

GEW27-14

202, 302.1, Table 302.1, 302.1.1, 602, 602.1, 602.1.1, 602.1.2, 602.1.2.1, 602.1.2.2, 602.1.2.3, 602.2, 1007.3, 1007.3.3.1, A106.1

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Add new definition as follows:

YEARLY ENERGY COST INDEX (yECI). A scalar representing the ratio of annual energy cost of the proposed design compared to the average annual energy cost of that same building constructed to meet the minimum energy requirements of the *International Energy Conservation Code*.

Revise as follows:

302.1 Requirements determined by the jurisdiction. The jurisdiction shall indicate the following information in Table 302.1 for inclusion in its code adopting ordinance:

1. The jurisdiction shall indicate whether requirements for residential buildings, as indicated in Exception 1 to Section 101.3, are applicable by selecting “Yes” or “No” in Table 302.1. Where “Yes” is selected, the provisions of ICC 700 shall apply and the remainder of this code shall not apply.
2. Where the jurisdiction requires enhanced energy performance for buildings designed on a performance basis, the jurisdiction shall indicate a zEPI of 46 or a yECI of 0.8 or less in Table 302.1 for each occupancy required to have enhanced energy performance.
3. Where “Yes” or “No” boxes are provided, the jurisdiction shall check the box to indicate “Yes” where that section is to be enforced as a mandatory requirement in the jurisdiction, or “No” where that section is not to be enforced as a mandatory requirement in the jurisdiction.

**TABLE 302.1
REQUIREMENTS DETERMINED BY THE JURISDICTION**

Section	Section Title or Description and Directives	Jurisdictional Requirements	
CHAPTER 6. ENERGY CONSERVATION, EFFICIENCY AND CO₂e EMISSION REDUCTION			
302.1, 302.1.1, 602.1	zEPI <u>or yECI</u> of Jurisdictional Choice – The jurisdiction shall indicate a zEPI of 46 <u>or a yECI of .75</u> or less in each occupancy for which it intends to require enhanced energy performance.	Occupancy: _____ zEPI: _____	
604.1	Automated demand response infrastructure	<input type="checkbox"/> Yes	<input type="checkbox"/> No
CHAPTER 10. EXISTING BUILDINGS			
1007.2	Evaluation of existing buildings	<input type="checkbox"/> Yes	<input type="checkbox"/> No
1007.3	Post Certificate of Occupancy zEPI <u>or yECI</u> , energy demand, and CO ₂ e emissions reporting	<input type="checkbox"/> Yes	<input type="checkbox"/> No

(Portions of table not shown remain unchanged)

302.1.1 zEPI of 46 or yECI of 0.75 or less. Where a zEPI of 46 or a yECI of 0.75 or less is indicated by the jurisdiction in Table 302.1, buildings shall comply on a performance-basis in accordance with Section 601.3.1.

Exception: Buildings less than 25,000 square feet (2323 m²) in *total building floor area* pursuing compliance on a prescriptive basis shall be deemed to have a zEPI of 51 and shall not be required to comply with the zEPI of Jurisdictional Choice indicated by the jurisdiction in Table 302.1.

602 MODELED PERFORMANCE PATHWAY REQUIREMENTS

602.1 Performance-based compliance. Compliance for buildings and their sites to be designed on a performance basis shall be determined by predictive modeling. Predictive modeling shall use source energy kBtu/sf-y unit measure based on compliance with Section 602.1.1 and CO₂e emissions in Section 602.3. Where a building has mixed uses, all uses shall be included in the performance-based compliance.

602.1.1 zEPI and yECI. Performance-based designs shall demonstrate either:

1. A zEPI of not more than 51 as determined in accordance with Equation 6-1 or
2. A yECI of not more than 0.8 as determined in accordance with Equation 6-XXX, and
3. ~~for energy use reduction and~~ Shall demonstrate a CO₂e emissions reduction in accordance with Section 602.2 and Equation 6-2 for CO₂e.

$$zEPI = 57 \times (EUI_p/EUI) \quad \text{(Equation 6-1)}$$

$$yEPI = CIP / CI \quad \text{(Equation 6- XXX)}$$

where:

EUI_p = the proposed energy use index in source kBtu/sf-y for the proposed design of the building and its site calculated in accordance with Section 602.1.2.

EUI = the base annual energy use index in source kBtu/sf-y for a baseline building and its site calculated in accordance with Section 602.1.2.

CIP = the proposed annual energy cost for the proposed design of the building and its site calculated in accordance with Section 602.1.2.

CI = the proposed annual energy cost for a baseline building and its site calculated in accordance with Section 602.1.2.

602.1.2 Base annual energy use index. Where zEPI is being determined, the proposed energy use index (EUI_p) of the building and building site shall be calculated in accordance with Equation 6-1 and Appendix G to ASHRAE 90.1, as modified by Sections 602.1.2.1 through 602.1.2.3. The annual energy use shall include all energy used for building functions and its anticipated occupancy.

Where yECI is being determined, the proposed and base annual energy cost index (ECIP and ECI) of the building and building site shall be calculated by a registered design professional in accordance with Equation 6-XXX and annual energy cost simulation software approved by the authority having jurisdiction. The annual energy cost shall include all energy used for building functions and its anticipated occupancy.

602.1.2.1 Modifications to Appendix G of ASHRAE 90.1. Where zEPI is being determined, the performance rating in Section G1.2 of ASHRAE 90.1 shall be based on energy use converted to consistent units in accordance with Sections 602.1.2.2 and 602.1.2.3, instead of energy cost.

