energy than the existing~~ *~~building~~* ~~did prior to the addition.~~ This method requires the project to obtain an Energy Rating Index score without onsite power production (OPP) used in the calculation, at three stages as outlined in Section R502.2.3.1

**R502.2.3.1 Reporting.**

1. For permitting: A baseline ERI of the existing structure prior to construction.
2. For Permitting: A projected ERI of the existing building plus the addition based on the proposed design for the building in its entirety that demonstrates an ERI score that is 10% better than the existing building did prior to the addition.
3. 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 an ERI score that is 10% better than the existing building did prior to the addition.

**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.~~

**R502.4 ~~3.2~~ 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.

**Exceptions:**

1. Where ducts from an existing heating and cooling system are extended to an *addition* that does not exceed 600 square feet. ~~is less than 30% of the total conditioned floor area of the existing building.~~
2. **~~HVAC Design~~**~~: Manual J, S, and D are not required for additions that increase the existing floor area less than 30% of the total conditioned floor area of the existing building~~

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

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

**Reason Statement:**

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 no way to conduct an air leakage test on an addition alone.

This new section leverages some existing compliance language but now offers three distinct compliance alternatives. The prescriptive approach limits compliance to using the Total UA alternative as it can analyze compliance on the addition alone. However, we know that the impact of the energy use of the entire house is also impacted by an addition and therefore this compliance approach also requires that the existing building plus the addition achieve an air leakage rate of no higher than 5.0 ACH50. This is in recognition that an air leakage test cannot be performed on the addition in isolation from the existing building.

The Total Building Performance or energy cost compliance approach, leverages an existing compliance option in this section of code that states that the building with the addition can demonstrate that it does not use more energy than the existing building did prior to the addition. The code never spelled out how to demonstrate compliance with this approach and now the proposed Section R502.2.2 does. Modeling has demonstrated that this approach works well for older homes.

The last approach is the most flexible compliance approach as it uses an ERI score and requires that the ERI score of the existing building plus the addition be 10% better than the existing building did prior to the addition. This metric was chosen rather than a specific ERI score to ensure that the age and condition of the existing home did not bias or allow the addition to be built to a lower energy standard than the 2021 IECC. Regardless of where the existing building is benchmarked on the ERI scale it will have to demonstrate that it plus the addition is 10% better.

This is a flexible compliance option as it includes the efficiency of appliances and mechanicals, as well as air leakage and building thermal envelope features in the house. It does not include or allow on site power production in the analysis. This compliance option is critical to include to provide progressive communities guidance on how to address existing homes in their attempt to meet climate action goals that go far beyond where the IECC currently is heading. Such municipalities can change the percentage better or switch to a specific ERI score to meet their goals or leave this compliance option as is as a means to incentivize change in their communities.

Additions on existing building like alterations are perhaps one of the primary opportunities to reduce national energy consumption, yet Chapter 5 does little to address this need. There are many opportunities to cost-effectively improve energy efficiency of the existing building stock using reasonable criteria to trigger requirements with flexibility in the manner or extent of compliance where needed. 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 not 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.

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 on Section R502.2. This new section leverages an existing compliance option and states that the addition shall be deemed to comply with this code where the existing building with the addition complies prescriptively (using Total UA) or does not use more energy than the existing building and demonstrates compliance using either Building Performance energy cost, or Energy Rating Index compliance option listed below. In this way a prescriptive nonenergy compliance base compliance path can be used, and two energy-based compliance paths are options. All of the compliance paths require that the building plus the addition be compared to the building before the addition to quantify that the building plus the addition is equal to or better than the building before the addition was added

This approach requires benchmarking the existing structure before construction begins so a comparison can be made using one of the three compliance approaches. ANSI/RESNET/ICC 301-2019 or ANSI/BPI 1200-S-2017 standards have been referenced as guidelines for how to evaluate insulation levels and other energy features needed to benchmark an existing building through computer modeling.

