2014 PROPOSED CHANGES TO THE INTERNATIONAL GREEN CONSTRUCTION CODE

(ENERGY/WATER)

ICC
INTERNATIONAL CODE COUNCIL®

First Printing

Publication Date: March 2014

PRINTED IN THE U.S.A.

2014 PROPOSED CHANGES TO THE INTERNATIONAL GREEN CONSTRUCTION CODE (ENERGY/WATER)

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TENTATIVE ORDER OF DISCUSSION
2014 PROPOSED CHANGES TO THE
INTERNATIONAL GREEN CONSTRUCTION CODE
(ENERGY/WATER)

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some GEW code change proposals may not be included on this list, as they are being heard by the General committee. Please consult the Cross Index of Proposed Changes. Note also that in this cycle, the hearing order places the code changes affecting hazardous materials first to give them proper attention.

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Proponent: Shaunna Mozingo, Colorado Code Consulting, LLC, representing Colorado Chapter of ICC, Inc (smozingo@coloradocode.net); Craig Conner, representing self

Revise as follows:

601.3 Application. ~~Buildings and their associated building sites shall comply with Section 601.3.1 or Section 601.3.2.~~Buildings shall be designed and constructed in accordance with the I*nternational Energy Conservation Code.*

601.3.1 Performance-based compliance. Buildings designed on a performance basis shall comply with ~~Sections 602, 608.6, 609, 610 and 611~~ Section 602 and the commercial mandatory and performance based requirements of the *International Energy Conservation Code.*

601.3.2 Prescriptive-based compliance. Buildings designed on a prescriptive basis shall comply with the requirements of ~~Sections 605, 606, 607, 608, 609, 610 and 611~~. Section 602 and the commercial mandatory and prescriptive based requirements of the *International Energy Conservation Code*

~~**601.4 Minimum requirements.** Buildings shall be provided with metering complying with Section 603, and commissioning complying with Section 611. Where required in accordance with Section 604.1, building shall be provided with automated-demand response complying with Section 604.~~

~~**601.5 Multiple buildings on a site and mixed use buildings.** Where there is more than one building on a site and where a building has more than one use in the building, each building or each portion of a building associated with a particular use shall comply with Sections 601.5.1 or 601.5.2 or a combination of both.~~

~~**601.5.1 Multiple buildings on a site.** For building sites with multiple buildings, the energy use associated with the building site shall be assigned on a proportional basis to each building based on total gross floor area of each building in relation to the total gross floor area of all buildings on the building site.~~

~~Where energy is derived from either renewable or waste energy, or both sources located on the building site, within individual buildings, or on individual buildings and delivered to multiple buildings, the energy so derived shall be assigned on a proportional basis to the buildings served based on building gross floor area. Energy delivered from renewable and waste energy sources located on or within a building shall be assigned to that building.~~

> ~~**Exception:** Where it can be shown that energy to be used at the building site is associated with a specific building, that energy use shall be assigned to that specific building.~~

~~**601.5.2 Mixed use buildings.** Where buildings have more than one use, the energy use requirements shall be based on each individual occupancy.~~

~~**602 MODELED PERFORMANCE PATHWAY REQUIREMENTS**~~

~~**603 ENERGY METERING, MONITORING AND REPORTING**~~

~~**604 AUTOMATED DEMAND-RESPONSE (AUTO-DR) INFRASTRUCTURE**~~

~~**605 BUILDING ENVELOPE SYSTEMS**~~

~~**606 BUILDING MECHANICAL SYSTEMS**~~

~~**607 BUILDING SERVICE WATER HEATING SYSTEMS**~~

~~**608 BUILDING ELECTRICAL POWER AND LIGHTING SYSTEMS**~~

~~**609SPECIFIC APPLIANCES AND EQUIPMENT**~~

~~610~~ 602 BUILDING RENEWABLE ENERGY SYSTEMS

~~**611ENERGY SYSTEMS COMMISSIONING AND COMPLETION**~~

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 less in Table 302.1 for each occupancy required to have enhanced energy performance.~~
~~3~~ 2. 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 CO_2*e* EMISSION REDUCTION**~~			
~~302.1, 302.1.1, 602.1~~	~~zEPI of Jurisdictional Choice – The jurisdiction shall indicate a zEPI of 46 or less in each occupancy for which it intends to require enhanced energy performance.~~	~~Occupancy: ______~~ ~~zEPI: ____________~~	
~~604.1~~	~~Automated demand response infrastructure~~	~~☐Yes~~	~~☐No~~
CHAPTER 10. EXISTING BUILDINGS			
1007.2	Evaluation of existing buildings	☐Yes	☐No
~~1007.3~~	~~Post Certificate of Occupancy zEPI, energy demand, and CO_2*e* emissions reporting~~	~~☐Yes~~	~~☐No~~

(portions of table not shown remain unchanged)

~~**302.1.1 zEPI of 46 or less.** Where a zEPI of 46 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 m^2) 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.~~

Revise as follows:

903.1 General. Where application is made for construction as described in this section, the registered design professional in responsible charge or approved agency shall perform commissioning during construction and after occupancy as required by Table 903.1. Where Table 903.1 specifies that commissioning is to be done on a periodic basis, the registered design professional in responsible charge shall provide a schedule of periodic commissioning with the submittal documents that shall be reviewed and *approved* by the *code official*.

The approved agency shall be qualified and shall demonstrate competence, to the satisfaction of the *code official*, for the commissioning of the particular type of construction or operation. The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency provided those personnel meet the qualification requirements of this section to the satisfaction of the *code official*. The approved agency shall provide written documentation to the *code official* demonstrating competence and relevant experience or training. Experience or training shall be considered relevant where the documented experience or training is related in complexity to the same type of commissioning activities for projects of similar complexity and material qualities.

TABLE 903.1
COMMISSIONING PLAN

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
~~**Chapter 6: Energy**~~						
~~Energy consumption, monitoring, targeting and reporting~~						
~~a. Monitoring system~~	~~X~~	~~None~~	~~Inspection and verification~~	~~During construction and prior to occupancy~~	~~None~~	~~603, 610.5~~
~~b. Calibration~~	~~X~~	~~X~~	~~Testing and review and evaluation or test reports~~	~~During commissioning~~	~~Annually~~	~~603, 610.5~~
~~Mechanical systems completion – all buildings~~						
~~a. Air system balancing – provide the means for system balancing~~	~~X~~	~~None~~	~~Inspection and verification~~	~~During construction and prior to occupancy~~	~~None~~	~~611.1.2.1 and through reference to IECC~~
~~b. Hydronic system balancing – provide means for system balancing~~	~~X~~	~~None~~	~~Inspection and verification~~	~~During construction and prior to occupancy~~	~~None~~	~~611.1.2.2 and through reference to IECC~~
~~c. Mechanical system manuals – construction documents to require O&M manual~~	~~X~~	~~None~~	~~Verification of constructio n documents~~	~~Plan review~~	~~None~~	~~611.1.5.2~~
~~Mechanical systems – buildings over 5,000 square feet total building floor area~~						
~~a. Commissioning required and noted in plans and specifications~~	~~X~~	~~None~~	~~Verification of construction documents~~	~~Plan review~~	~~None~~	~~611.1~~
~~b. Documentation of required commissioning outcomes~~	~~X~~	~~None~~	~~Verification with the building owner~~	~~Subsequent to completion of all commissioning activities~~	~~None~~	~~611.1~~

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
~~c. Preparation and availability of a commissioning plan~~	~~X~~	~~None~~	~~Verification with the RDP or commissioning agent~~	~~Between plan review and commissioning initiation~~	~~None~~	~~611.1.1~~
~~d. Balance HVAC systems (both air and hydronic)~~	~~X~~	~~X~~	~~HVAC system installer/contractor or commissioning agent~~	~~After installation of HVAC systems and prior to occupancy~~	~~TBD~~	~~611.1.2~~
~~e. Functional performance testing of HVAC equipment~~	~~X~~	~~X~~	~~HVAC system installer/contractor or commissioning agent~~	~~After installation of HVAC systems and prior to occupancy~~	~~TBD~~	~~611.1.3~~
~~f. Functional performance testing of HVAC controls and control systems~~	~~X~~	~~X~~	~~HVAC system installer/contractor or commissioning agent~~	~~After installation of HVAC systems and prior to occupancy~~	~~TBD~~	~~611.1.3.2~~
~~g. Preparation of preliminary commissioning report~~	~~None~~	~~X~~	~~HVAC system installer/contractor or commissioning agent~~	~~None~~	~~Subsequent to commissioning~~	~~611.1.4~~
~~h. Acceptance of HVAC systems and equipment/system verification report~~	~~None~~	~~X~~	~~Building owner~~	~~None~~	~~Letter verifying receipt of the commissioning report~~	~~611.1.4.1~~
~~i. Preparation and distribution of final HVAC system completion—Documentation that construction documents require drawings, manuals, balancing reports and commissioning report be provided to the owner and that they have been provided~~	~~None~~	~~X~~	~~RDP, contractor or commissioning authority~~	~~None~~	~~90 days after final certificate of occupancy~~	~~611.1.5~~
~~**Chapter 6: Lighting**~~						
~~Auto demand reduction control system functionality~~	~~X~~	~~X~~	~~Functional testing~~	~~Final inspection~~	~~18-24 months~~	~~604.4~~
~~Plug load controls~~	~~X~~	~~None~~	~~Functional testing~~	~~Final inspection~~	~~None~~	~~608.6~~

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
~~Connection of appliances to switched receptacles~~	—	~~X~~	~~Field inspection~~	~~None~~	~~18-24 months~~	~~608.6~~
~~Specified transformer nameplate efficiency rating~~	~~X~~	~~None~~	~~Field inspection~~	~~Final inspection~~	~~None~~	~~608.8.1.1~~
~~Verification of lamp~~	~~X~~	~~X~~	~~Field inspection~~	~~Final inspection~~	~~18-24 months~~	~~608.10~~
~~Verification of ballast~~	~~X~~	~~None~~	~~Field inspection~~	~~Final inspection~~	~~None~~	~~608.10~~
~~Lighting controls~~						
~~a. Installation~~	~~X~~	~~None~~	~~Field inspection~~	~~Post-installation~~	~~None~~	~~608.11~~
~~b. Calibration~~	~~X~~	~~X~~	~~System installer/contractor or commissioning agent~~	~~Post-installation~~	~~18-24 months~~	~~611.3.3~~

(portions of Table not shown remain unchanged)

904.3 Building operations and maintenance documents. The building operations and maintenance documents shall consist of manufacturer's specifications and recommendations, programming procedures and data points, narratives, and other means of illustrating to the owner how the building, site and systems are intended to be maintained and operated. The following information shall be included in the materials, as applicable to the specific project:

1. Directions to the owner or occupant on the manual cover sheet indicating that at least one copy of the materials shall be in the possession of the owner or occupant.

2. Operations and maintenance manuals for equipment, products and systems installed under or related to the provisions of Chapter 4 including, but not limited to, the following, as applicable:
   - 2.1. Vegetative shading, vegetative roofs and natural resource protections and setbacks.
   - 2.2. Water-conserving landscape and irrigation systems.
   - 2.3. Stormwater management systems.
   - 2.4. Permanent erosion control measures.
   - 2.5. Landscape or tree management plans.

3. Operations and maintenance documents for materials, products, assemblies and systems installed under or related to the provisions of this code for material resource conservation in accordance with Chapter 5 including, but not limited to, the following, as applicable:
   - 3.1. Care and maintenance instructions and recommended replacement schedule for flooring, including, but not limited to, carpeting, walk-off mats and tile.
   - 3.2. Care and maintenance instructions for natural materials including, but not limited to, wood, bio-based materials and stone.
   - 3.3. Available manufacturer's instructions on maintenance for:
     - 3.3.1. Exterior wall finishes.
     - 3.3.2. Roof coverings.
     - 3.3.3. Exterior doors, windows and skylights.

3.4. Information and recommended schedule for required routine maintenance measures, including, but not limited to, painting and refinishing.

~~4. Operations and maintenance documents for equipment, products and systems installed under or related to the provisions of this code for energy conservation in accordance with Chapter 6 including, but not limited to, the following:~~

~~4.1. Heating, ventilating and air-conditioning systems including: Domestic hot water systems including performance criteria and controls.~~

~~4.1.1. Recommended equipment maintenance schedule.~~

~~4.1.2. Air filters and fluid filters, including recommended replacement schedule and materials.~~

~~4.1.3. Time clocks, including settings determined during commissioning.~~

~~4.1.4. Programmable controls and thermostats, including settings determined during commissioning.~~

~~4.2. *Buildingthermal envelope* systems including:~~

~~4.2.1. Glazing systems inspection schedule.~~

~~4.2.2. Performance criteria for replacements and repairs.~~

~~4.2.3. Information and recommended schedule on required routine maintenance measures, including but not limited to, sealants, mortar joints and screens.~~

~~4.3. Electrical and lighting systems including: Automatic demand reduction systems.~~

~~4.3.1. Technical specifications and operating instructions for installed lighting equipment.~~

~~4.3.2. Luminaire maintenance and cleaning plan.~~

~~4.3.3. Lamp schedule, recommended relamping plan, and lamp disposal information.~~

~~4.3.4. Programmable and automatic controls documentation, including settings determined during commissioning.~~

~~4.3.5. Occupant sensor and daylight sensors documentation, including settings determined during commissioning.~~

~~5~~ 4. Operations and maintenance documents for equipment, products and systems installed under or related to the provisions of this code for water conservation in accordance with Chapter 7, including, but not limited to the following:

~~5.1~~ 4.1. Domestic fixtures.

~~5.2~~ 4.2. Water-regulating devices including faucets and valves.

~~5.3~~ 4.3. Irrigation and rainwater and gray water catchment.

~~6~~ 5. Operations and maintenance documents for equipment products and systems under or related to the provisions of this code for indoor environmental quality in accordance with Chapter 8, including, but not limited to, the following:

~~6.1~~ 5.1. Humidification/dehumidification.

~~6.2~~ 5.2. Green cleaning products, procedures and techniques.

~~6.3~~ 5.3. Recommended window cleaning schedule.

~~6.4~~ 5.4. Ventilation controls.

~~6.5~~ 5.5. Floor finishes.

~~6.6~~ 5.6. Fireplaces and combustion appliances.

Delete without substitution:

~~**1007.3 Post certificate of occupancy zEPI, energy demand, and CO_2*e* emissions reporting.** Where the jurisdiction indicates in Table 302.1 that ongoing post certificate of occupancy zEPI, energy demand and CO_2*e* 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 CO_2*e* emissions in accordance with Section 602.2 are required, zEPI, energy demand, and CO_2*e* emissions reporting shall be provided in accordance with this section.~~

~~**1007.3.1 Purpose.** The purpose of this section is to provide for the uniform reporting and display of the total annual net energy use, peak demand for each energy form and emissions associated with building operations and building sites.~~

~~**1007.3.2 Intent.** The intent of these requirements is to provide for the ongoing reporting and display of the total annual net energy use, peak energy demand and emissions associated with operation of the building and its systems to document ongoing compliance with the provisions of Sections 601 and 602.~~

~~**1007.3.3 Reporting.** Reports in accordance with Sections 1007.3.3.1 through 1007.3.3.3 shall be generated.~~

~~**1007.3.3.1 Annual net energy use.** The zEPI 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.~~

~~**1007.3.3.2 Peak monthly energy demand reporting.** The peak demand of all energy forms serving each building and the building site 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 energy demand reported separately. Where there are energy uses associated with the building site other than the buildings on the site, the energy demand for the building site shall be reported separately.~~

~~Monthly energy demand data for the previous year shall cover the complete calendar year and be reported on, or before, March 1st of the following year.~~

~~**1007.3.3.3 Annual CO2*e* emissions reporting.** The annual emissions associated with the operation of the building and its systems, as determined in accordance with Section 602.2, 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 annual emissions reported separately. Where there are energy uses associated with the building site other than the buildings on the site, the annual *CO2e* emissions for the building site shall be reported separately.~~

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

Delete without substitution:

~~**A106 ENERGY CONSERVATION, EFFICIENCY AND EARTH ATMOSPHERIC QUALITY**~~

Reason: The 2012 IgCC is not being adopted. The few jurisdictions that are adopting the IgCC are adopting it with a limited scope, as a "voluntary" code or outright deleting the Chapter 6 (Dallas Texas). We stand the chance of losing the IGCC and all of the hard work that has been put into it because it is not profitable to publish a book that nobody buys. Code officials have expressed over and over again that the energy codes have gone far enough and feel as though the IgCC energy provisions are far too complicated to learn, understand and enforce therefore most either don't adopt it or don't use it if they do adopt it. If that is the case, then are we really seeing any pay off for all of those efforts?

By proposing that the energy provisions of the IgCC simply reflect the provisions of the code that it is supposed to overlay, the IECC, there will be more buy in and eventual use of the code because it will be something that is already understood and being used. Sure, the energy provisions won't be much above code, with the exception of the renewable requirements, but are we getting above code now when nobody is using it? Wouldn't it
be better to leave the remaining chapters of the IgCC to carry the above code requirements and let Chapter 6 reflect the requirements that people are slowly getting used to in the IECC? The IECC has been advancing so fast that it has been hard to keep up with it. We would propose that it has advanced enough that we could use the requirements in it as the base for this code for at least one code cycle to see if it makes a difference in the adoption and use of this code.

The final action hearings for the IECC ended only a couple of months prior to the deadline for submitting changes to the IgCC. The 2015 IECC wasn't even published by the deadline for these submittals. Most of the time we are guessing what those IECC requirements are truly going to be while attempting to write something that is supposed to go above those requirements in efficiency. It's pretty hard to do when you don't really know what the IECC says yet.

If the IECC commercial provisions become the basis for Chapter 6 of the IGCC then we have eliminated the problem of not knowing what one says before we have to write the next. We eliminate the need for a third round of hearings because we can now write the IECC and the IGCC at the same time, while all of the same code writers are already in the room together. We can save ICC tens of thousands of dollars on separate hearings.We may even be able to save this code from extinction.

How long will a publisher keep publishing a book that is not used? We could find ourselves having to rely on other standards for a green code because it isn't worth continuing the cost of hearings and publishing for this code. The problem with that is that we don't have as much opportunity for input into those other documents. The ICC Code Development process is one of a kind. We can't afford to lose that for this type of code. It needs our input but if all of that input makes a document that nobody uses, it's time to rethink our strategy. What will make this code get used? We've researched the reasons for limited use and the same comment comes up over and over again-- make the energy chapter something that is understandable and easier to use. People keep saying that the IECC is advancing so fast that we need to take a break and let people catch up with the requirements and learning the new technologies and applications before trudging forward. Let's give it to them this cycle in the IGCC and see if it works

This proposal references the IECC in the new Section 601.3 with the same code language that the IBC does. As such it would also allow the use of ASHRAE90.1.

There are plenty of other provisions in this code that make it "green" and above code. All of those other requirements aren't found in other codes so they are "above code". Let them carry the IgCC for a cycle. At its core, this proposal is simply an effort to get the IgCC adopted and used by making it simpler and more familiar to the user.

Cost Impact: Will not increase the cost of construction. This proposal will likely reduce the cost of construction in most instances.

GEW1-14: 601.3.1-MOZINGO994

GEW2-14

302.1, 302.1.1, 1003.2.2, Chapter 6, 1007.3, 1007.3.1, 1007.3.2, 1007.3.3, 1007.3.3.1, 1007.3.3.2, 1007.3.3.3, A106

Proponent: Mark Nowak, Steel Framing Alliance, representing Steel Framing Alliance (mark@mnowak.net)

Revise as follows:

CHAPTER 6
ENERGY CONSERVATION~~, EFFICIENCY AND CO_2e EMISSION REDUCTION~~

601.3 Application. Buildings and their associated building sites shall comply with Section C407 ~~601.3.1 or Section 601.3.2.~~of the *International Energy Conservation Code* and shall exceed the requirements of Section C407 by not less than 10 percent.