602.1.2.2 Electric power. In calculating the annual energy use index for zEPI determinations, electric energy used shall be consistent units by converting the electric power use at the utility meter or measured point of delivery to Btus and multiplying by the conversion factor in Table 602.1.2.1 based on the geographical location of the building.

602.1.2.3 Nonrenewable energy. In calculating the annual energy use index for fuel other than electrical power, energy use shall be converted to consistent units by multiplying the nonrenewable energy fossil fuel use at the utility meter or measured point of delivery to Btu's and multiplying by the conversion factor in Table 602.1.2.2. The conversion factor for energy sources not included in Table 602.1.2.2 shall be 1.1. Conversion factors for purchased district heating shall be 1.35 for hot water and 1.45 for steam. The conversion factor for district cooling shall be 0.33 times the value in Table 602.1.2.1 based on the EPA eGRID Sub-region in which the building is located.

602.2 Annual direct and indirect CO₂e emissions. The CO₂e emissions calculations for the building and building site shall be determined in accordance with Sections 602.2.1 and 602.2.2. The emissions associated with the proposed design shall be less than or equal to the CO₂e emissions associated with the standard reference design in accordance with Equation 6-2 or Equation 6-YY,)

For zEPI: CO₂e pd ≥ (zEPI × CO₂e srbd)/57 (Equation 6-2)

For yECI: CO₂e pd < CO₂e srbd x 0.8 (Equation 6-YY)

where:

zEPI = the minimum score in accordance with Section 602.1.1.

yECI = the minimum score in accordance with Section 602.1.1

CO₂e pd = emissions associated with the proposed design.

CO₂e srbd = emissions associated with the standard reference budget design in accordance with Section 602.1.2.

Revise as follows:

1007.3 Post certificate of occupancy zEPI, energy demand, and CO₂e emissions reporting. Where the jurisdiction indicates in Table 302.1 that ongoing post certificate of occupancy zEPI or yECI, energy demand and CO₂e emissions reporting is required, and where the jurisdiction has indicated in Table 302.1 that enhanced energy performance in accordance with Section 302.1 or CO₂e emissions in accordance with Section 602.2 are required, zEPI or yECI, energy demand, and CO₂e emissions reporting shall be provided in accordance with this section.

1007.3.3.1 Annual net energy use. The zEPI or yECI associated with the operation of the building and the buildings on the site, as determined in accordance with Section 602.1, shall be reported by the building owner or the owner's registered agent to the [INSERT NAME OF APPROPRIATE STATE OR LOCAL GOVERNMENT AGENCY RESPONSIBLE FOR COLLECTING REPORTED INFORMATION].

Where there are multiple buildings on a building site, each building shall have its zEPI reported separately. Where there are energy uses associated with the building site other than the buildings on the site, the zEPI for the building site shall be reported separately.

Energy use for the previous year shall cover the complete calendar year and be reported on, or before, March 1st of the following year.

Revise as follows:

A106.1 zEPI or yECI reduction project electives. Where zEPI is used, project electives for buildings pursuing performance-based compliance in accordance with Section 601.3.1 shall be in accordance with the portions of Table A106 that reference Section A106.1, Equation 6-1 or 6-2 and the calculation procedures specified in Section 602.1.2.1.

Reason: This proposal is part of a series of proposals that replaces the zero energy performance index (zEPI) with the Yearly Energy Cost Index.

There are many technical problems with how the the zEPI is calculated. It is linked to ASHRAE Appendix G, and then modified with other factors. Under the latest revision to ASHRAE 90.1 (2013), Appendix G and Chapter 11 (the

Energy Cost Budget chapter) have been significantly changed. The key change is that the "baseline" building used for comparison is now "locked" using values and tables from ASHRAE 90.1-2004 (about equivalent to IECC 2006 Commercial Chapters). So while the zEPI used to be compared to a building based on ASHRAE 90.1-2010, the ratio of 51/57 will now be used with a 2004 building, not a 2013 building.

By changing to the Yearly Energy Cost Index, the baseline building can be the latest version of the IECC or ASHRAE 90.1 that is being enforced in a jurisdiction. Energy cost is a metric that is understood by building owners, used in several consensus-based building energy efficiency standards such as ASHRAE 189.1 for green buildings, and its adoption by the ICC would enhance the code's stature among the consuming public.

In addition, it is a ratio that will have the most meaning to building owners that are trying to justify the extra expenses of building a green building. Also, rather than a 10.5% reduction (51/57 ratio), the requirements under the Yearly Energy Cost Index are 20% (0.8 ratio), which is significantly more stringent than the 10.5% reduction under zEPI.

Also, the "source energy" estimates are out of date and not technically defensible. The use of these incorrect and outdated estimates will lead to decisions that would increase energy usage and environmental impacts (e.g., switching end uses from electricity to fuel oil). As highlighted in the 2012 DOE final report on focus group findings (for a program using source energy estimates), which can be viewed at:

http://apps1.eere.energy.gov/buildings/publications/pdfs/commercial_initiative/asset_ratio_seattle_focus_groups.pdf

One of the key findings was: "Including site versus source energy use was confusing or did not provide value. Site information was preferred by most stakeholders." In addition, the report also stated: "Several building stakeholders did not find the source energy use information helpful because they are more concerned with site energy."

To meet the needs of building owners, the yearly energy cost index will be of the most use, as shown in the DOE 2012 report:

"Recommendation 5: Revise the cost metric data to enhance relevance to property owners and investors and increase overall understanding. Property owners and investors were more interested in actual costs—for example, regional costs for energy use, estimated costs for energy consumption, and estimated costs/savings for upgrades for each.

Cost Impact: Will not increase the cost of construction.

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