All compliance approaches compare the building plus addition to itself without the addition, so parity is achieved. The two performance approaches should be more flexible as they are whole house approaches meaning, for example, that a leaky house before an addition, is compared with a leaky house plus a tighter addition with more volume which can offset (trade) to be equal to or better than. In addition, the existing house could add LED lighting or do other low hanging, low cost, energy upgrades to ensure compliance.

This approach is new and forces us to consider and offer opportunity to upgrade existing homes at the time that an addition is added to the structure. New Homes become existing homes and they last a really long time. Jurisdictions around the country are struggling with how to encourage energy upgrades to help meet climate action and other goals they may have for their housing stock. This proposal offers a starting point by which a community grow from. It requires a look at the existing structure to consider if some level of upgrade must happen when an addition is added. Communities could go further and require that the existing structure plus the addition be x percentage better than the existing structure was before. This is the direction that communities are looking to go. If we want jurisdictions to continue to use the IECC this proposal needs to be considered. Otherwise, community goals will outpace the what the IECC can offer to meet their climate goals.

**Cost**

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.

**If the above is acceptable then the following should be considered.**

**Revise as Follows:**

**SECTION R503 ALTERATIONS**

**R503.1 General.** *Alterations* to any building or structure

shall comply with the requirements of the code for new

construction, without requiring the unaltered portions of the

existing building or building system to comply with this

code. *Alterations* shall be such that the existing building or

structure is not less conforming to the provisions of this code

than the existing *building* or structure was prior to the

*alteration*.

*Alterations* shall not create an unsafe or hazardous condition

or overload *existing* building systems. *Alterations* shall

be such that the existing *building* or structure does not use

more energy than the existing building or structure prior to

the *alteration*. *Alterations* to existing *buildings* shall comply

with Sections R503.1.1 through R503.1.4.

**R503.1.1 Building envelope.** Building envelope assemblies

that are part of the *alteration* shall comply with

Section R402.1.2 or R402.1.4, Sections R402.2.1 through

R402.2.12, R402.3.1, R402.3.2, R402.4.3 and R402.4.5.

**Exception:** The following alterations shall not be

required to comply with the requirements for new

construction provided that the energy use of the building

is not increased:

1. Storm windows installed over existing

fenestration.

2. Existing ceiling, wall or floor cavities exposed

during construction provided that these cavities

are filled with insulation.

3. Construction where the existing roof, wall or

floor cavity is not exposed.

4. Roof recover.

5. Roofs without insulation in the cavity and

where the sheathing or insulation is exposed

during reroofing shall be insulated either above

or below the sheathing.

6. Surface-applied window film installed on

existing single pane fenestration assemblies to

reduce solar heat gain provided that the code

does not require the glazing or fenestration

assembly to be replaced.

**R503.1.1.1 Replacement fenestration.** Where some

or all of an existing fenestration unit is replaced with a

new fenestration product, including sash and glazing,

the replacement fenestration unit shall meet the applicable

requirements for *U*-factor and SHGC as

specified in Table R402.1.3. Where more than one

replacement fenestration unit is to be installed, an

area-weighted average of the *U*-factor, SHGC or both

of all replacement fenestration units shall be an alternative

that can be used to show compliance.

**R503.1.2 Heating and cooling systems.** HVAC ducts newly installed as part of an *alteration* shall comply with Section R403. 1, R403.3 through R403.3.7, R403.7.

**Exceptions:**

Where ducts from an existing heating and cooling system are extended to an *addition* that does not exceed 600 square feet.

**R503.1.3 Service hot water systems.** New service hot

water systems that are part of the *alteration* shall comply

with Section R403.5.

**R503.1.4 Lighting.** New lighting systems that are part of the *alteration* shall comply with Section R404.1.

**~~Exception:~~** *~~Alterations~~* ~~that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~

## REPI-144-21

*Add new Definition as follows:*

**EXTERIOR WALL ENVELOPE.** A system or assembly of exterior wall components, including exterior wall finish materials, that provides protection of the building structural members, including framing and sheathing materials, and conditioned interior space, from the detrimental effects of the exterior environment.