~~**601.3.1 Performance-based compliance.** Buildings designed on a performance basis shall comply with Sections 602, 608.6, 609, 610 and 611.~~

~~**601.3.2 Prescriptive-based compliance.** Buildings designed on a prescriptive basis shall comply with the requirements of Sections 605, 606, 607, 608, 609, 610 and 611.~~

601.4 Minimum requirements. Buildings shall be provided with metering complying with Section 603, and commissioning complying with Section 611. ~~Where required in accordance with Section 604.1, building shall be provided with automated-demand response complying with Section 604.~~

~~**602 MODELED PERFORMANCE PATHWAY REQUIREMENTS**~~

~~**603.5.1 Annual emissions.** The data acquisition and management system shall be capable of providing the data necessary to calculate the annual CO_2e emissions associated with the operation of the building and its systems using the results of annual energy use measured in accordance with Section 603.5. The calculation shall be based on energy measured for each form of energy delivered to the site on an annual basis. Where reporting of emissions is required, the determination of emissions shall be in accordance with Section 602.2.3.~~

~~**604 AUTOMATED DEMAND RESPONSE (AUTO-DR) INFRASTRUCTURE**~~

~~**605 BUILDING ENVELOPE SYSTEMS**~~

~~**606 BUILDING MECHANICAL SYSTEMS**~~

~~**607 BUILDING SERVICE WATER HEATING SYSTEMS**~~

~~**608 BUILDING ELECTRICAL POWER AND LIGHTING SYSTEMS**~~

~~**609 SPECIFIC APPLIANCES AND EQUIPMENT**~~

610.1.1 Building performance-based compliance. Buildings and surrounding property or building sites where there are multiple buildings on the building site~~, that are designed and constructed in accordance with Section 601.3.1, performance-based compliance,~~ shall be equipped with one or more renewable energy systems that have the capacity to provide not less than 2 percent of the total calculated annual energy use of the building, or collective buildings on the site.

~~**610.1.2 Building prescriptive compliance.** Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.2, prescriptive compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than 2 percent of the total estimated annual energy use of the building, or collective buildings on the building site, with onsite renewable energy by calculation demonstrating that onsite renewable energy production has a rating of not less than 1.75 Btu/h (0.5 W) or not less than 0.50 watts per square foot of conditioned floor area, and using any single or combination of renewable energy generation systems meeting the requirements of Sections 610.2, 610.3, or 610.4.~~

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 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 CO_2e EMISSION REDUCTION**~~			
~~302.1, 302.1.1, 602.1~~	~~zEPI of Jurisdictional Choice – The jurisdiction shall indicate a zEPI of 46 or less in each occupancy for which it intends to require enhanced energy performance.~~	~~Occupancy: ______~~ ~~zEPI: ____________~~	
~~604.1~~	~~Automated demand response infrastructure~~	~~☐Yes~~	~~☐No~~
CHAPTER 10. EXISTING BUILDINGS			
1007.2	Evaluation of existing buildings	☐Yes	☐No
~~1007.3~~	~~Post Certificate of Occupancy zEPI, energy demand, and CO_2e emissions reporting~~	~~☐Yes~~	~~☐No~~

(portions of table not shown remain unchanged)

~~**302.1.1 zEPI of 46 or less.** Where a zEPI of 46 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 m^2) 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.~~

Revise as follows:

1003.2.2 Heating, ventilating and air-conditioning. Heating, ventilating and air-conditioning systems and equipment shall be in accordance with the following:

1. Time clock and automatic time switch controls that can turn systems off and on according to building occupancy requirements shall be provided and connected to the following HVAC equipment: chillers and other space-cooling equipment, chilled water pumps, boilers and other space-heating devices, hot water pumps, heat exchanger circulation pumps, supply fans, return fans, and exhaust fans. Where occupant override is provided, it shall be designed with a timer to automatically revert to time clock and automatic time switch controls in not longer than 12 hours.

    Exception: A time clock or automatic time switch controls shall not be required for spaces where any of the following conditions exist:

    1. A time clock is not required by Section C403.2.4.3 of the *International Energy Conservation Code*.
    2. There is 24-hour occupancy materials with special atmospheric requirements dependent on 24-hour space conditioning.
    3. A majority of the areas of the building served by the system are under setback thermostat control.
    4. Manufacturer's specifications stipulate that the system must not be shut off.

2. Functional outside air economizers shall be provided on all cooling systems or more than 4 ½ tons cooling capacity, 54,000 Btu/h, or more than 1800 cfm (9.144 $m^3/s \times m^2$) air flow, provided manufactures' guidelines are available for adding the economizer to the existing system.

    Exception: An outside air economizer shall not be required for buildings or special uses where 100 percent outside air for ventilation is required or where any of the following conditions exist:

    1. Section C403.3.1 of the *International Energy Conservation Code* would not require an economizer.
    2. The existing system has a water-based economizer.
    3. The existing system does not have an outside air intake.
    4. Special economizer operations such as, but not limited to, carefully controlled humidity would require more energy use than is conserved.
    5. There is insufficient space to install necessary equipment.
    6. Installation of an economizer would require major modifications to the building's life safety system.
    7. The existing system is a multi-zone system where the same intake air is used at the same time for either heating or cooling in different parts of the building.

3. HVAC piping and ducts, including those located above suspended ceilings, shall comply with Sections 606.3 and 606.4.

    Exception: Additional insulation shall not be required for piping where any of the following conditions exist:

    1. Additional insulation shall not be required for piping where any of the following conditions exist:
        1.1. It is located within HVAC equipment;

1.2. It is located within conditioned space that conveys fluids between 60°F (15.6°C) and 105°F (40.6°C);

1.3. Piping that is already insulated and the insulation is in good condition; or

2. Where HVAC ducts and piping are installed in a building cavity or interstitial framing space of insufficient width to accommodate the duct or pipe and the insulation required by Section 606.3 and Table 606.4, the insulation thickness shall be permitted to have the maximum thickness that the wall can accommodate, but shall not be less than $^1/_2$-inch (12.7 mm) thick.

4. Where central heat is intended to be replaced with individual electric space heaters, the application for the electrical permit shall include documentation demonstrating that the new electric heaters will not consume more energy than the existing nonelectric heaters.
5. Boiler systems shall have been cleaned and tuned within one year prior to the alteration. Boilers shall be equipped with an outdoor air lock-out thermostat or a temperature reset control.
6. Chillers shall be equipped with an outdoor air lockout thermostat and chilled water reset control.
7. A maximum 5-year phase out plan shall be provided for buildings with existing systems that use CFC-based refrigerants.
8. Where mechanical and electrical systems and equipment are joined with microprocessors that communicate with each other or to a computer, a properly integrated building automation system shall be installed to optimize energy, operations, and indoor comfort. The building automation system shall:

8.1. Allow the owner to set up schedules of operation for the equipment and provide equipment optimal start with adaptive learning;
8.2. Provide trim and respond capabilities based on zone demand;
8.3. Offer the ability to monitor energy usage, including the ability to meter electric, gas, water, steam, hot water, chilled water, and fuel oil services;
8.4. Offer economizing based on enthalpy calculation and/or CO_2 set point control;
8.5. Offer load shedding when power companies are at peak demand and need; and
8.6. Offer the ability to send alarms to alert building owner, manager, or operator when problems occur due to system failures.

~~**1007.3.1 Purpose.** The purpose of this section is to provide for the uniform reporting and display of the total annual net energy use, peak demand for each energy form and emissions associated with building operations and building sites.~~

~~**1007.3.2 Intent.** The intent of these requirements is to provide for the ongoing reporting and display of the total annual net energy use, peak energy demand and emissions associated with operation of the building and its systems to document ongoing compliance with the provisions of Sections 601 and 602.~~

~~**1007.3.3 Reporting.** Reports in accordance with Sections 1007.3.3.1 through 1007.3.3.3 shall be generated.~~

~~**1007.3.3.1 Annual net energy use.** The zEPI 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.~~

~~**1007.3.3.2 Peak monthly energy demand reporting.** The peak demand of all energy forms serving each building and the building site 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 energy demand reported separately. Where there are energy uses associated with the building site other than the buildings on the site, the energy demand for the building site shall be reported separately.~~

~~Monthly energy demand data for the previous year shall cover the complete calendar year and be reported on, or before, March 1st of the following year.~~

~~**1007.3.3.3 Annual CO_2*e* emissions reporting.** The annual emissions associated with the operation of the building and its systems, as determined in accordance with Section 602.2, 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 annual emissions reported separately. Where there are energy uses associated with the building site other than the buildings on the site, the annual CO_2*e* emissions for the building site shall be reported separately.~~

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

Delete without substitution:

~~**A106 ENERGY CONSERVATION, EFFICIENCY AND EARTH ATMOSPHERIC QUALITY**~~

Reason: This proposal simplifies the code by relying on the base IECC code to achieve a higher performing building. It will eliminate the need for code officials, designers, owners, and others to learn and implement an approach and terminology that is vastly different from the base IECC code, and it eliminates the need to use two different methods to comply with the two codes. It will, however, retain the benefits of a green code that exceeds the base code in a balanced and flexible manner. Users of the code will be able to continue to use the performance path in the IECC but the level of performance will be required to be 10% higher. This is a simplification of the code that will allow owners to determine how to best achieve the energy efficiency objectives of the code.

Further, this proposal eliminates the arbitrary prescriptive requirements from the IgCC for a 10% decrease in the IECC U-factors. To apply an arbitrary reduction as a percentage to the IECC U-factors is inappropriate for the following reasons:

A 10% U-factor decrease is not the same as a 10% increase in performance.

-This introduces an inconsistent standard whereby assemblies with different U- factors in the IECC will be required to meet a higher incremental level of performance in the IgCC simply because their U-factors in the IECC are higher than other assemblies.

The 10% U-factor decrease is discriminatory against some building materials due to the differences in their costs of construction versus other materials. As stated above, this creates a different "standard" for performance for some materials versus others compared to the base IECC document.

If the IECC is based on an optimized design that balances life cycle costs with performance, there is no rationale to support more stringent U-factors in the IgCC. Even a "green" code or standard should be based on some level of cost-effectiveness. There is no such substantiation provided to support an arbitrary 10% decrease in U-factors. In warmers climate zones, there will be little to no energy savings from the U-factor increases.

Cost Impact: Will not increase the cost of construction.

GEW2-14: CHAPTER 6-NOWAK993

GEW3-14

Chapter 6, 202, 302.1, 302.1.1, 903.1, 1003.2.2, 1003.2.3, 1007.3, 1007.3.1, 1007.3.2, 1007.3.3, 1007.3.3.1, 1007.3.3.2, 1007.3.3.3, Chapter 12, Table A106, A106.1, A106.5.1, A106.5.2, A106.6

Proponent: Steven Rosenstock, Electric Edison Institute, representing Edison Electric Institute (srosenstock@eei.org)

Delete without substitution:

SECTION 202 DEFINITIONS

~~**ZERO ENERGY PERFORMANCE INDEX (zEPI).** A scalar representing the ratio of energy performance of the proposed design compared to the average energy performance of buildings relative to a benchmark year.~~

Revise as follows:

601.3 Application. Buildings and their associated building sites shall comply ~~with Section 601.3.1 or Section 601.3.2.~~ the requirements of Section 7 and Normative Appendices A through D of the ASHRAE 189.1.

~~**601.3.1 Performance-based compliance.** Buildings designed on a performance basis shall comply with Sections 602, 608.6, 609, 610 and 611.~~

~~**601.3.2 Prescriptive-based compliance.** Buildings designed on a prescriptive basis shall comply with the requirements of Sections 605, 606, 607, 608, 609, 610 and 611.~~

~~**601.4 Minimum requirements.** Buildings shall be provided with metering complying with Section 603, and commissioning complying with Section 611. Where required in accordance with Section 604.1, building shall be provided with automated-demand response complying with Section 604.~~

~~**601.5 Multiple buildings on a site and mixed use buildings.** Where there is more than one building on a site and where a building has more than one use in the building, each building or each portion of a building associated with a particular use shall comply with Sections 601.5.1 or 601.5.2 or a combination of both.~~

~~**601.5.1 Multiple buildings on a site.** For building sites with multiple buildings, the energy use associated with the building site shall be assigned on a proportional basis to each building based on total gross floor area of each building in relation to the total gross floor area of all buildings on the building site.~~

~~Where energy is derived from either renewable or waste energy, or both sources located on the building site, within individual buildings, or on individual buildings and delivered to multiple buildings, the energy so derived shall be assigned on a proportional basis to the buildings served based on building gross floor area. Energy delivered from renewable and waste energy sources located on or within a building shall be assigned to that building.~~

> ~~**Exception:** Where it can be shown that energy to be used at the building site is associated with a specific building, that energy use shall be assigned to that specific building.~~

~~**601.5.2 Mixed use buildings.** Where buildings have more than one use, the energy use requirements shall be based on each individual occupancy.~~

~~**602 MODELED PERFORMANCE PATHWAY REQUIREMENTS**~~

~~**603 ENERGY METERING, MONITORING AND REPORTING**~~

~~**604 AUTOMATED DEMAND-RESPONSE (AUTO-DR) INFRASTRUCTURE**~~

~~**605 BUILDING ENVELOPE SYSTEMS**~~

~~**606 BUILDING MECHANICAL SYSTEMS**~~

~~**607 BUILDING SERVICE WATER HEATING SYSTEMS**~~

~~**608 BUILDING ELECTRICAL POWER AND LIGHTING SYSTEMS**~~

~~**609 SPECIFIC APPLIANCES AND EQUIPMENT**~~

~~**610 BUILDING RENEWABLE ENERGY SYSTEMS**~~

~~**611 ENERGY SYSTEMS COMMISSIONING AND COMPLETION**~~

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~~ less <u>the required improvement compared to ASHRAE 189</u> 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 CO_2e EMISSION REDUCTION			
302.1, 302.1.1, 602.1	zEPI <u>Improvement compared to ASHRAE 189.1</u> of Jurisdictional Choice – The jurisdiction shall indicate a zEPI of 46 or less <u>the required energy cost improvement compared to ASHRAE 189.1</u> in each occupancy for which it intends to require enhanced energy performance.	Occupancy: ______ ~~zEPI~~ <u>Improvement compared to ASHRAE 189.1</u>: ____________	
604.1	Automated demand response infrastructure	☐Yes	☐No
CHAPTER 10. EXISTING BUILDINGS			
1007.2	Evaluation of existing buildings	☐Yes	☐No
~~1007.3~~	~~Post Certificate of Occupancy zEPI, energy demand, and CO_2e emissions reporting~~	~~☐Yes~~	~~☐No~~

(portions of table not shown remain unchanged)

302.1.1 ~~zEPI of 46 or less.~~ Improvement compared to ASHRAE 189.1 Where ~~a zEPI of 46 or less~~ an improvement compared to ASHRAE 189.1 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 m^2) in *total building floor area* pursuing compliance on a prescriptive basis shall be deemed to ~~have a zEPI of 51~~ acomply with ASHRAE 18.1 and shall not be required to comply with the ~~zEPI~~ improvement compared to ASHRAE 189.1 of Jurisdictional Choice indicated by the jurisdiction in Table 302.1.

Revise as follows:

903.1 General. Where application is made for construction as described in this section, the registered design professional in responsible charge or approved agency shall perform commissioning during construction and after occupancy as required by Table 903.1. Where Table 903.1 specifies that commissioning is to be done on a periodic basis, the registered design professional in responsible charge shall provide a schedule of periodic commissioning with the submittal documents that shall be reviewed and *approved* by the *code official*.

The approved agency shall be qualified and shall demonstrate competence, to the satisfaction of the *code official*, for the commissioning of the particular type of construction or operation. The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency provided those personnel meet the qualification requirements of this section to the satisfaction of the *code official*. The approved agency shall provide written documentation to the *code official* demonstrating competence and relevant experience or training. Experience or training shall be considered relevant where the documented experience or training is related in complexity to the same type of commissioning activities for projects of similar complexity and material qualities.

TABLE 903.1
COMMISSIONING PLAN

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
Chapter 6: Energy						
Energy consumption, monitoring, targeting and reporting						
a. Monitoring system	X	None	Inspection and verification	During construction and prior to occupancy	None	~~603, 610.5~~ Section 10.3 of ASHRAE 189.1
b. Calibration	X	X	Testing and review and evaluation or test reports	During commissioning	Annually	~~603, 610.5~~ Section 10.3 of ASHRAE 189.1
Mechanical systems completion – all buildings						
a. Air system balancing – provide the means for system balancing	X	None	Inspection and verification	During construction and prior to occupancy	None	~~611.1.2.1 and through reference to IECC~~ Section 10.3 of ASHRAE 189.1

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
b. Hydronic system balancing – provide means for system balancing	X	None	Inspection and verification	During construction and prior to occupancy	None	~~611.1.2.2 and through reference to IECC~~ Section 10.3 of ASHRAE 189.1
c. Mechanical system manuals – construction documents to require O&M manual	X	None	Verification of construction documents	Plan review	None	~~611.1.5.2~~ Section 10.3 of ASHRAE 189.1
Mechanical systems – buildings over 5,000 square feet total building floor area						
a. Commissioning required and noted in plans and specifications	X	None	Verification of construction documents	Plan review	None	611.1 Section 10.3 of ASHRAE 189.1
b. Documentation of required commissioning outcomes	X	None	Verification with the building owner	Subsequent to completion of all commissioning activities	None	611.1 Section 10.3 of ASHRAE 189.1
c. Preparation and availability of a commissioning plan	X	None	Verification with the RDP or commissioning	Between plan review and commissioning initiation	None	~~611.1.1~~ Section 10.3 of ASHRAE 189.1
d. Balance HVAC systems (both air and hydronic)	X	X	HVAC system installer/contractor or commissioning	After installation of HVAC systems and prior to occupancy	TBD	~~611.1.2~~ Section 10.3 of ASHRAE 189.1
e. Functional performance testing of HVAC equipment	X	X	HVAC system installer/contractor or commissioning	After installation of HVAC systems and prior to occupancy	TBD	~~611.1.3~~ Section 10.3 of ASHRAE 189.1
f. Functional performance testing of HVAC controls and control systems	X	X	HVAC system installer/contractor or commissioning	After installation of HVAC systems and prior to occupancy	TBD	~~611.1.3.2~~ Section 10.3 of ASHRAE 189.1
g. Preparation of preliminary commissioning report	None	X	HVAC system installer/contractor or commissioning	None	Subsequent to commissioning	~~611.1.4~~ Section 10.3 of ASHRAE 189.1
h. Acceptance of HVAC systems and equipment/system verification report	None	X	Building owner	None	Letter verifying receipt of the commissioning report	611.1.4.1 Section 10.3 of ASHRAE 189.1

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
i. Preparation and distribution of final HVAC system completion—Documentation that construction documents require drawings, manuals, balancing reports and commissioning report be provided to the owner and that they have been provided	None	X	RDP, contractor or commissioning authority	None	90 days after final certificate of occupancy	~~611.1.5~~ Section 10.3 of ASHRAE 189.1
Chapter 6: Lighting						
Auto demand reduction control system functionality	X	X	Functional testing	Final inspection	18-24 months	~~604.4~~ Section 10.3 of ASHRAE 189.1
Plug load controls	X	None	Functional testing	Final inspection	None	~~608.6~~ Section 10.3 of ASHRAE 189.1
Connection of appliances to switched receptacles	—	X	Field inspection	None	18-24 months	~~608.6~~ Section 10.3 of ASHRAE 189.1
Specified transformer nameplate efficiency rating	X	None	Field inspection	Final inspection	None	~~608.8.1.1~~ Section 10.3 of ASHRAE 189.1
Verification of lamp	X	X	Field inspection	Final inspection	18-24 months	~~608.10~~ Section 10.3 of ASHRAE 189.1
Verification of ballast	X	None	Field inspection	Final inspection	None	~~608.10~~ Section 10.3 of ASHRAE 189.1
Lighting controls						
a. Installation	X	None	Field inspection	Post-installation	None	~~608.11~~ Section 10.3 of ASHRAE 189.1
b. Calibration	X	X	System installer/contractor or commissioning agent	Post-installation	18-24 months	~~611.3.3~~ Section 10.3 of ASHRAE 189.1

For SI: 1 square foot = 0.0929 m^2.

Revise as follows:

1003.2.2 Heating, ventilating and air-conditioning. Heating, ventilating and air-conditioning systems and equipment shall be in accordance with the following:

1. Time clock and automatic time switch controls that can turn systems off and on according to building occupancy requirements shall be provided and connected to the following HVAC equipment: chillers and other space-cooling equipment, chilled water

pumps, boilers and other space-heating devices, hot water pumps, heat exchanger circulation pumps, supply fans, return fans, and exhaust fans. Where occupant override is provided, it shall be designed with a timer to automatically revert to time clock and automatic time switch controls in not longer than 12 hours.

Exception: A time clock or automatic time switch controls shall not be required for spaces where any of the following conditions exist:

1. A time clock is not required by Section C403.2.4.3 of the *International Energy Conservation Code*.
2. There is 24-hour occupancy materials with special atmospheric requirements dependent on 24-hour space conditioning.
3. A majority of the areas of the building served by the system are under setback thermostat control.
4. Manufacturer's specifications stipulate that the system must not be shut off.

2. Functional outside air economizers shall be provided on all cooling systems or more than 4 ½ tons cooling capacity, 54,000 Btu/h, or more than 1800 cfm (9.144 m^3/s x m^2) air flow, provided manufactures' guidelines are available for adding the economizer to the existing system.

Exception: An outside air economizer shall not be required for buildings or special uses where 100 percent outside air for ventilation is required or where any of the following conditions exist:

1. Section C403.3.1 of the *International Energy Conservation Code* would not require an economizer.
2. The existing system has a water-based economizer.
3. The existing system does not have an outside air intake.
4. Special economizer operations such as, but not limited to, carefully controlled humidity would require more energy use than is conserved.
5. There is insufficient space to install necessary equipment.
6. Installation of an economizer would require major modifications to the building's life safety system.
7. The existing system is a multi-zone system where the same intake air is used at the same time for either heating or cooling in different parts of the building.

3. HVAC piping and ducts, including those located above suspended ceilings, shall comply with ~~Sections 606.3 and 606.4~~ Section 7 of ASHRAE 189.1.

Exception: Additional insulation shall not be required for piping where any of the following conditions exist:

1. Additional insulation shall not be required for piping where any of the following conditions exist:
   1.1. It is located within HVAC equipment;
   1.2. It is located within conditioned space that conveys fluids between 60°F (15.6°C) and 105°F (40.6°C);
   1.3. Piping that is already insulated and the insulation is in good condition; or
2. Where HVAC ducts and piping are installed in a building cavity or interstitial framing space of insufficient width to accommodate the

duct or pipe and the insulation required by ~~Section 606.3 and Table 606.4~~ Section 7 of ASHRAE 189.1, the insulation thickness shall be permitted to have the maximum thickness that the wall can
2 accommodate, but shall not be less than 1/2 -inch (12.7 mm) thick.

4. Where central heat is intended to be replaced with individual electric space heaters, the application for the electrical permit shall include documentation demonstrating that the new electric heaters will not consume more energy than the existing nonelectric heaters.
5. Boiler systems shall have been cleaned and tuned within one year prior to the alteration. Boilers shall be equipped with an outdoor air lock-out thermostat or a temperature reset control.
6. Chillers shall be equipped with an outdoor air lockout thermostat and chilled water reset control.
7. A maximum 5-year phase out plan shall be provided for buildings with existing systems that use CFC-based refrigerants.
8. Where mechanical and electrical systems and equipment are joined with microprocessors that communicate with each other or to a computer, a properly integrated building automation system shall be installed to optimize energy, operations, and indoor comfort. The building automation system shall:

    8.1. Allow the owner to set up schedules of operation for the equipment and provide equipment optimal start with adaptive learning;
    8.2. Provide trim and respond capabilities based on zone demand;
    8.3. Offer the ability to monitor energy usage, including the ability to meter electric, gas, water, steam, hot water, chilled water, and fuel oil services;
    8.4. Offer economizing based on enthalpy calculation and/or CO_2 set point control;
    8.5. Offer load shedding when power companies are at peak demand and need; and
    8.6. Offer the ability to send alarms to alert building owner, manager, or operator when problems occur due to system failures.

1003.2.3 Service water systems. Service water systems and equipment shall be in accordance with the following:

1. Water heater and hot water storage tanks shall have a combined minimum total of external and internal insulation value of R-16.

2. Accessible hot and cold water supply and distribution pipes shall comply with ~~Section 607.6~~ Section 7 of ASHRAE 189.1. The insulation shall not be required to extend beyond the *building thermal envelope*.

3. Circulating pump systems for hot water supply purposes other than comfort heating shall be controlled as specified in ~~Section 607.7~~ Section 7 of ASHRAE 189.1.

4. Showerhead, toilet, urinal and faucet flow rates shall be in accordance with this code.

1007.3 Post certificate of occupancy ~~zEPI~~ annual energy cost, energy demand, and CO2*e* emissions reporting. Where the jurisdiction indicates in Table 302.1 that ongoing post certificate of occupancy ~~zEPI~~ annual energy cost, energy demand and CO2*e* 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 CO2*e* emissions in accordance with ~~Section 602.2~~ Section 7 of ASHRAE 189.1 are required, ~~zEPI~~ annual energy cost, energy demand, and CO2*e* emissions reporting shall be provided in accordance with this section.

1007.3.2 Intent. The intent of these requirements is to provide for the ongoing reporting and display of the total annual ~~net energy use~~ energy cost, peak energy demand and emissions associated with operation of the building and its systems to document ongoing compliance with the provisions of ~~Sections 601~~ ~~and 602~~ Section 7 of ASHRAE 189.1.

1007.3.1 Purpose. The purpose of this section is to provide for the uniform reporting and display of the total annual ~~net~~ ~~energy use~~ energy cost, peak demand for each energy form and emissions associated with building operations and building sites.

1007.3.3 Reporting. Reports in accordance with Sections 1007.3.3.1 through 1007.3.3.3 shall be generated.

1007.3.3.1 Annual ~~net energy use~~ energy cost. The ~~zEPI~~ annual energy cost associated with the operation of the building and the buildings on the site, as determined in accordance with ~~Section 602.1~~ Section 7 of ASHRAE 189.1, 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~~ annual energy cost reported separately. Where there are energy uses associated with the building site other than the buildings on the site, the ~~zEPI~~ energy cost for the building site shall be reported separately.

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

1007.3.3.2 Peak monthly energy demand reporting. The peak demand of all energy forms serving each building and the building site 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 INFORMATIO N].

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

Monthly energy demand data for the previous year shall cover the complete calendar year and be reported on, or before, March 1st of the following year.

1007.3.3.3 Annual CO_2*e* emissions reporting. The annual emissions associated with the operation of the building and its systems, as determined in accordance with ~~Section 602.2~~ Section 7 of ASHRAE 189.1, 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 annual emissions reported separately. Where there are energy uses associated with the building site other than the buildings on the site, the annual CO*2e* emissions for the building site shall be reported separately.

Emissions reported 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:

TABLE A106
ENERGY CONSERVATION AND EFFICIENCY

SECTION	DESCRIPTION	MINIMUM NUMBER OF ELECTIVES REQUIRED AND ELECTIVES SELECTED
A102.2	The jurisdiction shall indicate a number between and including 0 and up to and including 10 to establish the minimum total number of project electives that must be satisfied.	—
A106.1	~~zEPI~~ Energy cost reduction project electives	☐Yes ☐No
A106.1	Project ~~zEPI~~ Energy cost is at least ~~5 points~~ 3 percent lower than required by Table 302.1	☐1 elective
A106.1	Project ~~zEPI~~ Energy cost is at least ~~10 points~~ 6 percent lower than required by Table 302.1	☐2 electives
A106.1	Project ~~zEPI~~ Energy cost is at least ~~15 points~~ 9 percent lower than required by Table 302.1	☐3 electives
A106.1	Project ~~zEPI~~ Energy cost is at least ~~20 points~~ 12 percent lower than required by Table 302.1	☐4 electives
A106.1	Project ~~zEPI~~ Energy cost is at least ~~25 points~~ 15 percent lower than required by Table 302.1	☐5 electives
A106.1	Project ~~zEPI~~ Energy cost is at least ~~30 points~~ 18 percent lower than required by Table 302.1	☐6 electives
A106.1	Project ~~zEPI~~ Energy cost is at least ~~35 points~~ 21 percent lower than required by Table 302.1	☐7 electives
A106.1	Project ~~zEPI~~ Energy cost is at least ~~40 points~~ 24 percent lower than required by Table 302.1	☐8 electives
A106.1	Project ~~zEPI~~ Energy cost is at least ~~45 points~~ 27 percent lower than required by Table 302.1	☐9 electives
A106.1	Project ~~zEPI~~ Energy cost is at least ~~51 points~~ 30 percent lower than required by Table 302.1	☐10 electives
A106.2	Mechanical systems project elective	☐Yes ☐No
A106.3	Service water heating	☐Yes ☐No
A106.4	Lighting systems	☐Yes ☐No
A106.5	Passive design	☐Yes ☐No
A106.6	Renewable energy systems—5 percent	☐Yes ☐No
A106.6	Renewable energy systems—10 percent	☐Yes ☐No
A106.6	Renewable energy systems—20 percent	☐Yes ☐No

A106.1 ~~zEPI~~ Energy cost reduction project electives. Project electives for buildings pursuing performance-based compliance in accordance with ~~Section 601.3.1~~ Section 7 of ASHRAE 189.1 shall be in accordance with the portions of Table A106 that reference Section A106.1, ~~Equation 6-1~~ and the calculation procedures specified in ~~Section 602.1.2.1~~ Section 7 of ASHRAE 189.1.

A106.5.1 Performance path. The building shall be designed using the performance path in accordance with S~~ection 601.3.1~~ Section 7 of ASHRAE 189.1.

A106.5.2 Passive design provisions. The simulation of energy use performed pursuant to ~~Section 602~~ Section 7 of ASHRAE 189.1 shall document that not less than 40 percent of the annual energy ~~use~~ cost reduction realized by the proposed design has been achieved through passive heating, cooling, and ventilation design, as compared to the standard reference design. Passive heating and cooling shall use strategies including, but not limited to, building orientation, fenestration provisions, material selection, insulation choices, overhangs, shading means, microclimate vegetation and water use, passive cooling towers, natural heat storage, natural ventilation, and thermal mass.

A106.6 Renewable energy system project electives. Buildings seeking a renewable energy system project elective or electives shall be equipped with one or more renewable energy systems in accordance with ~~Section 610.1~~ Section 7 of ASHRAE 189.1 that have the capacity to provide the percent of annual energy used within the building as selected in Table A106. Capacity shall be demonstrated in accordance with ~~Section 610.1.1 or 610.1.2~~. Section 7 of ASHRAE 189.1

Add new standard(s) as follows:

ASHRAE/IESNA Standard 189.1-2014	Standard for the Design of High-Performance Green Buildings Except for Low-Rise Residential Buildings

Reason: As currently written, Chapter 6 will be very hard to enforce by code officials. In addition, there are unintended consequences of the current provisions that could result in buildings that use more energy and produce more emissions.

By replacing the current language with Section 7 of ASHRAE 189.1, several goals will be accomplished:

- -The energy efficiency chapter will be based on a consensus-based ANSI process that went through several public reviews and is under continuous maintenance.
- -The energy efficiency provisions of the IGCC and ASHRAE 189.1 will be consistent and enforceable.
- -Builders and designers will not face significantly different compliance approaches when comparing ASHRAE Standard 189 with the IGCC. In addition, the authority having jurisdiction will be able to determine compliance with energy efficiency provisions more easily.

Cost Impact: Will not increase the cost of construction.

Analysis: This code change proposal addresses the scope and application of the *International Green Construction Code*. Therefore, the final action taken on this code change proposal will be limited to an advisory recommendation to the ICC Board of Directors who will determine the final disposition of this code change proposal in accordance with Section 1.3 of CP28, which stipulates that the ICC Board of Directors determines the scope of the I-Codes.

GEW3-14: 601.3-ROSENSTOCK458

GEW4-14

Chapter 6, 302.1, Table 302.1, 903.1, Table 903.1, A106

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com); Craig Conner (craig.conner@mac.com) representing self.

Revise as follows:

601.3 Application. ~~Buildings and their associated building sites shall comply with Section 601.3.1 or Section 601.3.2~~. Buildings shall be designed and constructed in accordance with the *International Energy Conservation Code*.

~~**601.3.1 Performance-based compliance.** Buildings designed on a performance basis shall comply with Sections 602, 608.6, 609, 610 and 611.~~

~~**601.3.2 Prescriptive-based compliance.** Buildings designed on a prescriptive basis shall comply with the requirements of Sections 605, 606, 607, 608, 609, 610 and 611.~~

~~**601.4 Minimum requirements**. Buildings shall be provided with metering complying with Section 603, and commissioning complying with Section 611. Where required in accordance with Section 604.1, building shall be provided with automated-demand response complying with Section 604.~~

~~**601.5.1 Multiple buildings on a site.** For building sites with multiple buildings, the energy use associated with the building site shall be assigned on a proportional basis to each building based on total gross floor area of each building in relation to the total gross floor area of all buildings on the building site.~~

~~Where energy is derived from either renewable or waste energy, or both sources located on the building site, within individual buildings, or on individual buildings and delivered to multiple buildings, the energy so derived shall be assigned on a proportional basis to the buildings served based on building gross floor area. Energy delivered from renewable and waste energy sources located on or within a building shall be assigned to that building.~~

~~**Exception:** Where it can be shown that energy to be used at the building site is associated with a specific building, that energy use shall be assigned to that specific building.~~

~~**601.5.2 Mixed use buildings.** Where buildings have more than one use, the energy use requirements shall be based on each individual occupancy.~~

~~**602 MODELED PERFORMANCE PATHWAY REQUIREMENTS**~~

~~**603 ENERGY METERING, MONITORING AND REPORTING**~~

~~**604 AUTOMATED DEMAND RESPONSE (AUTO-DR) INFRASTRUCTURE**~~

~~**605 BUILDING ENVELOPE SYSTEMS**~~

~~**606 BUILDING MECHANICAL SYSTEMS**~~

~~**607 BUILDING SERVICE WATER HEATING SYSTEMS**~~

~~**608 BUILDING ELECTRICAL POWER AND LIGHTING SYSTEMS**~~

~~609 SPECIFIC APPLIANCES AND EQUIPMENT~~

~~610 BUILDING RENEWABLE ENERGY SYSTEMS~~

~~611ENERGY SYSTEMS COMMISSIONING AND COMPLETION~~

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:

TABLE 302.1
REQUIREMENTS DETERMINED BY THE JURISDICTION

Section	Section Title or Description and Directives	Jurisdictional Requirements	
~~**CHAPTER 6. ENERGY CONSERVATION, EFFICIENCY AND CO_2e EMISSION REDUCTION**~~			
~~302.1, 302.1.1, 602.1~~	~~zEPI of Jurisdictional Choice – The jurisdiction shall indicate a zEPI of 46 or less in each occupancy for which it intends to require enhanced energy performance.~~	~~Occupancy: ______~~ ~~zEPI: ___________~~	
~~604.1~~	~~Automated demand response infrastructure~~	~~☐Yes~~	~~☐No~~

(portions of table not shown remain unchanged)

Revise as follows:

903.1 General. Where application is made for construction as described in this section, the registered design professional in responsible charge or approved agency shall perform commissioning during construction and after occupancy as required by Table 903.1. Where Table 903.1 specifies that commissioning is to be done on a periodic basis, the registered design professional in responsible charge shall provide a schedule of periodic commissioning with the submittal documents that shall be reviewed and *approved* by the *code official*. The approved agency shall be qualified and shall demonstrate competence, to the satisfaction of the *code official*, for the commissioning of the particular type of construction or operation. The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency provided those personnel meet the qualification requirements of this section to the satisfaction of the *code official*. The approved agency shall provide written documentation to the *code official* demonstrating competence and relevant experience or training. Experience or training shall be considered relevant where the documented experience or training is related in complexity to the same type of commissioning activities for projects of similar complexity and material qualities.

TABLE 903.1
COMMISSIONING PLAN

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
~~**Chapter 6: Energy**~~						
~~Energy consumption, monitoring, targeting and reporting~~						
~~a. Monitoring system~~	~~X~~	~~None~~	~~Inspection and verification~~	~~During construction and prior to occupancy~~	~~None~~	~~603, 610.5~~

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
~~b. Calibration~~	~~X~~	~~X~~	~~Testing and review and evaluation or test reports~~	~~During commissioning~~	~~Annually~~	~~603, 610.5~~
~~Mechanical systems completion – all buildings~~						
~~a. Air system balancing – provide the means for system balancing~~	~~X~~	~~None~~	~~Inspection and verification~~	~~During construction and prior to occupancy~~	~~None~~	~~611.1.2.1 and through reference to IECC~~
~~b. Hydronic system balancing – provide means for system balancing~~	~~X~~	~~None~~	~~Inspection and verification~~	~~During construction and prior to occupancy~~	~~None~~	~~611.1.2.2 and through reference to IECC~~
~~c. Mechanical system manuals – construction documents to require O&M manual~~	~~X~~	~~None~~	~~Verification of constructio n documents~~	~~Plan review~~	~~None~~	~~611.1.5.2~~
~~Mechanical systems – buildings over 5,000 square feet total building floor area~~						
~~a. Commissioning required and noted in plans and specifications~~	~~X~~	~~None~~	~~Verification of construction documents~~	~~Plan review~~	~~None~~	~~611.1~~
~~b. Documentation of required commissioning outcomes~~	~~X~~	~~None~~	~~Verification with the building owner~~	~~Subsequent to completion of all commissioning activities~~	~~None~~	~~611.1~~
~~c. Preparation and availability of a commissioning plan~~	~~X~~	~~None~~	~~Verification with the RDP or commissioni ng agent~~	~~Between plan review and commissioning initiation~~	~~None~~	~~611.1.1~~
~~d. Balance HVAC systems (both air and hydronic)~~	~~X~~	~~X~~	~~HVAC system installer/contr actor or commissioni ng agent~~	~~After installation of HVAC systems and prior to occupancy~~	~~TBD~~	~~611.1.2~~
~~e. Functional performance testing of HVAC equipment~~	~~X~~	~~X~~	~~HVAC system installer/contr actor or commissioni ng agent~~	~~After installation of HVAC systems and prior to occupancy~~	~~TBD~~	~~611.1.3~~
~~f. Functional performance testing of HVAC controls and control systems~~	~~X~~	~~X~~	~~HVAC system installer/contr actor or commissioni ng agent~~	~~After installation of HVAC systems and prior to occupancy~~	~~TBD~~	~~611.1.3.2~~

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
~~g. Preparation of preliminary commissioning report~~	~~None~~	~~X~~	~~HVAC system installer/contractor or commissioning agent~~	~~None~~	~~Subsequent to commissioning~~	~~611.1.4~~
~~h. Acceptance of HVAC systems and equipment/system verification report~~	~~None~~	~~X~~	~~Building owner~~	~~None~~	~~Letter verifying receipt of the commissioning report~~	~~611.1.4.1~~
~~i. Preparation and distribution of final HVAC system completion—Documentation that construction documents require drawings, manuals, balancing reports and commissioning report be provided to the owner and that they have been provided~~	~~None~~	~~X~~	~~RDP, contractor or commissioning authority~~	~~None~~	~~90 days after final certificate of occupancy~~	~~611.1.5~~
~~**Chapter 6: Lighting**~~						
~~Auto demand reduction control system functionality~~	~~X~~	~~X~~	~~Functional testing~~	~~Final inspection~~	~~18-24 months~~	~~604.4~~
~~Plug load controls~~	~~X~~	~~None~~	~~Functional testing~~	~~Final inspection~~	~~None~~	~~608.6~~
~~Connection of appliances to switched receptacles~~	~~—~~	~~X~~	~~Field inspection~~	~~None~~	~~18-24 months~~	~~608.6~~
~~Specified transformer nameplate efficiency rating~~	~~X~~	~~None~~	~~Field inspection~~	~~Final inspection~~	~~None~~	~~608.8.1.1~~
~~Verification of lamp~~	~~X~~	~~X~~	~~Field inspection~~	~~Final inspection~~	~~18-24 months~~	~~608.10~~
~~Verification of ballast~~	~~X~~	~~None~~	~~Field inspection~~	~~Final inspection~~	~~None~~	~~608.10~~
~~Lighting controls~~						
~~a. Installation~~	~~X~~	~~None~~	~~Field inspection~~	~~Post-installation~~	~~None~~	~~608.11~~
~~b. Calibration~~	~~X~~	~~X~~	~~System installer/contractor or commissioning agent~~	~~Post-installation~~	~~18-24 months~~	~~611.3.3~~

(portions of Table not shown remain unchanged)

Delete without substitution

~~**A106 ENERGY CONSERVATION, EFFICIENCY AND EARTH ATMOSPHERIC QUALITY**~~

Reason: The IGCC energy chapter is the largest impediment for those considering adopting the IGCC. Many code officials just want to use the IECC. Few can read through Chapter 6 and understand it. Even catching up with all the accumulated changes in the 2015 IECC will be a challenge to many. The main calculations in the energy chapter, the zEPI and CO2 emission calculations, are not the same as the IECC or ASHRAE 90.1. This is not an overlay to the IECC. With this change the IgCC would refer to the IECC for energy related provisions.