**WORK AREA.** That portion or portions of a building consisting of all reconfigured spaces as indicated on the construction documents. Work area excludes other portions of the building where incidental work entailed by the intended work must be performed and portions of the building where work not initially intended by the owner is specifically required by this code.

*Modify the Section as follows:*

**R502.3 Prescriptive compliance.** Additions shall comply with Sections R502.3.1 through ~~R502.3.4~~ R502.3.5.

*Add new Section as follows:*

**R502.3.5 Additional Efficiency Packages.** *Additions* shall comply with Section R506. *Alterations* to the existing building that are not part of the *addition*, but permitted with the *addition*, may be used to achieve this requirement.

**Exceptions:**

1. *Additions* that increase the *building*’s total *conditioned floor area* by less than 25 percent.
2. *Additions* that do not include the addition or replacement of equipment covered in Sections R403.5 or R403.7.
3. *Additions* that do not contain *conditioned space*.
4. Where the *addition* alone or the existing building and *addition* together comply with Section R405 or R406.

*Modify the Section as follows:*

**SECTION R503**

**ALTERATIONS**

**R503.1 General.** Alterations to any building or structure shall comply with the requirements of the code for new construction, without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall be such that the existing building or structure is not less conforming to the provisions of this code than the existing building or structure was prior to the alteration.

Alterations shall not create an unsafe or hazardous condition or overload existing building systems. Alterations shall be such that the existing building or structure does not use more energy than the existing building or structure prior to the alteration. Alterations to existing buildings shall comply with Sections R503.1.1 through ~~R503.1.4~~ R503.1.5.

*Add new Sections as follows:*

**R503.1.5 Additional Efficiency Packages.** *Alterations* shall comply with Section R506 where the *alteration* contains replacement of two or more of the following:

* 1. HVAC unitary systems or HVAC central heating or cooling equipment serving the *alteration work area*.
  2. Water heating equipment serving the *alteration work area.*
  3. 50% or more of the lighting fixtures in the *alteration* *work area*.
  4. 50% or more of the area of interior surfaces in the alteration *work area*
  5. 50% or more of the area of the *building’s* *exterior wall envelope*

**Exceptions:**

1. *Alterations* that are permitted with an addition complying with section R502.3.5.
2. *Alterations* that comply with Section R405 or R406.

**SECTION R506**

**ADDITIONAL EFFICIENCY PACKAGE OPTIONS**

**R506.1 General.** Where required in Section R502 or R503, the *building* shall comply with one or more additional efficiency package options in accordance with the following:

1. Enhanced envelope performance in accordance with Section R408.2.1.
2. More efficient HVAC equipment performance in accordance with R408.2.2
3. Reduced energy use in service water-heating in accordance with R408.2.3
4. More efficient duct thermal distribution system in accordance with R408.2.4
5. Improved air sealing and efficient ventilation system in accordance with R408.2.5

## Revisions and Reasons

The revised proposal provides a clearer threshold to ensure that the requirements only apply to substantial alterations. Only alterations that include two of more items from the list would be subject to the requirements. Each of these items are themselves substantial alterations of the major energy systems in a home. 50% is used as the area threshold for Level 3 alterations in the IEBC. It also introduces the term “work area” from the IEBC to clearly define that these thresholds are 50% of just the area of the alteration and not the whole building.

This approach was chosen over the Level 1-3 approach in the IEBC because those thresholds are not well-tuned to the energy systems. Those thresholds are concerned primarily with egress and accessibility, so they are framed in terms of reconfiguration of spaces, that is, the moving of doors or windows. A building could be completely gutted, completely reskinned, with all lighting, space conditioning and water heating equipment replaced and still only be considered a Level 1 alteration as long as no door or windows were moved/added and the equipment replacements did not include additional equipment. Conversely, an alteration might be considered Level 3 because it includes substantial alterations to egress paths but include only minimal impacts to energy systems.