Cost Impact: Will not increase the cost of construction The IgCC will now refer to the IECC for practically all of the energy related provisions.

GEW4-14: 601.3-KLEIN1191

GEW5-14

601.3, 605.1, 606.1, 607.1, 608.1

Proponent: Jim Edelson, New Buildings Institute, representing New Buildings Institute; Maureen Guttman (mguttman@ase.org); David Collins (dcollins@preview-group.com)

Revise as follows:

601.3 Application. Buildings and their associated building sites shall comply with Section 601.3.1 or Section 601.3.2. Where a requirement is provided in this chapter, it supersedes the corresponding requirement in the *International Energy Conservation Code.* For all other requirements, the building and the associated building site shall comply with the *International Energy Conservation Code.*

605.1 Prescriptive compliance. ~~Where buildings are~~ Buildings designed using the prescriptive-based compliance path in accordance with Section 601.3.2~~., *building thermal envelope* systems~~ shall comply with ~~the provisions of Section C402 of the *International Energy Conservation Code* and~~ the provisions of this section.

606.1 Prescriptive compliance. ~~Where buildings are~~ Buildings designed using the prescriptive-based compliance path in accordance with Section 601.3.2, ~~building mechanical systems~~ shall comply with ~~the provisions of the *International Energy Conservation Code* and~~ the provisions of this section.

607.1 Prescriptive compliance. ~~Where buildings are~~ Buildings designed using the prescriptive-based compliance path in accordance with Section 601.3.2, ~~service water heating systems~~ shall comply with ~~the provisions of the *International Energy Conservation Code* and~~ the provisions of this section.

608.1 ~~**General.**~~ **Prescriptive compliance.** ~~Where buildings are~~ Buildings designed using the prescriptive-based compliance path in accordance with Section 601.3.2~~, building electrical power and lighting systems~~ shall comply with the ~~provisions of the *International Energy Conservation Code* and the~~ provisions of this section ~~Section 608~~.

Reason: One of the most frequently asked questions about the IgCC is how does its measures and provisions relate to the IECC?

Section 101.2 clearly states that the IgCC is an 'overlay' code, and that the IgCC is not a "standalone" code. But no further guidance is given on how specific measures in the IgCC "overlay" related, or partially related, measures in the IECC.

This proposal uses language similar to that found in ASHRAE 189.1 to define 189.1's relationship to ASHRAE 90.1. By placing this clear direction about the overlay nature of the IgCC into the Application Section 601.3, the proposal is able to delete duplicate language in each of the 60x.1 sections. This existing language is inconsistent between sections and is more ambiguous. The proposal also makes the title of 608.1 consistent with the other parallel sections.

Cost Impact: Will not increase the cost of construction.

GEW5-14: 601.3-EDELSON1046

GEW6-14
601.3, 601.3.1, 601.3.2

Proponent: David Collins, The Preview Group, Inc., representing American Institute of Architects (dcollins@preview-group.com)

Revise as follows:

601.3 Application. Buildings and their associated building sites shall comply with Section 601.3.1 or Section 601.3.2.

601.3.1 Performance-based compliance. Buildings designed on a performance basis shall comply with Sections C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7 of the *International Energy Conservation Code* and Sections 602, 608.6, 609, 610 and 611.

601.3.2 Prescriptive-based compliance. Buildings designed on a prescriptive basis shall comply with Sections C402, C403, C404 and C405 of the *International Energy Conservation Code* and the requirements of Sections 605, 606, 607, 608, 609, 610 and 611.

Reason: Clarifies the intent that this chapter is used as an overlay to the IECC, explicitly drawing a parallel between the IECC performance path and the IgCC performance path, and between the IECC prescriptive path and the IgCC prescriptive path.

Cost Impact: Will not increase the cost of construction

Analysis: The *International Energy Conservation Code* sections referenced in the text of this proposal are section numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section numbers for the 2015 Editions will be C402.5, C403.2, C404, C405.2, C405.3, C405.4, C405.5, C405.6 in Section 601.3.1 of this proposal (One of the referenced sections was deleted.) In Section 601.3.2 none of these sections changed for 2015 IECC.

GEW6-14: 601.3.1-COLLINS617

GEW7-14
601.3, 601.3.1, 601.3.2, 601.4

Proponent: Jack Bailey, One Lux Studio, representing self (jbailey@oneluxstudio.com)

Revise as follows:

601.3 Application. Buildings and their associated building sites shall comply with Section 601.3.1 or Section 601.3.2.

601.3.1 Performance-based compliance. Buildings designed on a performance basis shall comply with Sections 602, 608.6, 609, <u>and</u> 610 ~~and 611~~.

601.3.2 Prescriptive-based compliance. Buildings designed on a prescriptive basis shall comply with the requirements of Sections 605, 606, 607, 608, 609, <u>and</u> 610 ~~and 611~~.

601.4 Minimum requirements. Buildings shall be provided with metering complying with Section 603, and commissioning complying with Section 611. Where required in accordance with Section 604.1, building shall be provided with automated-demand response complying with Section 604.

Reason: There is no reason to list Section 611 in 601.3.1 and 601.3.2 when it is already listed as a minimum requirement in 601.4, and other "minimum requirements" in 601.4 are not listed in 601.3.1 and 601.3.2.

Cost Impact: Will not increase the cost of construction.

GEW7-14: 601.3.1-BAILEY587

GEW8-14
601.3.1

Proponent: Glenn Heinmiller, Lam Partners Inc., representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

601.3.1 Performance-based compliance. Buildings designed on a performance basis shall comply with Sections 602, 608.6, <u>608.7, 608.8, 608.9</u>, 609, 610 and 611.

Reason: The three items added by this proposal should be included in performance-based compliance calculations. 608.7 covers efficiency of transformers and electrical feeders, 608.8 includes fuel-gas lighting systems in energy calculations, and 608.9 expands the scope of exterior lighting efficiency provisions in the IGCC to include all site lighting, not just lighting that is powered through the building's electrical service. The performance path should not provide an exception from these basic efficiency requirements

Cost Impact: Will not increase the cost of construction.

GEW8-14: 601.3.1-HEINMILLER671

GEW9-14
601.3

Proponent: Jim Edelson, New Building Institute, representing New Buildings Institute (edelson8@gmail.com)

Revise as follows:

601.3 Application. Buildings and their associated building sites shall comply with Section 601.3.1 or Section 601.3.2, <u>and with not less than two of the following sections: C406.2, C406.3, C406.4, C406.6 and C406.7 of the *International Energy Conservation Code*. Tenant spaces shall comply with Section C406.1.1, of the *International Energy Conservation Code*.</u>

Reason: The modeled performance compliance path in the IgCC requires a 10% performance improvement over the IECC. However, there are questions about whether the prescriptive path offers equivalent savings. For example, the prescriptive path does not require an efficiency improvement for HVAC equipment above federal minimum standards and does not require reductions in LPD. Additionally, the updates to the 2015 edition of the IECC have absorbed some IgCC prescriptive requirements from the 2012 IgCC, narrowing the performance gap even more. Though the IgCC prescriptive path has not been modeled to the best of our knowledge, it is difficult to believe that the prescriptive path in the IgCC delivers the same level of efficiency as the modeled performance path, making it a compliance loophole.

One of the important changes approved for the 2015 IECC increased the number of packages in Section 406 from three to six. The energy savings of the IgCC prescriptive path can be enhanced by using this existing code language in the IECC. In the 2015 IECC, buildings must comply with one of six packages from section 406 of the IECC. This proposal improves the efficiency of the IgCC prescriptive path by requiring buildings to comply with no less than 2 packages. Because the renewable measure in Section C406.5 is already largely required by Section 610 of the IgCC, there are five packages to select from. This proposal will allow the prescriptive path of the IgCC to deliver a higher level of efficiency more closely equivalent to the modeled performance path. Tenant spaces which generally have less flexibility in their construction options are able to use the tenant provisions of the IECC.

Cost Impact: Will increase the cost of construction

Analysis: The International Energy Conservation Code sections referenced in the text of this proposal are section numbers for the 2015 Edition. Section C406 of the IECC was substantially revised and this proposal addresses the 2015 provisions.

GEW9-14: 601.3-EDELSON1121

GEW10-14
604, 611, 601.4

Proponent: Gary Klein, Affiliated International Management LLC, representing self (gary@aim4sustainability.com); Craig Conner (craig.conner@mac.com)

Revise as follows:

601.4 Minimum requirements. Buildings shall be provided with metering complying with Section 603.~~, and commissioning complying with Section 611. Where required in accordance with Section 604.1, building shall be provided with automated-demand response complying with Section 604.~~

~~**604 AUTOMATED DEMAND RESPONSE (AUTO-DR) INFRASTRUCTURE**~~

~~**611 ENERGY SYSTEMS COMMISSIONING AND COMPLETION**~~

Reason: The purpose of this proposal is to remove provisions that are duplicative of the IECC or are overly complex. The intent of the proposal is to completely delete Sections 604 and 611.

Cost Impact: Will not increase the cost of construction. The proposal removes provisions.

GEW10-14: 601.4- KLEIN1194

GEW 11-14
601.5, 601.5.1, 601.5.2

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com); Craig Conner (craig.conner@mac.com)

Delete without substitution:

~~**601.5 Multiple buildings on a site and mixed use buildings.** Where there is more than one building on a site and where a building has more than one use in the building, each building or each portion of a building associated with a particular use shall comply with Sections 601.5.1 or 601.5.2 or a combination of both.~~

~~**601.5.1 Multiple buildings on a site.** For building sites with multiple buildings, the energy use associated with the building site shall be assigned on a proportional basis to each building based on total gross floor area of each building in relation to the total gross floor area of all buildings on the building site.~~

~~Where energy is derived from either renewable or waste energy, or both sources located on the building site, within individual buildings, or on individual buildings and delivered to multiple buildings, the energy so derived shall be assigned on a proportional basis to the buildings served based on building gross floor area. Energy delivered from renewable and waste energy sources located on or within a building shall be assigned to that building.~~

> ~~**Exception:** Where it can be shown that energy to be used at the building site is associated with a specific building, that energy use shall be assigned to that specific building.~~

~~**601.5.2 Mixed use buildings.** Where buildings have more than one use, the energy use requirements shall be based on each individual occupancy.~~

Reason: The concepts behind the provisions in these sections are already included in the IECC.

Cost Impact: Will not increase the cost of construction. The proposal removes redundant provisions.

GEW 11-14: 601.5-KLEIN119

GEW12-14
601.5.1

Proponent: Jack Bailey, One Lux Studio, representing self (jbailey@oneluxstudio.com)

Revise as follows:

601.5.1 Multiple buildings on a site. For building sites with multiple buildings, the energy use associated with the building site shall be assigned on a proportional basis to each building based on total ~~gross~~ net floor area of each building in relation to the total ~~gross~~ net floor area of all buildings on the building site.

Where energy is derived from either renewable or waste energy, or both sources located on the building site, within individual buildings, or on individual buildings and delivered to multiple buildings, the energy so derived shall be assigned on a proportional basis to the buildings served based on building ~~gross~~ net floor area. Energy delivered from renewable and waste energy sources located on or within a building shall be assigned to that building.

> **Exception:** Where it can be shown that energy to be used at the building site is associated with a specific building, that energy use shall be assigned to that specific building.

Reason: Large campuses will often have dedicated "energy" buildings which contain centralized district heating and district cooling system equipment. These buildings contain little or no net floor area, but can contain large gross floor areas. It makes more sense that energy used and renewable energy generated would be distributed across a multi-building site based on net floor area rather than gross floor area so that energy is attributed to building spaces where energy is used, not the central heating and cooling plants which are serving those spaces.

Furthermore, *net floor area* is a defined term in this code, but "gross floor area" is not.

Cost Impact: Will not increase the cost of construction.

GEW12-14: 601.5.1 #1-BAILEY588

GEW13-14
601.5.1

Proponent: Jack Bailey, One Lux Studio, representing self (jbailey@oneluxstudio.com)

Revise as follows:

601.5.1 Multiple buildings on a site. For building sites with multiple buildings, the energy use associated with the building site shall be assigned on a proportional basis to each building based on total gross floor area of each building in relation to the total gross floor area of all buildings on the building site.

Where energy is derived from either renewable or waste energy, or both sources located on the building site, ~~within individual buildings,~~ or ~~on~~ in individual buildings and delivered to multiple buildings, the energy so derived shall be assigned on a proportional basis to the buildings served based on building gross floor area. ~~Energy delivered from renewable and waste energy sources located on or within a building shall be assigned to that building.~~

> **Exception:** Where it can be shown that energy to be used at the building site is associated with a specific building, that energy use shall be assigned to that specific building.

Reason: Editorial. The intent of the first sentence seems clear, but the wording is confusing. The last sentence appears to directly contradict the first sentence, and should be deleted.

Cost Impact: Will not increase the cost of construction.

GEW13-14: 601.5.1 #2-BAILEY589

GEW14-14
601.6 (New)

Proponent: Garrett Stone, Brickfield, Burchette, Ritts & Stone, representing Brickfield, Burchette, Ritts & Stone (gas@bbrslaw.com); Brian Dean (Brian.Dean@icfi.com); William Prindle (william.prindle@icfi.com); Maureen Guttman (mguttman@ase.org); Harry Misuriello (misuriello@verizon.net)

Add new text as follows:

601.6 Maximum envelope values under all compliance methods. Regardless of the method of compliance with this code, the area-weighted average U- factor, C-factor, F-factor and SHGC values applicable to each component of the building envelope shall not exceed by more than 10 percent the values specified in Tables C402.1.2 and C402.3 of the *International Energy Conservation Code*.

Reason: This proposal promotes energy conservation and environmental stewardship by adding a reasonable mandatory backstop for thermal envelope measures. The thermal envelopes of buildings designed and constructed today may be in existence for 100 years or more. Over the building's useful life, there will be regular changes in lighting, heating and cooling equipment, and other measures that can be accomplished without disturbing the building shell. However, the passive components of the thermal envelope – such as insulation – are likely to remain unchanged for much longer periods of time.

The IGCC is designed to enhance sustainability at all phases of the building – from design and construction to additions and alterations to removal and demolition. Buildings properly designed and constructed today will require fewer alterations in the future – and will result in lower impacts on the environment. This is why the most permanent elements of the building – components of the thermal envelope – must be built to a level of efficiency that will not be a burden to later owners and operators of the building.

The new section 601.6 we are proposing will apply an area-weighted cap or limit on the use of thermal envelope components to ensure prudent levels of performance are achieved by each envelope component in all buildings. Specifically, this new section allows each component to exceed the prescriptive requirements of the IGCC by roughly 20% (the current IGCC requires a 10% improvement over the IECC values; this proposal allows trade-offs of envelope values up to 10% higher than what the IECC allows). This approach will allow substantial trade-off flexibility while still ensuring that all envelope measures will exceed some reasonable level of performance.

The buildings designed and constructed today will be a part of the urban landscape for generations to come. It is important that the permanent envelope of each new building meets a level of efficiency within a reasonable range of the IGCC's envelope requirements.

Cost Impact: Will increase the cost of construction

Analysis: The International Energy Conservation Code tables referenced in the text of this proposal are numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the table numbers for the 2015 Editions will be C402.1.4 and C402.4

GEW14-14: 601.6 (NEW)-STONE916

GEW15-14
602, 602.1, 602.1.1, A106

Proponent: David Collins, The Preview Group, Inc., representing American Institute of Architects (dcollins@preview-group.com)

Revise as follows:

602 ~~MODELED PERFORMANCE PATHWAY REQUIREMENTS~~ <u>PERFORMANCED-BASED COMPLIANCE</u>

602.1 Performance-based compliance. Compliance for buildings and their sites to be designed on a performance basis shall be determined by predictive modeling <u>of both energy performance and CO_2e emissions</u>. Predictive <u>energy</u> modeling shall use source energy kBtu/sf-y unit measure based on compliance with Section 602.1.1 and ~~CO_2e emissions in Section 602.3. Where a building has mixed uses, all uses shall be included in the performance-based compliance~~ <u>Section 602.1.2. Predictive CO_2e emissions modeling shall be in accordance with Section 602.2</u>.

602.1.1 zEPI. Performance-based designs shall demonstrate a zEPI of not more than ~~51~~ <u>50</u> as determined in accordance with Equation 6-1 ~~for energy use reduction and shall demonstrate a CO_2e emissions reduction in accordance with Section 602.2 and Equation 6-2 for CO_2e~~.

zEPI = 57 x (EUIp/EUI) **(Equation 6-1)**

where:

EUIp = 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.

<u>57 = a fixed value establishing the relationship between EUI and EUIp and the maximum zEPI.</u>

TABLE A106
ENERGY CONSERVATION AND EFFICIENCY

SECTION	DESCRIPTION	MINIMUM NUMBER OF ELECTIVES REQUIRED AND ELECTIVES SELECTED
A102.2	The jurisdiction shall indicate a number between and including 0 and up to and including 10 to establish the minimum total number of project electives that must be satisfied.	—
A106.1	zEPI reduction project electives	☐Yes ☐No
A106.1	Project zEPI is at least 5 points lower than required by Table 302.1	☐1 elective
A106.1	Project zEPI is at least 10 points lower than required by Table 302.1	☐2 electives
A106.1	Project zEPI is at least 15 points lower than required by Table 302.1	☐3 electives
A106.1	Project zEPI is at least 20 points lower than required by Table 302.1	☐4 electives
A106.1	Project zEPI is at least 25 points lower than required by Table 302.1	☐5 electives
A106.1	Project zEPI is at least 30 points lower than required by Table 302.1	☐6 electives
A106.1	Project zEPI is at least 35 points lower than required by Table 302.1	☐7 electives
A106.1	Project zEPI is at least 40 points lower than required by Table 302.1	☐8 electives

A106.1	Project zEPI is at least 45 points lower than required by Table 302.1	☐9 electives	
A106.1	Project zEPI is at least ~~51~~ <u>50</u> points lower than required by Table 302.1	☐10 electives	
A106.2	Mechanical systems project elective	☐Yes	☐No
A106.3	Service water heating	☐Yes	☐No
A106.4	Lighting systems	☐Yes	☐No
A106.5	Passive design	☐Yes	☐No
A106.6	Renewable energy systems—5 percent	☐Yes	☐No
A106.6	Renewable energy systems—10 percent	☐Yes	☐No
A106.6	Renewable energy systems—20 percent	☐Yes	☐No

Reason: zEPI is a critical piece of the goals included in the IgCC that focuses the energy performance of buildings and sites on achieving a zero net energy design for buildings. Simply replacing it with a percentage ignores that concept and as everyone knows reductions by a percentage never get you there. zEPI points to a unit on a scale that goes from a theoretical 100 to zero where 100 equal actual performance for existing buildings as identified in the CBECS data based and 57 equals the 2012 IECC.

The 57 on that scale is a fixed number which was assumed as part of the 2012 IgCC to equate to the performance of the 2012 IECC energy performance. The 50 represents a 10% reduction from what the IECC would allow. To truly get to a zero energy performance goal will require adjusting zEPI each code cycle. This change indicates that zEPI should be adjusted to 50, which would lead to steps as follows:

2015 - zEPI = 50
2018 - zEPI = 40
2021 -zEPI = 30
2024 - zEPI = 20
2027 - zEPI = 10
2030 - zEPI = 0

We believe that communities which wish to achieve zero energy design buildings are looking to this code for that approach to clearly be outlined and included in the code.

In addition, a change to Table A106 has been modified to be consistent with this change.

Cost Impact: Will not increase the cost of construction.

GEW15-14: 602-COLLINS618

GEW16-14
602.1.1, 602.1.2

Proponent: Jack Bailey, One Lux Studio, representing self (jbailey@oneluxstudio.com)

Revise as follows:

602.1.1 zEPI. Performance-based designs shall demonstrate a zEPI of not more than 51 as determined in accordance with Equation 6-1 for energy use reduction and shall demonstrate a CO_2e emissions reduction in accordance with Section 602.2 and Equation 6-2 for CO_2e.

zEPI = 57 x (EUIp/EUI) **(Equation 6-1)**

where:

EUIp = the proposed <u>annual</u> 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.

602.1.2 ~~Base annual~~ <u>Annual</u> energy use index. The <u>base and</u> proposed <u>annual</u> energy use index ~~(EUIp)~~ 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.

Reason: Editorial. Section 602.1.2 is used to determine both the base and the proposed annual energy use index. The word "annual" is added to EUIp for clarity.

Cost Impact: Will not increase the cost of construction.

GEW16-14: 602.1.1-BAILEY624

GEW17-14
602.1.2

Proponent: David Collins, The Preview Group, Inc., representing American Institute of Architects (dcollins@preview-group.com)

Revise as follows:

602.1.2 ~~Base annual~~ Annual energy use ~~index~~ indices. The proposed energy use index (EUIp) and the base energy use index (EUI) 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~~ 602.1.2.2. The annual energy use shall include all energy used for building and building site functions and ~~its~~ anticipated occupancy.

Reason: This proposal seeks to clarify that this Section directs the user to perform modeling for both the proposed and base project designs using the Appendix G of ASHRAE 90.1, as modified

Cost Impact: Will not increase the cost of construction.

GEW17-14: 602.1.2-COLLINS693

GEW18-14
602.1.2, 602.1.2.2

Proponent: Neil Leslie, Gas Technology Institute, representing self (neil.leslie@gastechnology.org)

Revise as follows:

602.1.2 ~~Base annual~~ Annual energy use index calculation. ~~The proposed energy use index (~~EUIp~~) of the building and building site~~ and EUI 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.

602.1.2.2 Electric power. In calculating EUIp and EUI ~~the annual energy use index~~, 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.

TABLE 602.1.2.2
U.S. AVERAGE BUILDING FUELS ENERGY CONVERSION FACTORS BY FUEL TYPE[a]

FUEL TYPE	ENERGY CONVERSION FACTOR
Natural Gas	1.09
Fuel Oil	1.13
LPG	1.12

a. Source: Gas Technology Institute Source Energy and Emissions Analysis Tool.

Reason: Increases clarity and simplifies language.

Cost Impact: Will not increase the cost of construction.

GEW18-14: 602.1.2-LESLIE975

GEW19-14
602.1.2.3

Proponent: Jack Bailey, One Lux Studio, representing self (jbailey@oneluxstudio.com)

Revise as follows:

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~~ <u>converting</u> 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.

Reason: Editorial. Fuel use needs to be <u>converted</u> to units of energy BTU's before <u>multiplying</u> by the conversion factor.

Cost Impact: Will not increase the cost of construction.

GEW19-14: 602.1.2.3-BAILEY625

GEW20-14
602.1.3

Proponent: David Collins, Preview Group, representing American Institute of Architects (dcollins@preview-group.com)

Delete without substitution:

~~**602.1.3 Registered design professional in responsible charge of building energy simulation.** For purposes of this section, and where it is required that documents be prepared by a *registered design professional*, the *code official* is authorized to require the owner to engage and designate on the building permit application a *registered design professional* who shall act as the registered design professional in responsible charge of building energy simulation. Modelers engaged by the registered design professional in responsible charge of building energy simulation shall be certified by an *approved* accrediting entity. Where the circumstances require, the owner shall designate a substitute registered design professional in responsible charge of building energy simulation who shall perform the duties required of the original registered design professional in responsible charge of building energy simulation. The *code official* shall be notified in writing by the owner whenever the registered design professional in responsible charge of building energy simulation is changed or is unable to continue to perform the duties.~~

Reason: The requirement for a registered design professional in responsible charge is a defined term and is recognized in practice. Adding to the term a qualifier for energy modeling adds a level of complexity that isn't recognized in any form by a sanctioning body and adds confusion to the professions.

Cost Impact: Will not increase the cost of construction.

GEW20-14: 602.1.3-COLLINS697

GEW 21-14
602.2

Proponent: Jack Bailey, One Lux Studio, representing self (jbailey@oneluxstudio.com)

Revise as follows:

602.2 Annual direct and indirect CO_2e emissions. The CO_2e 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 CO_2e emissions associated with the standard reference design in accordance with Equation 6-2.

~~CO_2e pd ≥ (zEPI x CO_2e sr*bd*)/57~~ **~~(Equation 6-2)~~**

<u>CO_2e pd ≤ (zEPI x CO_2e sr*bd*)/57</u> **<u>(Equation 6-2)</u>**

where:

zEPI = ~~the minimum~~ score <u>determined</u> in accordance with Section 602.1.1.

CO_2e pd = emissions associated with the proposed design.

CO_2e sr*bd* = emissions associated with the standard reference budget design in accordance with Section 602.1.2.

Reason: Editorial. The proposal changes the "greater than or equal to" sign in the current equation to "less than or equal to". As stated in 602.2, the emissions associated with the proposed design should be <u>less than</u> the emissions associated with the reference design.

Cost Impact: Will not increase the cost of construction.

GEW21-14: 602.2-BAILEY623

GEW22-14
602.2

Proponent: Neil Leslie, Gas Technology Institute, representing self (neil.leslie@gastechnology.org)

Revise as follows:

602.2 Annual direct and indirect CO_2e emissions. The CO_2e 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 CO_2e emissions associated with the standard reference design in accordance with Equation 6-2.

$$CO_2e\ \mathrm{pd}\ \underline{\leq}\ \cancel{\geq(\mathrm{zEPI} \times}\ CO_2e\ \mathrm{sr}bd)\ \underline{\times\ 51}/57 \qquad \textbf{(Equation 6-2)}$$

where:

zEPI = the minimum score in accordance with Section 602.1.1.

CO_2e pd = emissions associated with the proposed design.

CO_2e sr*bd* = emissions associated with the standard reference budget design in accordance with Section 602.1.2.

Reason: Corrects two errors in equation:

The proposed design CO_2e emissions for compliance need to be less than or equal to the standard reference budget design emissions, not greater than or equal to.

The direct linkage to the proposed design zEPI results in a variable rather than fixed emission compliance requirement for the building. If the proposed design has a zEPI of 51, the equation will be consistent with the zEPI energy performance for minimum compliance. However, at all other compliant proposed design zEPI values the CO_2e emissions compliance requirement will be too stringent. Using the ratio of 51/57 correctly sets a fixed baseline compliance requirement based on the standard reference energy consumption adjusted for the code minimum energy performance level requirement.

Cost Impact: Will not increase the cost of construction.

GEW22-14: 602.2-LESLIE849

GEW23-14

602.1, 602.1.1, 602.1.2, 602.1.2.1, Table 602.1.2.1, 602.1.2.2, Table 602.1.2.2, 602.1.2.3

Proponent: Charles Foster, Steffes Corporation, representing self (cfoster20187@yahoo.com)

Revise as follows:

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~~ site energy kBtu/sf-y unit measure based on compliance with Section 602.1.1 and CO_2e 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. Performance-based designs shall demonstrate a zEPI of not more than 51 as determined in accordance with Equation 6-1 for energy use reduction and shall demonstrate a CO_2e emissions reduction in accordance with Section 602.2 and Equation 6-2 for CO_2e.

zEPI = 57 x (EUIp/EUI) **(Equation 6-1)**

where:

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

602.1.2 Base annual energy use index. The proposed energy use index (EUIp) 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.

602.1.2.1 Modifications to Appendix G of ASHRAE 90.1. 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.

~~TABLE 602.1.2.1~~
~~ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY EPA eGRID SUB-REGION~~[a]

~~eGRID 2007 SUB-REGION ACRONYM~~	~~eGRID 2007 SUB-REGION NAME~~	~~ENERGY CONVERSION FACTOR~~
~~AKGD~~	~~ASCC Alaska Grid~~	~~2.97~~
~~AKMS~~	~~ASCC Miscellaneous~~	~~1.76~~
~~ERCT~~	~~ERCOT All~~	~~2.93~~
~~FRCC~~	~~FRCC All~~	~~2.97~~
~~HIMS~~	~~HICC Miscellaneous~~	~~3.82~~
~~HIOA~~	~~HICC Oahu~~	~~3.14~~
~~MORE~~	~~MRO East~~	~~3.40~~
~~MROW~~	~~MRO West~~	~~3.41~~

~~eGRID 2007 SUB-REGION ACRONYM~~	~~eGRID 2007 SUB-REGION NAME~~	~~ENERGY CONVERSION FACTOR~~
~~NYLI~~	~~NPCC Long Island~~	~~3.20~~
~~NEWE~~	~~NPCC New England~~	~~3.01~~
~~NYCW~~	~~NPCC NYC/Westchester~~	~~3.32~~
~~NYUP~~	~~NPCC Upstate NY~~	~~2.51~~
~~RFCE~~	~~RFC East~~	~~3.15~~
~~RFCM~~	~~RFC Michigan~~	~~3.05~~
~~RFCW~~	~~RFC West~~	~~3.14~~
~~SRMW~~	~~SERC Midwest~~	~~3.24~~
~~SRMV~~	~~SERC Mississippi Valley~~	~~3.00~~
~~SRSO~~	~~SERC South~~	~~3.08~~
~~SRTV~~	~~SERC Tennessee Valley~~	~~3.11~~
~~SRVC~~	~~SERC Virginia/Carolina~~	~~3.13~~
~~SPNO~~	~~SPP North~~	~~3.53~~
~~SPSO~~	~~SPP South~~	~~3.05~~
~~CAMX~~	~~WECC California~~	~~2.61~~
~~NWPP~~	~~WECC Northwest~~	~~2.26~~
~~RMPA~~	~~WECC Rockies~~	~~3.18~~
~~AZNM~~	~~WECC Southwest~~	~~2.95~~

~~a. Sources: EPA eGrid2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4b and 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data.~~

602.1.2.2 Electric power. In calculating the annual energy use index, 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~~.

~~TABLE 602.1.2.2~~
~~U.S. AVERAGE BUILDING FUELS ENERGY CONVERSION FACTORS BY FUEL TYPE[a]~~

~~FUEL TYPE~~	~~ENERGY CONVERSION FACTOR~~
~~Natural Gas~~	~~1.09~~
~~Fuel Oil~~	~~1.13~~
~~LPG~~	~~1.12~~

~~a. Source: Gas Technology Institute Source Energy and Emissions Analysis Tool.~~

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.~~

Reason: These suggested edits would help to streamline the IgCC and improve the accounting of energy usage in Chapter 6.

They would also make the IgCC easier to understand, easier to enforce, easier to measure, easier to verify performance, and make the code consistent with ASHRAE Standard 189.1, which uses site energy metrics.

In addition, this proposal would bring that will be in line with the agreement between ASHRAE, USGBC, AIA, and IESNA.

Although zEPI is a relatively new concept and has not been used in any other enforceable building code, it offers promise so far as tracking the energy efficiency performance of buildings towards a goal of "net zero." In the first publication of the IgCC, the code used a version of ZEPI that required users to convert calculated annual site energy consumption into "source energy" units. However, ZEPI works with any consistent energy unit input, whether it be site or source energy units.

This proposal would eliminate the extra steps involved in converting site to source energy and would make the process more consistent with ICC affiliates that have consciously chosen to use site energy metrics.

For example, the conclusion by a panel of experts that published the ASHRAE *Report of the Technology Council Ad Hoc Committee on Energy Targets* (June 2010) concluded:

"The Vision 2020 Ad Hoc also realized that in order to make such a vision a reality, they would need to define a single meaning for net-zero energy building. The conclusion they reached is supported by this Energy Targets Ad Hoc. Quoting from the Vision 2020 report:

'Ultimately, the only way to measure if a building is a NZEB is to look at the energy crossing the boundary. Other definitions, including source, emissions, and cost, are based on this measured information and include weighting factors and algorithms to get to the metric of interest. Because of the complications involved in making these computations, **site energy measurements** have been chosen through an agreement of understanding between ASHRAE, the American Institute of Architects (AIA), the U.S. Green Building Council (USGBC), and the Illuminating Engineering Society of North America (IESNA).' "

In addition, in a report entitled *DOE Commercial Building Energy Asset Rating Program Focus Groups with Primary Stakeholders in Seattle,* in a series of focus groups convened by the U.S. Department of Energy, a primary conclusion was that users of building performance data preferred site energy to source energy. One of the key findings of the Report was:

"Including site versus source energy use was confusing or did not provide value. Site information was preferred by most stakeholders.

In another part of the report it stated:

"Comparing site energy use versus source energy use is confusing or does not provide value. Page 1 of the asset rating report compared site energy use and source energy use. Several building stakeholders did not find the source energy use information helpful because they are more concerned with site energy. For example, one participant commented *"When I first looked at this in trying to figure out what it all meant, I ended up just focusing on the "site energy use," I mean, thinking that the "source energy use" really wasn't going to be on anyone's high priority list of evaluations when they're looking at buying a building."* And another participant has this to say about source information: *"As a building owner…do I really care about source energy use? ...I'm just more focused on what's it costing me."* In addition, a few building stakeholders were confused by source energy and did not understand the purpose of presenting the information."

Furthermore, there have been significant changes in energy production since 2005 (more renewable electricity production, more hydraulic fracturing of shale gas, more deepwater drilling and oil sands production of fuel oil) which is not captured in any of the current Chapter 6 table estimates. In addition, no projected estimates are shown for the years 2015 and beyond. These values are not static, and to knowing use significantly incorrect as well as static estimates will create situations that contradict the purpose of this code (e.g., building designers selecting energy types such as fuel oil with a lower source estimate than electricity will lead to many non-green buildings that will increase the amount of oil imports).

Bibliography:

1. DOE CBAR Asset Rating Program focus groups:
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http://www.tc76.org/docs/Energy_Targets_Report_2010-06-22.pdf

3. Fossil fuel upstream source energy estimates and emissions information:
http://www.netl.doe.gov/energy-analyses/pubs/NG-GHG-LCI.pdf
http://www.pnas.org/content/early/2011/10/13/1107409108.full.pdf
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Cost Impact: Will not increase the cost of construction.

GEW23-14: 602.1-FOSTER456

GEW24-14

602, 602.1, 602.1.1, 602.1.2, 602.1.2.1, Table 602.1.2.1, 602.1.2.2, Table 602.1.2.2, 602.1.2.3, 602.1.3, 602.2, 602.2.1, 602.2.2, Table 602.2.2, 602.2.3

Proponent: Maureen Guttman, Building Codes Assistance Project, representing Building Codes Assistance Project (mguttman@ase.org)

Revise as follows:

602 ~~MODELED PERFORMANCE PATHWAY REQUIREMENTS~~ PERFORMANCE-BASED COMPLIANCE

602.1 Performance-based compliance. Compliance for buildings and their sites to be designed on a performance basis shall be determined by predictive modeling of both energy performance and CO_2e emissions. Predictive energy modeling shall use source energy kBtu~~/sf-y~~ unit measure based on compliance with ~~Section 602.1.1 and CO_2e emissions in Section 602.3. Where a building has mixed uses, all uses shall be included in the performance-based compliance~~ Section 602.2. Predictive CO_2e emissions modeling shall be in accordance with Section 602.3.

~~602.1.1 zEPI~~ 602.2 Energy performance modeling. Performance-based designs shall demonstrate a zEPI of not more than ~~51~~ 50 as determined in accordance with Equation 6-1 ~~for energy use reduction and shall demonstrate a CO_2e emissions reduction in accordance with Section 602.2 and Equation 6-2 for CO_2e~~.

zEPI = 57 x (Proposed building performance/Baseline building performance) ~~(EUIp/EUI)~~

(Equation 6-1)

where:

~~EUIp = 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.~~

Proposed Building Performance = The proposed building performance in source kBtu for the proposed design of the building and its site calculated in accordance with Section 602.2.1.

Baseline Building Performance = The baseline building performance in source kBtu for a baseline building and its site calculated in accordance with Section 602.2.1.

57 = A fixed value representing the performance of a baseline building designed to comply with the 2012 *International Energy Conservation Code.*

~~602.1.2 Base annual energy use index.~~ 602.2.1 Modeling methodology. The proposed ~~energy use index (EUIp)~~ building performance and the baseline building performance 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~~ Section 602.2.1.1 and Section 602.2.1.2. The ~~annual~~ energy use modeling shall include all energy used for building and site functions and ~~its~~ anticipated occupancy.

~~602.1.2.1~~ 602.2.1.1 ~~Modifications to Appendix G of ASHRAE 90.1~~ Energy units. The ~~performance rating~~ building performance calculations in Section ~~G1.2~~ G3 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. 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 Btus and multiplying by the conversion factor in Table 602.1.2.2 based on the geographical location of the building.

TABLE ~~602.1.2.1~~ 602.2.1.1
ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY EPA

(portions of table not shown remain unchanged)

~~602.1.2.2 Electric power~~ 602.2.1.2 Site to source electric power conversion. In calculating the ~~annual energy use index~~ the proposed building performance and the baseline building performance, electric energy used shall be calculated in source energy ~~consistent units~~ by ~~converting~~ multiplying the electric power use at the utility meter or measured point of delivery ~~to~~ in 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.~~

TABLE ~~602.1.2.2~~ 602.2.1.2
U.S. AVERAGE BUILDING FUELS ENERGY CONVERSION FACTORS BY FUEL TYPE[a]

FUEL TYPE	ENERGY CONVERSION FACTOR
Natural Gas[a]	1.09
Fuel Oil[a]	1.13
LPG[a]	1.12
Purchased District Heating - Hot Water	1.35
Purchased District Heating - Steam	1.45
District Cooling	0.33 x value in Table 602.1.2.1
Other	1.1

a. Source: Gas Technology Institute Source Energy and Emissions Analysis Tool.

~~**602.1.3 Registered design professional in responsible charge of building energy simulation.** For purposes of this section, and where it is required that documents be prepared by a *registered design professional*, the *code official* is authorized to require the owner to engage and designate on the building permit application a *registered design professional* who shall act as the registered design professional in responsible charge of building energy simulation. Modelers engaged by the registered design professional in responsible charge of building energy simulation shall be certified by an *approved* accrediting entity. Where the circumstances require, the owner shall designate a substitute registered design professional in responsible charge of building energy simulation who shall perform the duties required of the original registered design professional in responsible charge of building energy simulation. The *code official* shall be notified in writing by the owner whenever the registered design professional in responsible charge of building energy simulation is changed or is unable to continue to perform the duties.~~

~~602.2 Annual direct and indirect CO_2e emissions~~ 602.3 CO_2e emissions modeling. The CO_2e emissions ~~calculations~~ for the proposed and baseline building and building site shall be ~~determined~~ based on the proposed and baseline building performance calculated in accordance with Sections 602.2.1 and ~~602.2.2~~ as modified by Sections 602.3.1 and 602.3.2. The emissions associated with the proposed design shall be less than ~~or equal to~~ the CO_2e emissions associated with the standard reference design in accordance with Equation 6-2.

CO_2e pdp ≥ (zEPI x CO_2e ~~srbd~~bbp)/57 **(Equation 6-2)**

where:

zEPI = the minimum score in accordance with Section ~~602.1.1~~ 602.2.

CO_2e pdp = emissions associated with the proposed ~~design~~ building performance.

CO_2e ~~srbd~~ bbp=emissions associated with the ~~standard reference budget design~~ baseline building performance in accordance with Section 602.1.2.

57 = A fixed value representing CO_2e emissions of a baseline building designed to comply with the 2012 *International Energy Conservation Code*.

~~602.2.1~~ 602.3.1 ~~Onsite~~ CO_2e emissions from electricity. Emissions associated with use of electric power shall be ~~based on electric power excluding any renewable or recovered waste energy covered under Section 602.2.1. Emissions shall be~~ calculated by converting the electric power used by the building at the electric utility meter or measured point of delivery, to MWHs, and multiplying by the CO_2e conversion factor in Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

~~602.2.2~~ 602.3.2 Onsite nonrenewable energy. Emissions associated with the use of nonrenewable energy sources other than electrical power ~~such as natural gas, fuel oil, and propane~~ shall be calculated by multiplying the fossil fuel energy used by the building and its site at the utility meter by the national emission factors in Table 602.2.2 ~~and the conversions required by this section~~. ~~Emissions associated with fossil fuels not specified in Table 602.2.2 shall be calculated by multiplying the fossil fuel used by the building at the utility meter by 250~~. Emissions associated with purchased ~~district energy shall be calculated by multiplying the energy used by the building at the utility meter by 150 for hot water and steam, and for~~ district cooling shall be calculated by multiplying by the factors from Table ~~602.2.2~~ 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

~~TABLE 602.2.2~~ 602.3.2
~~FOSSIL FUEL EMISSION FACTORS~~

~~EMISSION RATE (lb/MMbtu HHV)~~	~~NATURAL GAS AS STATIONARY FUEL~~	~~FUEL OIL AS STATIONARY FUEL~~	~~PROPANE AS STATIONARY FUEL~~
~~CO_2e~~	~~137.35~~	~~200.63~~	~~162.85~~

~~For SI: MMBtu = 1,000,000 Btu = 10 terms: HHV = High-heating value.~~

TABLE 602.3.2
FOSSIL FUEL EMISSION FACTORS

STATIONARY FUEL TYPE	EMISSION FACTOR
Natural Gas	13.7.35
Fuel Oil	200.63
Propane	162.85
Other Fossil Fuels	250.00
Purchased District Energy – Hot water and steam	150.00

For SI: MMBtu – 1,000,000 Btu = 10 terms; HHV = High-heating value.

~~**602.2.3 Annual direct and indirect CO_2e emissions associated with onsite use of fossil fuels and purchased district energy.** Emissions associated with the use of natural gas, fuel oil and, propane shall be calculated by multiplying the natural gas, fuel oil, and propane delivered to the building at the utility meter by the corresponding emission factors in Table 602.2.2. Emissions associated with fossil fuels not listed shall be calculated by multiplying the fossil fuel delivered to the building at the utility meter by 250.~~

~~Emissions associated with purchased district heating shall be calculated by multiplying the heating energy delivered to the building at the utility meter by 150 for hot water and steam, and for district cooling, the factors from Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.~~

Reason: This proposal clarifies and simplifies Section 602 of the IgCC by cleaning up language, reorganizing the sections, and reducing the zEPI calculation to the basic required units.

602.1 This Section clearly states that modeling shall produce information on both energy performance and CO2e emissions, and changes the energy units from kBtu/sf-y to kBtu.

602.1.1 (new 602.2) This proposal is a modification on that submitted by the American Institute of Architects. Instead of using EUI and EUIp, this proposal uses the units and language that are found in ASHRAE Appendix G for clarity and consistency. The EUI concept is not forsaken, but the need to divide the energy use by building area is an unnecessary complication, since the baseline building and proposed building will be exactly the same. Furthermore, it is unnecessary to specify that the energy use is "annual", since whatever measure of time is used must be consistent for both the baseline and proposed calculations.

We agree with AIA that zEPI is a critical piece of the goals included in the IgCC that focuses the energy perfomance of buildings and sites on achieving a zero net energy design for buildings. zEPI points to a unit on a scale that goes from a theoretical 100 to zero where 100 equal actual performance for existing buildings as identified in the 2003 CBECS database and 57 equals the performance level associated with the 2012 IECC.

The 57 on that scale is a fixed number which was assumed as part of the 2012 IgCC to equate to the performance of the 2012 IECC energy performance. The 50 represents a 10% reduction from what the IECC would allow. To truly get to a zero energy performance goal will require adjusting zEPI each code cycle. This change indicates that zEPI should be adjusted to 50, which would lead to steps as follows:

2015 - zEPI = 50
2018 - zEPI = 40
2021 -zEPI = 30
2024 - zEPI = 20
2027 - zEPI = 10
2030 - zEPI = 0

We believe that communities which wish to achieve zero energy design buildings are looking to this code for that approach to clearly be outlined and included in the code.

602.1.2 (new 602.2.1) This Section is renumbered to be a direct subsection of 602.2, in that it builds on the zEPI requirement with further information on how the building performance modeling shall be done. The language is cleaned up to make it clear that the modeling shall be done in accordance with ASHRAE Appendix G as modified.

602.1.2.1 (new 602.2.1.1) The title of this Section did not make sense, as required modifications were identified in multiple Sections. The change to Section G3 of ASHRAE 90.1 refers directly to the modeling methodology, whereas the previously referenced Section G1.2 addressed Performance Rating. This Section also incorporates a provision formerly in Section 602.1.2.3, as it is related to the calculation of energy units.

602.1.2.2 (new 602.2.1.2) The title of this Section is changed to clarify the actual purpose of the Section, which constitutes the second required modification to Appendix G. The language is amended for clarity.

602.1.2.3 is deleted in its entirety. The first sentence of the Section is moved up to Section 602.1.2.1 (new 602.2.1.1), and the other sentences are deleted in favor of providing the information in Table 602.1.2.2 with the other fuel conversion factors.

Table 602.1.2.2 is expanded to include the fuel conversion factors formerly in 602.1.2.3, and the footnote marking is clarified to be applicable only to NG, Fuel Oil, and LPG.

602.1.3 is deleted in its entirety. The requirement for a registered design professional in responsible charge is a defined term and is recognized in practice. Adding to the term a qualifier for energy modeling adds a level of complexity that isn't recognized in any form by a sanctioning body and adds confusion to the professions.

602.2 (new 602.3) is amended to more closely parallel the language in 602.1.1 and 602.1.2 (new 602.2).

The abbreviations used in the calculation are changed to correlate with the definitions provided.

602.2.1 (new 602.3.1) and 602.2.2 (new 602.3.2) The titles are changed for clarity.

Table 602.2.2 (new Table 602.3.2) is replaced to include the emission conversion factors formerly in 602.2.2.

Cost Impact: Will not increase the cost of construction

GEW24-14: 602-GUTTMAN939

GEW25-14

202, 302.1, 302.1.1, 601.3, 601.3.1, 602.1, 602.1.2, 602.1.2.1, 602.1.2.3, 602.2, 602.2.1, 602.2.2, 602.2.3, A106, A106.1

Proponent: Mark Heizer, Oregon Building Codes Division, representing self (mark.r.heizer@gmail.com)

Delete without substitution:

SECTION 202 DEFINITIONS

~~**ZERO ENERGY PERFORMANCE INDEX (zEPI).** A scalar representing the ratio of energy performance of the proposed design compared to the average energy performance of buildings relative to a benchmark year.~~

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 less in Table 302.1for each occupancy required to have enhanced energy performance.~~

~~3.~~ <u>2.</u> 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 CO_2e EMISSION REDUCTION			
<u>302.1, 601.3, 602.1</u>	<u>Performance-based compliance: The jurisdiction shall indicate whether performance-based energy compliance, as determined in accordance with Section 602.1 is required for buildings with a total floor area of more than 25,000 square feet.</u>	<u>☐Yes</u>	<u>☐No</u>
302.1, ~~302.1.1,~~ <u>601.3, 601.3.1</u> 602.1	~~zEPI of Jurisdictional Choice – The jurisdiction shall indicate a zEPI of 46 or less in each occupancy for which it intends to require enhanced energy performance.~~ <u>Enhanced energy performance: Where the jurisdiction intends to require enhanced energy performance for buildings designed on a performance basis, the jurisdiction shall indicate a required minimum reduction in net energy use for such buildings. The minimum reduction set by the jurisdiction shall be not less than 5 percent as calculated in accordance with Section 602.1.</u>	~~Occupancy: ______~~ ~~zEPI: ___________~~ <u>Minimum Reduction in Net Energy Use: %</u>	
604.1	Automated demand response infrastructure	☐Yes	☐No
CHAPTER 10. EXISTING BUILDINGS			
1007.2	Evaluation of existing buildings	☐Yes	☐No
1007.3	Post Certificate of Occupancy ~~zEPI~~ <u>annual energy use,</u>, energy demand, and CO_2e emissions reporting	☐Yes	☐No

(portions of table not shown remain unchanged)

~~**302.1.1 zEPI of 46 or less.** Where a zEPI of 46 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.~~

Revise as follows:

601.3 Application. Buildings and their associated building sites shall comply with Section 601.3.1 or Section 601.3.2~~.~~ except that, where indicated by the jurisdiction under the Chapter 6 provisions of Table 302.1, buildings with a total building floor area of more than 25,000 square feet and their associated building sites shall be designed on a performance basis in accordance with Section 601.3.1

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 be determined in accordance with Section C407 of the *International Energy Conservation Code*. The proposed design shall not use more energy than the standard reference design. Where indicated under the Chapter 6 provisions of Table 302.1, the proposed design shall further reduce annual energy use by not less than the amount indicated in Table 302.1, as compared to the energy used by the standard reference design. ~~use source energy kBtu/sf-y unit measure based on compliance with Section 602.1.1 and CO2*e* emissions in Section 602.3.~~ Where a building has mixed uses, all uses shall be included in the performance-based compliance.

~~**602.1.1zEPI.** Performance-based designs shall demonstrate a zEPI of not more than 51 as determined in accordance with Equation 6-1 for energy use reduction and shall demonstrate a CO2*e* emissions reduction in accordance with Section 602.2 and Equation 6-2 for CO2*e*.~~

~~zEPI = 57 ´ (EUIp/EUI) **(Equation 6-1)**~~

~~where:~~

~~EUIp = 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.~~

~~**602.1.2 Base annual energy use index.** The proposed energy use index (EUIp) 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.~~

~~**602.1.2.1 Modifications to Appendix G of ASHRAE 90.1.** 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.~~

~~**TABLE 602.1.2.1**~~
~~**ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY EPA eGRID SUB-REGION**~~[a]

~~**eGRID 2007 SUB-REGION ACRONYM**~~	~~**eGRID 2007 SUB-REGION NAME**~~	~~**ENERGY CONVERSION FACTOR**~~
~~AKGD~~	~~ASCC Alaska Grid~~	~~2.97~~

~~AKMS~~	~~ASCC Miscellaneous~~	~~1.76~~
~~ERCT~~	~~ERCOT All~~	~~2.93~~
~~FRCC~~	~~FRCC All~~	~~2.97~~
~~HIMS~~	~~HICC Miscellaneous~~	~~3.82~~
~~HIOA~~	~~HICC Oahu~~	~~3.14~~
~~MORE~~	~~MRO East~~	~~3.40~~
~~MROW~~	~~MRO West~~	~~3.41~~
~~NYLI~~	~~NPCC Long Island~~	~~3.20~~
~~NEWE~~	~~NPCC New England~~	~~3.01~~
~~NYCW~~	~~NPCC NYC/Westchester~~	~~3.32~~
~~NYUP~~	~~NPCC Upstate NY~~	~~2.51~~
~~RFCE~~	~~RFC East~~	~~3.15~~
~~RFCM~~	~~RFC Michigan~~	~~3.05~~
~~RFCW~~	~~RFC West~~	~~3.14~~
~~SRMW~~	~~SERC Midwest~~	~~3.24~~
~~SRMV~~	~~SERC Mississippi Valley~~	~~3.00~~
~~SRSO~~	~~SERC South~~	~~3.08~~
~~SRTV~~	~~SERC Tennessee Valley~~	~~3.11~~
~~SRVC~~	~~SERC Virginia/Carolina~~	~~3.13~~
~~SPNO~~	~~SPP North~~	~~3.53~~
~~SPSO~~	~~SPP South~~	~~3.05~~
~~CAMX~~	~~WECC California~~	~~2.61~~
~~NWPP~~	~~WECC Northwest~~	~~2.26~~
~~RMPA~~	~~WECC Rockies~~	~~3.18~~
~~AZNM~~	~~WECC Southwest~~	~~2.95~~

~~a. Sources: EPA eGrid2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4b and 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data.~~

~~**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 CO2*e* emissions**. The CO2*e* 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 CO2*e* emissions associated with the standard reference design in accordance with Equation 6-2.~~

~~CO_2e pd ≥ (zEPI x CO_2e sr*bd*)/57~~ ~~**(Equation 6-2)**~~

~~where:~~

~~zEPI = the minimum score in accordance with Section 602.1.1.~~

~~CO_2e pd = emissions associated with the proposed design.~~

~~CO_2e sr*bd* = emissions associated with the standard reference budget design in accordance with Section 602.1.2.~~

602.2 Annual direct and indirect CO2*e* emissions. CO_2e emissions for building and building site for the proposed design shall be less than or equal to the CO_2e emissions for the standard reference design. The CO2*e* emissions shall be determined in accordance with Section 7 of ASHRAE 105, utilizing the annual energy use figures from Section 602.1.

~~**602.2.1 Onsite electricity.** Emissions associated with use of electric power shall be based on electric power excluding any renewable or recovered waste energy covered under Section 602.2.1. Emissions shall be calculated by converting the electric power used by the building at the electric utility meter or measured point of delivery, to MWHs, and multiplying by the CO_2e conversion factor in Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.~~

~~**TABLE 602.2.1**~~
~~**ELECTRICITY EMISSION RATE BY EPA eGRID SUB-REGION**~~[a]

~~**eGRID 2007 SUB-REGION ACRONYM**~~	~~**eGRID 2007 SUB-REGION NAME**~~	~~**2005 CO_2e RATE (lbs/MWh)**~~
~~AKGD~~	~~ASCC Alaska Grid~~	~~1270~~
~~AKMS~~	~~ASCC Miscellaneous~~	~~515~~
~~ERCT~~	~~ERCOT All~~	~~1417~~
~~FRCC~~	~~FRCC All~~	~~1416~~
~~HIMS~~	~~HICC Miscellaneous~~	~~1595~~
~~HIOA~~	~~HICC Oahu~~	~~18591~~
~~MORE~~	~~MRO East~~	~~1971~~
~~MROW~~	~~MRO West~~	~~1957~~
~~NYLI~~	~~NPCC Long Island~~	~~1651~~
~~NEWE~~	~~NPCC New England~~	~~999~~
~~NYCW~~	~~NPCC NYC/Westchester~~	~~874~~
~~NYUP~~	~~NPCC Upstate NY~~	~~774~~
~~RFCE~~	~~RFC East~~	~~1224~~
~~RFCM~~	~~RFC Michigan~~	~~1680~~
~~RFCW~~	~~RFC West~~	~~1652~~
~~SRMW~~	~~SERC Midwest~~	~~1966~~

~~eGRID 2007 SUB-REGION ACRONYM~~	~~eGRID 2007 SUB-REGION NAME~~	~~2005 CO_2e RATE (lbs/MWh)~~
~~SRMV~~	~~SERC Mississippi Valley~~	~~1094~~
~~SRSO~~	~~SERC South~~	~~1601~~
~~SRTV~~	~~SERC Tennessee Valley~~	~~1623~~
~~SRVC~~	~~SERC Virginia/Carolina~~	~~1220~~
~~SPNO~~	~~SPP North~~	~~2106~~
~~SPSO~~	~~SPP South~~	~~1780~~
~~CAMX~~	~~WECC California~~	~~768~~
~~NWPP~~	~~WECC Northwest~~	~~958~~
~~RMPA~~	~~WECC Rockies~~	~~1999~~
~~AZNM~~	~~WECC Southwest~~	~~1391~~

~~a.Sources: EPA eGRID2007 Version 1.1, 2005 data; EPA eGrid regional gross grid loss factor.~~

~~**602.2.2 Onsite nonrenewable energy.** Emissions associated with the use of nonrenewable energy sources other than electrical power such as natural gas, fuel oil, and propane shall be calculated by multiplying the fossil fuel energy used by the building and its site at the utility meter by the national emission factors in Table 602.2.2 and the conversions required by this section. Emissions associated with fossil fuels not specified in Table 602.2.2 shall be calculated by multiplying the fossil fuel used by the building at the utility meter by 250. Emissions associated with purchased district energy shall be calculated by multiplying the energy used by the building at the utility meter by 150 for hot water and steam, and for district cooling, the factors from Table 602.2.2 based on the EPA eGRID Sub-region in which the building is located.~~

TABLE ~~602.2.2~~
~~FOSSIL FUEL EMISSION FACTORS~~

~~EMISSION RATE (lb/MMbtu HHV)~~	~~NATURAL GAS AS STATIONARY FUEL~~	~~FUEL OIL AS STATIONARY FUEL~~	~~PROPANE AS STATIONARY FUEL~~
~~CO2*e*~~	~~137.35~~	~~200.63~~	~~162.85~~

~~For SI: MMBtu = 1,000,000 Btu = 10 terms: HHV = High-heating value.~~

~~**602.2.3 Annual direct and indirect CO_2e emissions associated with onsite use of fossil fuels and purchased district energy.** Emissions associated with the use of natural gas, fuel oil and, propane shall be calculated by multiplying the natural gas, fuel oil, and propane delivered to the building at the utility meter by the corresponding emission factors in Table 602.2.2. Emissions associated with fossil fuels not listed shall be calculated by multiplying the fossil fuel delivered to the building at the utility meter by 250. Emissions associated with purchased district heating shall be calculated by multiplying the heating energy delivered to the building at the utility meter by 150 for hot water and steam, and for district cooling, the factors from Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.~~

603.3.7 Renewable and waste energy. Equipment and systems providing energy from renewable or waste energy sources which is included in the determination of the ~~building zEPI,~~ <u>annual energy use of the proposed design in accordance with Section 602.1</u> shall be capable of being metered to allow a determination of the output of equipment and systems in accordance with Sections 603.3.7.1 through 603.3.7.5.

Revise as follows:

TABLE A106
ENERGY CONSERVATION AND EFFICIENCY

SECTION	DESCRIPTION	MINIMUM NUMBER OF ELECTIVES REQUIRED AND ELECTIVES SELECTED
A102.2	The jurisdiction shall indicate a number between and including 0 and up to and including 10 to establish the minimum total number of project electives that must be satisfied.	—
A106.1	~~zEPI~~ Annual net energy use reduction project electives	☐Yes ☐No
A106.1	~~zEPI~~ Annual net energy use is at least ~~5 points~~10 percent lower than required by Table 302.1	☐1 elective
A106.1	~~zEPI~~ Annual net energy use is at least ~~10 points~~ 20 percent lower than required by Table 302.1	☐2 electives
A106.1	~~zEPI~~ Annual net energy use is at least ~~15 points~~ 30 percent lower than required by Table 302.1	☐3 electives
A106.1	~~zEPI~~ Annual net energy use is at least 20~~ points~~40 percent lower than required by Table 302.1	☐4 electives
A106.1	~~zEPI~~ Annual net energy use is at least ~~25 points~~ 50 percent lower than required by Table 302.1	☐5 electives
A106.1	~~zEPI~~ Annual net energy use is at least ~~30 points~~ 60 percent lower than required by Table 302.1	☐6 electives
A106.1	~~zEPI~~ Annual net energy use is at least ~~35 points~~ 70 percent lower than required by Table 302.1	☐7 electives
A106.1	~~zEPI~~ Annual net energy use is at least ~~40 points~~ 80 percent lower than required by Table 302.1	☐8 electives
A106.1	~~zEPI~~ Annual net energy use is at least ~~45 points~~ 90 percent lower than required by Table 302.1	☐9 electives
A106.1	~~zEPI~~ Annual net energy use is at least ~~51 points~~100 percent lower than required by Table 302.1	☐10 electives
A106.2	Mechanical systems project elective	☐Yes ☐No
A106.3	Service water heating	☐Yes ☐No
A106.4	Lighting systems	☐Yes ☐No
A106.5	Passive design	☐Yes ☐No
A106.6	Renewable energy systems—5 percent	☐Yes ☐No
A106.6	Renewable energy systems—10 percent	☐Yes ☐No
A106.6	Renewable energy systems—20 percent	☐Yes ☐No

A106.1 ~~zEPI~~ Annual net energy use reduction project electives. 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~~ and the calculation procedures specified in Section 602.1 ~~602.1.2.1~~.

Add new standard(s) as follows:

ASHRAE

ANSI/ASHRAE 105-2013 Standard Methods of Determining, Expressing, and Comparing Building Energy Performance and Greenhouse Gas Emissions

Reason: The current zEPI language is difficult to understand, adopt, modify and enforce. The zEPI multiplier requires modification at each adoption cycle to align the zEPI multiplier relative ratio of the efficiency of the current ASHRAE 90.1 (2013) and the baseline "100 level" CBECS building. Otherwise, the path-to-net-zero multiplier is ineffective.

The options for local modification are difficult to understand by an adopting jurisdiction, as well as the method to select the level of enhanced energy performance.

The use of the regional conversion factors further complicate the understanding. And the use of 2005 EIA eGRID data to create the multiplication factors is an outdated method using decade-old view of regional energy use. The 2005 data does not take into account either the substantial increases in renewable energy (wind, solar, etc.) or the phase-out of coal fired power plants. This is the reason that no other sustainable program uses the eGRID regional data for "source energy" and CO2e reporting. LEED, Energy Star and ASHRAE Standards utilize national source energy figures. IgCC is an international standard and for US energy reporting, national figures (or locally selected figures) should be used.

The intent is to simplify the method for a performance/modeled energy compliance path through X steps:

Step 1: Simplify the 302.1 and Table 302.1 methodology for local adoption and selection of "level a modeled/performance design should be above code". The intent of the 2010 IgCC was to allow local jurisdiction to require performance (modeling) path of the design to 10% above the current code (for all structures over 25,000 Sq. Ft.). The % above code could be modified by the local jurisdiction. The revised 302.1 is clearer about how the jurisdiction sets the improvement above code. Current code is unclear on how the zEPI correlates to current code .

Step 2: Use the IECC as the energy code. The IgCC is an overlay code to the I-codes, not ASHRAE 90.1. The modeling of energy performance should be relative to the IECC. IECC C407 is the performance modeling methodology for the I-Codes.

Using ASHRAE 90.1 as the energy code baseline in the current IgCC does not show the building energy performance relative to the IECC, much less if the building is even compliant with the IgCC. If wanting to compare energy performance relative to 90.1, ASHRAE 189.1 is an available compliance path.

Step 3: Section 602 is inordinately complex and uses a proxy that is not substantiated through any energy modeling or other calculation. The zEPI requires updating at every code cycle to match current energy code performance (actually it requires analyzing ASHRAE 90.1). The Equation 6-1 is simplified to require: The design building shall use 10% less energy (or the figure selected by the local jurisdiction) than a baseline IECC building.

Step 4: It also simplifies the emissions reporting methodology. Source energy figures are controversial and a are relative to means and methods that are NOT under the control of the building. The current tables with eGRID data will be a full decade out of date when the 2015 IgCC is released. Putting requirements for minimum code compliance based on these figures is not within the scope of a building code. The design and construction of tomorrow's buildings should not be based on the rough estimates of yesterday's energy distribution grid. Carbon emissions information is recognized as important information for an Owner to use in their construction decisions. However CO2e is difficult as a minimum hurdle "enforcement tool" in code. CO2e should be a reporting requirement for the baseline and design conditions and is all that is required. The reporting methodology is now made easier with the updated release of ASHRAE Standard 105 (Standard Methods of Determining, Expressing, and Comparing Building Energy Performance and Greenhouse Gas Emissions). This ASHRAE standard can reference the latest eGRID via an ANSI standard methodology, yet leaves flexibility to the local jurisdiction to set multipliers the local authority might desire. The City of Tacoma, Washington, has its own electric utility that owns enough hydroelectric generation to provide over 80% of its power from this renewable source. They may wish to use a different multiplier for their CO2e reporting.

Step 5: Path to net zero. Outside organizations can take the time to develop on their own a multiplier for the EUI of IECC/IgCC buildings to show the "path to zero". But setting an arbitrary multiplier in code as a minimum requirement for obtaining a certificate of occupancy should not be included in the IgCC.

Step 6: Table A106.1 for the electives for performance modeling beyond the Section 602 level is updated for a post-zEPI.

Cost Impact: Will not increase the cost of construction. The methodology will simplify methods of compliance for the construction community as well as for the enforcing jurisdictions.

Analysis: A review of the standard proposed for inclusion in the code, ASHRAE105-2013 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2014.

GEW25-14: 601.3-HEIZER1122

GEW26-14

202, 302.1, 302.1.1, 602.1, 602.1.1, 602.1.2, 602.1.2.1, 602.1.2.2, 602.1.2.3, 602.2, 603.3.7, 1007.3, 1007.3.3.1, A106, A106.1

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org); Charles Foster, Steffes Corporation, representing self.

Delete and substitute definition as follows:

~~**ZERO ENERGY PERFORMANCE INDEX (zEPI).** A scalar representing the ratio of energy performance of the proposed design compared to the average energy performance of buildings relative to a benchmark year.~~

YEARLY ENERGY COST INDEX (yECI). A scalar representing the ratio of the annual energy cost of the proposed design compared to the annual energy cost of the same building constructed in accordance with the minimum requirements and maximum allowances 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~~ yECI of 0.75 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 CO_2e EMISSION REDUCTION**~~			
302.1, 302.1.1, 602.1	~~zEPI~~ yECI of Jurisdictional Choice – The jurisdiction shall indicate a ~~zEPI of 46~~ yECI of 0.75 or less in each occupancy for which it intends to require enhanced energy performance.	Occupancy: ______ ~~yEPI~~ yECI: ____________	
604.1	Automated demand response infrastructure	☐Yes	☐No
CHAPTER 10. EXISTING BUILDINGS			
1007.2	Evaluation of existing buildings	☐Yes	☐No
1007.3	Post Certificate of Occupancy ~~Zepi~~ yECI , energy demand, and CO_2e emissions reporting	☐Yes	☐No

(portions of table not shown remain unchanged)

302.1.1 ~~zEPI of 46 or less~~ yECI of 0.75 or less. Where a ~~zEPI of 46~~ 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 m^2) in *total building floor area* pursuing compliance on a prescriptive basis shall be deemed to have a ~~zEPI of 51~~ yECI of 0.8 and shall not be required to comply with the ~~zEPI~~ yECI of Jurisdictional Choice indicated by the jurisdiction in Table 302.1.

Revise as follows:

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 cost ~~kBtu/sf-y unit measure~~ based on compliance with Section 602.1.1 and CO2*e* 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.~~ yECI. Performance-based designs shall demonstrate ~~a~~ an annual energy cost index ~~zEPI~~ yECI of not more than ~~51~~ 0.8 as determined in accordance with Equation 6-1 for energy ~~use~~ cost reduction and shall demonstrate a CO2*e* emissions reduction in accordance with Section 602.2 and Equation 6-2 for CO_2e.

~~zEPI = 57 x (EUIp/EUI)~~ yECI = (EUCIp/EUCI) **Equation 6-1)**

where:

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

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

602.1.2 ~~Base~~ Annual energy cost index. The proposed and base annual energy use cost index (~~EUIp~~ ECIp and ECI) of the building and building site shall be calculated by a registered design professional in accordance with Equation 6-1 and an annual energy cost simulation software approved by the authority having jurisdiction ~~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.

~~**602.1.2.1 Modifications to Appendix G of ASHRAE 90.1.** 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.~~

~~TABLE 602.1.2.1~~
~~ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY EPA eGRID SUB-REGION[a]~~

~~eGRID 2007 SUB-REGION ACRONYM~~	~~eGRID 2007 SUB-REGION NAME~~	~~ENERGY CONVERSION FACTOR~~
~~AKGD~~	~~ASCC Alaska Grid~~	~~2.97~~
~~AKMS~~	~~ASCC Miscellaneous~~	~~1.76~~
~~ERCT~~	~~ERCOT All~~	~~2.93~~
~~FRCC~~	~~FRCC All~~	~~2.97~~
~~HIMS~~	~~HICC Miscellaneous~~	~~3.82~~

~~eGRID 2007 SUB-REGION ACRONYM~~	~~eGRID 2007 SUB-REGION NAME~~	~~ENERGY CONVERSION FACTOR~~
~~HIOA~~	~~HICC Oahu~~	~~3.14~~
~~MORE~~	~~MRO East~~	~~3.40~~
~~MROW~~	~~MRO West~~	~~3.41~~
~~NYLI~~	~~NPCC Long Island~~	~~3.20~~
~~NEWE~~	~~NPCC New England~~	~~3.01~~
~~NYCW~~	~~NPCC NYC/Westchester~~	~~3.32~~
~~NYUP~~	~~NPCC Upstate NY~~	~~2.51~~
~~RFCE~~	~~RFC East~~	~~3.15~~
~~RFCM~~	~~RFC Michigan~~	~~3.05~~
~~RFCW~~	~~RFC West~~	~~3.14~~
~~SRMW~~	~~SERC Midwest~~	~~3.24~~
~~SRMV~~	~~SERC Mississippi Valley~~	~~3.00~~
~~SRSO~~	~~SERC South~~	~~3.08~~
~~SRTV~~	~~SERC Tennessee Valley~~	~~3.11~~
~~SRVC~~	~~SERC Virginia/Carolina~~	~~3.13~~
~~SPNO~~	~~SPP North~~	~~3.53~~
~~SPSO~~	~~SPP South~~	~~3.05~~
~~CAMX~~	~~WECC California~~	~~2.61~~
~~NWPP~~	~~WECC Northwest~~	~~2.26~~
~~RMPA~~	~~WECC Rockies~~	~~3.18~~
~~AZNM~~	~~WECC Southwest~~	~~2.95~~

~~a. Sources: EPA eGrid2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4b and 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data.~~

~~**602.1.2.2 Electric power.**~~ ~~In calculating the annual energy use index, 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.~~

~~TABLE 602.1.2.2~~
~~U.S. AVERAGE BUILDING FUELS ENERGY CONVERSION FACTORS BY FUEL TYPE~~[a]

~~FUEL TYPE~~	~~ENERGY CONVERSION FACTOR~~
~~Natural Gas~~	~~1.09~~
~~Fuel Oil~~	~~1.13~~
~~LPG~~	~~1.12~~

~~a. Source: Gas Technology Institute Source Energy and Emissions Analysis Tool.~~

~~**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 CO_2e emissions. The CO_2e 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 CO_2e emissions associated with the standard reference design in accordance with Equation 6-2.

CO_2e pd ≥ (~~zEPI~~ yECI x CO_2e sr*bd*)~~/57~~ **(Equation 6-2)**

where:

~~zEPI~~ yECI = ~~the minimum score~~ calculated energy cost ratio in accordance with Section 602.1.1.
CO_2e pd = emissions associated with the proposed design.
CO_2e sr*bd* = emissions associated with the standard reference budget design in accordance with Section 602.1.2.

603.3.7 Renewable and waste energy. Equipment and systems providing energy from renewable or waste energy sources which is included in the determination of the building ~~zEPI~~ yECI, shall be capable of being metered to allow a determination of the output of equipment and systems in accordance with Sections 603.3.7.1 through 603.3.7.5.

Revise as follows:

1007.3 Post certificate of occupancy ~~zEPI~~ yECI, energy demand, and CO_2e emissions reporting. Where the jurisdiction indicates in Table 302.1 that ongoing post certificate of occupancy yECI ~~zEPI~~, energy demand and CO2*e* 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 CO_2e emissions in accordance with Section 602.2 are required, yECI ~~zEPI~~, energy demand, and CO_2e emissions reporting shall be provided in accordance with this section.

1007.3.3.1 Annual net energy use. The ~~zEPI~~ 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~~yECI reported separately. Where there are energy uses associated with the building site other than the buildings on the site, the ~~zEPI~~ yECI 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:

TABLE A106
ENERGY CONSERVATION AND EFFICIENCY

SECTION	DESCRIPTION	MINIMUM NUMBER OF ELECTIVES REQUIRED AND ELECTIVES SELECTED
A102.2	The jurisdiction shall indicate a number between and including 0 and up to and including 10 to establish the minimum total number of project electives that must be satisfied.	—
A106.1	~~zEPI~~ yECI reduction project electives	☐Yes ☐No
A106.1	Project ~~zEPI~~ yECI is at least ~~5 points~~ 3 percent lower than required by Table 302.1	☐1 elective
A106.1	Project ~~zEPI~~ yECI is at least ~~10 points~~ 6 percent lower than required by Table 302.1	☐2 electives
A106.1	Project ~~zEPI~~ yECI is at least ~~15 points~~ 9 percent lower than required by Table 302.1	☐3 electives
A106.1	Project ~~zEPI~~ yECI is at least ~~20 points~~ 12 percent lower than required by Table 302.1	☐4 electives
A106.1	Project ~~zEPI~~ yECI is at least ~~25 points~~ 15 percent lower than required by Table 302.1	☐5 electives
A106.1	Project ~~zEPI~~ yECI is at least ~~30 points~~ 18 percent lower than required by Table 302.1	☐6 electives
A106.1	Project ~~zEPI~~ yECI is at least ~~35 points~~ 21 percent lower than required by Table 302.1	☐7 electives
A106.1	Project ~~zEPI~~ yECI is at least ~~40 points~~ 24 percent lower than required by Table 302.1	☐8 electives
A106.1	Project ~~zEPI~~ yECI is at least ~~45 points~~ 27 percent lower than required by Table 302.1	☐9 electives
A106.1	Project ~~zEPI~~ yECI is at least ~~51 points~~ 30 percent lower than required by Table 302.1	☐10 electives
A106.2	Mechanical systems project elective	☐Yes ☐No
A106.3	Service water heating	☐Yes ☐No
A106.4	Lighting systems	☐Yes ☐No
A106.5	Passive design	☐Yes ☐No
A106.6	Renewable energy systems—5 percent	☐Yes ☐No
A106.6	Renewable energy systems—10 percent	☐Yes ☐No
A106.6	Renewable energy systems—20 percent	☐Yes ☐No

A106.1 ~~zEPI~~ yECI reduction project electives. 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~~,~~ , and Equation 6-1 ~~and the calculation procedures specified in Section 602.1.2.1~~.

Reason: This purpose of the proposal is to replace the existing zEPI concept with a new IgCC compliance metric; namely, yearly energy cost.

Conceptually, yECI is very straight forward as it merely compares the modeled energy cost of a proposed building to the modeled energy cost for the same building that is built to meet the minimum energy requirements of the IECC. yECI is flexible as it allows the use of any cost estimation software models so long as it has been approved by the authority having jurisdiction.

Energy cost is a metric that is easily understood by consumers, is used in several consensus building energy efficiency standards, and its adoption by the ICC would enhance the code's stature among the consuming public.

Moreover, there are many technical problems with how the existing zEPI metric is calculated. It is linked to ASHRAE Appendix G, and then modified with other factors. Under the latest revision to ASHRAE Standard 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 zEPI was originally intended 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.

Further, the existing zEPI approach uses so called “source energy” as its basis of comparison. To the extent source energy would ever be helpful (an assumption that is highly debated), the "source energy" estimates used for zEPI 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).

A 2012 DOE final report on focus group findings (for a program using source energy estimates) is helpful in understanding some of source energy's shortfalls. (*See* the Report at http://apps1.eere.energy.gov/buildings/publications/pdfs/commercial_initiative/asset_rating_seattle_f ocus_groups.pdf)

One of the Report's key findings was "[i]ncluding 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 "[s]everal 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 (yECI) would be most useful to users of the IgCC 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 system. Include estimated cost information, where possible, to address the needs of owners and investors.

Consistent with the DOE Report, by changing to a Yearly Energy Cost Index approach, the baseline building would be either the latest version of the IECC *or* ASHRAE 90.1 that is being enforced in a jurisdiction. 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.

Finally, rather than a 10.5% reduction as would occur using the zEPI approach (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.

In terms of specific proposed changes, this proposal would:

1. add a new definition for yECI
2. modify Section 3 by replacing zEPI with yECI,
3. modify Section 6 by replacing zEPI with yECI,
4. modify Section 10 by replacing zEPI with yECI, and
5. modify Appendix A by replacing zEPI with yECI.

Bibliography and web site links:

DOE, 2012. *DOE Commercial Building Energy Asset Rating Program Focus Groups with Primary Stakeholders in Seattle*. U.S. Department of Energy, Washington, D.C.
http://apps1.eere.energy.gov/buildings/publications/pdfs/commercial_initiative/asset_rating_seattle_focus_groups.pdf)

http://www.netl.doe.gov/energy-analyses/pubs/NG-GHG-LCI.pdf

http://www.pnas.org/content/early/2011/10/13/1107409108.full.pdf

http://www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_6_Fugitive_Emissions_from_Oil_and_Natural_Gas.p df

https://circabc.europa.eu/d/d/workspace/SpacesStore/db806977-6418-44db-a-64-20267139b34d/Brandt_Oil_Sands_GHGs_Final.pdf http://www.nytimes.com/2011/09/27/business/energy-environment/in-north-dakota-wasted-natural-ga s-flickers-against-the-sky.html?pagewanted=all
http://www.investmentu.com/2011/September/natural-gas-flaring.html

Methane Leaks from North American Natural Gas Systems
Science 14 February 2014: DOI: 10.1126/science.1247045
http://www.sciencemag.org/content/343/6172/733.summary?rss=1

Cost Impact: Will not increase the cost of construction.

GEW26-14: 602.1-ROSENSTOCK497

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

Proponent: Keith Dennis, NRECA, representing National Rural Electric Cooperative Association (keith.dennis@nreca.coop)

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 CO_2e EMISSION REDUCTION			
302.1, 302.1.1, 602.1	zEPI or yECI of Jurisdictional Choice – The jurisdiction shall indicate a zEPI of 46 or a yECI of .75 or less in each occupancy for which it intends to require enhanced energy performance.	Occupancy: ______ zEPI: ___________	
604.1	Automated demand response infrastructure	☐Yes	☐No
CHAPTER 10. EXISTING BUILDINGS			
1007.2	Evaluation of existing buildings	☐Yes	☐No
1007.3	Post Certificate of Occupancy zEPI or yECI , energy demand, and CO_2e emissions reporting	☐Yes	☐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 CO2*e* 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 CO_2e emissions reduction in accordance with Section 602.2 and Equation 6-2 for CO_2e.

zEPI = 57 × (EUIp/EUI) **(Equation 6-1)**

yEPI = CIp / CI **(Equation 6- XXX)**

where:

EUIp = 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 (EUIp) 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 CO_2e emissions. The CO_2e 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 CO2*e* emissions associated with the standard reference design in accordance with Equation 6-2 or Equation 6-YY,)

For zEPI: CO2*e* pd ≥ (zEPI × CO2*e* sr*bd*)/57 **(Equation 6-2)**

For yECI: CO2*e* pd < CO2*e* sr*bd* 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
CO_2e pd = emissions associated with the proposed design.
CO_2e sr*bd* = 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 CO_2e emissions reporting. Where the jurisdiction indicates in Table 302.1 that ongoing post certificate of occupancy zEPI or yECI, energy demand and CO_2e 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 CO_2e emissions in accordance with Section 602.2 are required, zEPI or yECI, energy demand, and CO_2e 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 an 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_rati ng_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.

GEW27-14: 602.1-DENNIS1070

GEW28-14

602.1.2.1, Table 602.1.2.1, 602.1.2.2, Table 602.1.2.2, 602.1.2.3

Proponent: David Collins, The Preview Group, representing American Institute of Architects (dcollins@preview-group.com)

Revise as follows:

602.1.2.1 ~~**Modifications to Appendix G of ASHRAE 90.1.**~~ **Energy units.** 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. 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.

~~**TABLE 602.1.2.1**~~
~~**ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY EPA eGRID SUB-REGION**~~[a]

~~eGRID 2007 SUB-REGION ACRONYM~~	~~eGRID 2007 SUB-REGION NAME~~	~~ENERGY CONVERSION FACTOR~~
~~AKGD~~	~~ASCC Alaska Grid~~	~~2.97~~
~~AKMS~~	~~ASCC Miscellaneous~~	~~1.76~~
~~ERCT~~	~~ERCOT All~~	~~2.93~~
~~FRCC~~	~~FRCC All~~	~~2.97~~
~~HIMS~~	~~HICC Miscellaneous~~	~~3.82~~
~~HIOA~~	~~HICC Oahu~~	~~3.14~~
~~MORE~~	~~MRO East~~	~~3.40~~
~~MROW~~	~~MRO West~~	~~3.41~~
~~NYLI~~	~~NPCC Long Island~~	~~3.20~~
~~NEWE~~	~~NPCC New England~~	~~3.01~~
~~NYCW~~	~~NPCC NYC/Westchester~~	~~3.32~~
~~NYUP~~	~~NPCC Upstate NY~~	~~2.51~~
~~RFCE~~	~~RFC East~~	~~3.15~~
~~RFCM~~	~~RFC Michigan~~	~~3.05~~
~~RFCW~~	~~RFC West~~	~~3.14~~
~~SRMW~~	~~SERC Midwest~~	~~3.24~~
~~SRMV~~	~~SERC Mississippi Valley~~	~~3.00~~
~~SRSO~~	~~SERC South~~	~~3.08~~
~~SRTV~~	~~SERC Tennessee Valley~~	~~3.11~~
~~SRVC~~	~~SERC Virginia/Carolina~~	~~3.13~~
~~SPNO~~	~~SPP North~~	~~3.53~~

~~eGRID 2007 SUB-REGION ACRONYM~~	~~eGRID 2007 SUB-REGION NAME~~	~~ENERGY CONVERSION FACTOR~~
~~SPSO~~	~~SPP South~~	~~3.05~~
~~CAMX~~	~~WECC California~~	~~2.61~~
~~NWPP~~	~~WECC Northwest~~	~~2.26~~
~~RMPA~~	~~WECC Rockies~~	~~3.18~~
~~AZNM~~	~~WECC Southwest~~	~~2.95~~

~~a. Sources: EPA eGrid2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4b and 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data.~~

602.1.2.2 <u>Site to source e</u>lectric ~~power~~ <u>conversion,</u> In calculating the annual energy use index, 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.

~~TABLE 602.1.2.2~~
~~U.S. AVERAGE BUILDING FUELS ENERGY CONVERSION FACTORS BY FUEL TYPE[a]~~

~~FUEL TYPE~~	~~ENERGY CONVERSION FACTOR~~
~~Natural Gas~~	~~1.09~~
~~Fuel Oil~~	~~1.13~~
~~LPG~~	~~1.12~~

~~a. Source: Gas Technology Institute Source Energy and Emissions Analysis Tool.~~

~~**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.~~

Reason: The three sections of 602.1.2 are unnecessarily complicated. Sections 602.1.2.1, 602.1.2.2 and 602.1.2.3 provide what is identified in their titles as modifications to Appendix G of ASHRAE 90.1, but in reality they are simply attempting to change the methods of looking at various energy sources so that they can be evaluated in a consistent manner. The change to Section 602.1.2.1 is therefore changed to match the content of the section. The content of the table has been modified to include all fuels addressed.

The title to Section 602.1.2.2 has been changed to make what is occurring in the section clear.

Finally, Section 602.1.2.3 has been modified by deleting the provision as they will already addressed in the changes to 602.1.2.1 requiring energy to be measured consistently, independent of the type of energy.

Cost Impact: Will not increase the cost of construction.

GEW28-14: 602.1.2.1 #1-COLLINS695

GEW29-14
602.1.2.1

Proponent: David Collins, The Preview Group, representing American Institute of Architects (dcollins@preview-group.com)

Revise as follows:

602.1.2.1 Modifications to Appendix G of ASHRAE 90.1. The performance rating in Section G1.2 of ASHRAE 90.1 shall be based on energy use instead of cost. Energy use shall be converted to consistent units ~~in accordance with~~ ~~Sections 602.1.2.2 and 602.1.2.3, instead of energy cost~~. by multiplying the nonrenewable energy fossil 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.

Reason: In the performance modeling required by the IgCC and to determine an appropriate ZEPI value, this exception in the energy modeling protocol of ASHRAE 90.1 Appendix G disallows the inclusion of on-site or site recovered renewable energy sources.

The IgCC was originally intended to recognize and include the use of on-site or site recovered renewable energy sources in calculating the ZEPI value for a building intended to comply with the IgCC.

By eliminating this exception the energy modeling protocol of ASHRAE 90.1 is modified to meet the original intent of the SBTC in developing the IgCC and the ASHRAE 90.1
Appendix G modeling protocol is aligned with the original drafting intent of the code. For the edification of the reader the exception to G2.4 states:

G2.4.1On-Site Renewable Energy and Site-Recovered Energy.

Site-Recovered energy shall not be considered purchased energy and shall be subtracted from the proposed design energy consumption prior to calculating the proposed building performance. On-site renewable energy generated by systems included on the building permit that is used by the building shall be subtracted from the proposed design energy consumption prior to calculating the proposed building performance.

Cost impact: Will not increase the cost of construction.

GEW29-14: 602.1.2.1#2-COLLINS920

GEW30-14

602.1.2.1, Table 602.1.2.1, 602.1.2.2, Table 602.1.2.2, 602.2.1, Table 602.2.1

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

602.1.2.1 Modifications to Appendix G of ASHRAE 90.1. 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.

TABLE 602.1.2.1
ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY EPA eGRID SUB-REGION[a]

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB-REGION NAME	ENERGY CONVERSION FACTOR
AKGD	ASCC Alaska Grid	2.97
AKMS	ASCC Miscellaneous	1.76
ERCT	ERCOT All	2.93
FRCC	FRCC All	2.97
HIMS	HICC Miscellaneous	3.82
HIOA	HICC Oahu	3.14
MORE	MRO East	3.40
MROW	MRO West	3.41
NYLI	NPCC Long Island	3.20
NEWE	NPCC New England	3.01
NYCW	NPCC NYC/Westchester	3.32
NYUP	NPCC Upstate NY	2.51
RFCE	RFC East	3.15
RFCM	RFC Michigan	3.05
RFCW	RFC West	3.14
SRMW	SERC Midwest	3.24
SRMV	SERC Mississippi Valley	3.00
SRSO	SERC South	3.08
SRTV	SERC Tennessee Valley	3.11
SRVC	SERC Virginia/Carolina	3.13
SPNO	SPP North	3.53
SPSO	SPP South	3.05
CAMX	WECC California	2.61

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB-REGION NAME	ENERGY CONVERSION FACTOR
NWPP	WECC Northwest	2.26
RMPA	WECC Rockies	3.18
AZNM	WECC Southwest	2.95

~~a. Sources: EPA eGrid2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4b and 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data.~~

602.1.2.2 Electric power. In calculating the annual energy use index, 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.

TABLE 602.1.2.2
U.S. AVERAGE BUILDING FUELS ENERGY CONVERSION FACTORS BY FUEL TYPE[a]

FUEL TYPE	ENERGY CONVERSION FACTOR
Natural Gas	1.09
Fuel Oil	1.13
LPG	1.12

~~a. Source: Gas Technology Institute Source Energy and Emissions Analysis Tool.~~

602.2.1 Onsite electricity. Emissions associated with use of electric power shall be based on electric power excluding any renewable or recovered waste energy covered under Section 602.2.1. Emissions shall be calculated by converting the electric power used by the building at the electric utility meter or measured point of delivery, to MWHs, and multiplying by the CO2*e* conversion factor in Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

TABLE 602.2.1
ELECTRICITY EMISSION RATE BY EPA eGRID SUB-REGION[a]

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB-REGION NAME	2005 CO_2e RATE (lbs/MWh)
AKGD	ASCC Alaska Grid	1270
AKMS	ASCC Miscellaneous	515
ERCT	ERCOT All	1417
FRCC	FRCC All	1416
HIMS	HICC Miscellaneous	1595
HIOA	HICC Oahu	18591
MORE	MRO East	1971
MROW	MRO West	1957
NYLI	NPCC Long Island	1651
NEWE	NPCC New England	999
NYCW	NPCC NYC/Westchester	874
NYUP	NPCC Upstate NY	774

RFCE	RFC East	1224
RFCM	RFC Michigan	1680
RFCW	RFC West	1652
SRMW	SERC Midwest	1966
SRMV	SERC Mississippi Valley	1094
SRSO	SERC South	1601
SRTV	SERC Tennessee Valley	1623
SRVC	SERC Virginia/Carolina	1220
SPNO	SPP North	2106
SPSO	SPP South	1780
CAMX	WECC California	768
NWPP	WECC Northwest	958
RMPA	WECC Rockies	1999
AZNM	WECC Southwest	1391

~~a. Sources: EPA eGRID2007 Version 1.1, 2005 data; EPA eGrid regional gross grid loss factor.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The purpose of this proposal is to delete the footnotes from Tables 602.1.2.1, 602.1.2.2 and 602.2.1. The balance of the tables are to remain the same.

The footnote for each of the three tables is commentary information and should be located in the commentary and not in the code. The footnotes do not provide any information which adjusts the table values nor provide information how the values in the table are to be applied. Such background information was important as the IgCC was developed, but should have been removed before the code was finalized and published.

Cost Impact: Will not increase the cost of construction. The proposal is editorial and removes non-regulatory language.

GEW30-14: TABLE602.1.2.1-THOMPSON566

GEW31-14

602.1.2.1, Table 602.1.2.1, 602.1.2.2, Table 602.1.2.2, 602.2.1, Table 602.2.1, 602.2.2, Table 602.2.2

Proponent: Neil Leslie, Gas Technology Institute, representing self
(neil.leslie@gastechnology.org)

Revise as follows:

602.1.2.1 Modifications to Appendix G of ASHRAE 90.1. 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.

TABLE 602.1.2.1
ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY EPA eGRID SUB-REGION[a]

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB-REGION NAME	ENERGY CONVERSION FACTOR
AKGD	ASCC Alaska Grid	~~2.97~~ <u>3.15</u>
AKMS	ASCC Miscellaneous	~~1.76~~ <u>1.90</u>
ERCT	ERCOT All	~~2.93~~ <u>3.08</u>
FRCC	FRCC All	~~2.97~~ <u>3.26</u>
HIMS	HICC Miscellaneous	~~3.82~~ <u>3.67</u>
HIOA	HICC Oahu	3.14
MORE	MRO East	~~3.40~~ <u>3.50</u>
MROW	MRO West	~~3.41~~ <u>3.64</u>
NYLI	NPCC Long Island	~~3.20~~ <u>3.47</u>
NEWE	NPCC New England	~~3.01~~ <u>3.03</u>
NYCW	NPCC NYC/Westchester	~~3.32~~ <u>3.21</u>
NYUP	NPCC Upstate NY	~~2.51~~ <u>2.66</u>
RFCE	RFC East	~~3.15~~ <u>3.28</u>
RFCM	RFC Michigan	~~3.05~~ <u>3.35</u>
RFCW	RFC West	~~3.14~~ <u>3.29</u>
SRMW	SERC Midwest	~~3.24~~ <u>3.40</u>
SRMV	SERC Mississippi Valley	~~3.00~~ <u>3.20</u>
SRSO	SERC South	~~3.08~~ <u>3.30</u>
SRTV	SERC Tennessee Valley	~~3.11~~ <u>3.24</u>
SRVC	SERC Virginia/Carolina	~~3.13~~ <u>3.24</u>
SPNO	SPP North	~~3.53~~ <u>3.57</u>
SPSO	SPP South	~~3.05~~ <u>3.26</u>

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB-REGION NAME	ENERGY CONVERSION FACTOR
CAMX	WECC California	~~2.61~~ 2.89
NWPP	WECC Northwest	~~2.26~~ 2.32
RMPA	WECC Rockies	~~3.18~~ 3.82
AZNM	WECC Southwest	~~2.95~~ 3.10
None	Not Included	3.15

a. Sources: EPA eGrid 2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4b and 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data.

602.1.2.2 Electric power. In calculating the annual energy use index, 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.

TABLE 602.1.2.2
U.S. AVERAGE BUILDING FUELS ENERGY CONVERSION FACTORS BY FUEL TYPE[a]

FUEL TYPE	ENERGY CONVERSION FACTOR
Natural Gas	1.09
Fuel Oil	~~1.13~~ 1.19
LPG	~~1.12~~ 1.15

~~a. Source: Gas Technology Institute Source Energy and Emissions Analysis Tool.~~

602.2.1 Onsite electricity. Emissions associated with use of electric power shall be based on electric power excluding any renewable or recovered waste energy covered under Section 602.2.1. Emissions shall be calculated by converting the electric power used by the building at the electric utility meter or measured point of delivery, to kWh ~~MWHs~~, and multiplying by the CO_2e conversion factor in Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

TABLE 602.2.1
ELECTRICITY EMISSION RATE BY EPA eGRID SUB-REGION[a]

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB-REGION NAME	2005 CO_2e RATE (lbs/MWh)
AKGD	ASCC Alaska Grid	~~1270~~ 0.685
AKMS	ASCC Miscellaneous	~~515~~ 0.265
ERCT	ERCOT All	~~1417~~ 0.698
FRCC	FRCC All	~~1416~~ 0.617
HIMS	HICC Miscellaneous	~~1595~~ 0.722
HIOA	HICC Oahu	~~18591~~ 0.825
MORE	MRO East	~~1971~~ 0.909
MROW	MRO West	~~1957~~ 0.964
NYLI	NPCC Long Island	~~1651~~ 0.698
NEWE	NPCC New England	~~999~~ 0.428

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB-REGION NAME	2005 CO_2e RATE (lbs/MWh)
NYCW	NPCC NYC/Westchester	~~874~~ 0.391
NYUP	NPCC Upstate NY	~~774~~ 0.369
RFCE	RFC East	~~1224~~ 0.543
RFCM	RFC Michigan	~~1680~~ 0.874
RFCW	RFC West	~~1652~~ 0.820
SRMW	SERC Midwest	~~1966~~ 0.960
SRMV	SERC Mississippi Valley	~~1094~~ 0.572
SRSO	SERC South	~~1601~~ 0.780
SRTV	SERC Tennessee Valley	~~1623~~ 0.818
SRVC	SERC Virginia/Carolina	~~1220~~ 0.581
SPNO	SPP North	~~2106~~ 0.972
SPSO	SPP South	~~1780~~ 0.873
CAMX	WECC California	~~768~~ 0.370
NWPP	WECC Northwest	~~958~~ 0.453
RMPA	WECC Rockies	~~1999~~ 1.149
AZNM	WECC Southwest	~~1391~~ 0.671
None	Not Included	0.692

~~a. Sources: EPA eGRID 2007 Version 1.1, 2005 data; EPA eGrid regional gross grid loss factor.~~

602.2.2 Onsite nonrenewable energy. Emissions associated with the use of nonrenewable energy sources other than electrical power such as natural gas, fuel oil, and propane shall be calculated by multiplying the fossil fuel energy used by the building and its site at the utility meter by the national emission factors in Table 602.2.2 and the conversions required by this section. Emissions associated with fossil fuels not specified in Table 602.2.2 shall be calculated by multiplying the fossil fuel used by the building at the utility meter by ~~250~~ 217. Emissions associated with purchased district energy shall be calculated by multiplying the energy used by the building at the utility meter by ~~150~~ 191 for hot water, 205 for ~~and~~ steam, and 147 for district cooling, the factors from Table 602.2.2 based on the EPA eGRID Sub- region in which the building is located.

TABLE 602.2.2
FOSSIL FUEL EMISSION FACTORS

EMISSION RATE (lb/MMbtu HHV)	NATURAL GAS AS STATIONARY FUEL	FUEL OIL AS STATIONARY FUEL	PROPANE AS STATIONARY FUEL
CO_2e	~~137.35~~ 141	~~200.63~~ 198	~~162.85~~ 172

For SI: MMBtu = 1,000,000 Btu = 10 ~~terms~~ therms: HHV = ~~High~~ Higher-heating value.

Reason: This proposal updates factors for all energy forms based on the methodology and values contained in the revised version of ASHRAE Standard 105, Standard Methods of Determining, Expressing and Comparing Building Energy Performance and Greenhouse Gas Emissions, Tables J2-A through J2-D.

The proposal also adds a row of electricity conversion factors for those interested in using the code (such as Canada or Mexico) whose buildings are not located in any of the eGRID sub-regions.

The footnoted sources of the data in the tables should not be in the body of the code, but can be in the users manual.

The proposal also fixes typos in the footnote to Table 602.2.2.

Bibliography:

ASHRAE Standard 105, Standard Methods of Determining, Expressing and Comparing Building Energy Performance and Greenhouse Gas Emissions (publication expected in 2014).

Cost Impact: Will not increase the cost of construction.

GEW31-14: TABLE602.1.2.1-LESLIE1037

GEW32-14

602.1.2.1, Table 602.1.2.1, 602.2.1, Table 602.2.1

Proponent: Bridget Herring, Mathis Consulting Company, representing self

Revise as follows:

602.1.2.1 Modifications to Appendix G of ASHRAE 90.1. 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.

TABLE 602.1.2.1
ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY EPA eGRID SUB-REGION[a]

eGRID ~~2007~~ SUB-REGION ACRONYM	eGRID ~~2007~~ SUB-REGION NAME	ENERGY CONVERSION FACTOR
AKGD	ASCC Alaska Grid	~~2.97~~ <u>3.41</u>
AKMS	ASCC Miscellaneous	~~1.76~~ <u>3.27</u>
ERCT	ERCOT All	~~2.93~~ <u>2.89</u>
FRCC	FRCC All	~~2.97~~ <u>2.99</u>
HIMS	HICC Miscellaneous	~~3.82~~ <u>3.61</u>
HIOA	HICC Oahu	~~3.14~~ <u>3.53</u>
~~MORE~~ <u>MROE</u>	MRO East	~~3.40~~ <u>3.21</u>
MROW	MRO West	~~3.41~~ <u>3.63</u>
NYLI	NPCC Long Island	~~3.20~~ <u>3.57</u>
NEWE	NPCC New England	~~3.01~~ <u>2.80</u>
NYCW	NPCC NYC/Westchester	~~3.32~~ <u>3.10</u>
NYUP	NPCC Upstate NY	~~2.51~~ <u>2.82</u>
RFCE	RFC East	~~3.15~~ <u>3.11</u>
RFCM	RFC Michigan	~~3.05~~ <u>3.18</u>
RFCW	RFC West	~~3.14~~ <u>3.26</u>
SRMW	SERC Midwest	~~3.24~~ <u>3.46</u>
SRMV	SERC Mississippi Valley	~~3.00~~ 3~~.15~~
SRSO	SERC South	~~3.08~~ <u>3.05</u>
SRTV	SERC Tennessee Valley	~~3.11~~ <u>3.23</u>
SRVC	SERC Virginia/Carolina	~~3.13~~ <u>3.14</u>
SPNO	SPP North	~~3.53~~ <u>3.69</u>
SPSO	SPP South	~~3.05~~ <u>3.31</u>
CAMX	WECC California	~~2.61~~ <u>2.99</u>

NWPP	WECC Northwest	~~2.26~~ 3.05
RMPA	WECC Rockies	~~3.18~~ 3.41
AZNM	WECC Southwest	~~2.95~~ 2.89

~~a. Sources: EPA eGrid2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4b and 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data.~~

602.2.1 Onsite electricity. Emissions associated with use of electric power shall be based on electric power excluding any renewable or recovered waste energy covered under Section 602.2.1. Emissions shall be calculated by converting the electric power used by the building at the electric utility meter or measured point of delivery, to MWHs, and multiplying by the CO_2e conversion factor in Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

TABLE 602.2.1
ELECTRICITY EMISSION RATE BY EPA eGRID SUB-REGION[a]

eGRID ~~2007~~ SUB-REGION ACRONYM	eGRID ~~2007~~ SUB-REGION NAME	~~2005~~ CO_2e RATE (lbs/MWh)
AKGD	ASCC Alaska Grid	~~1270~~ 1647
AKMS	ASCC Miscellaneous	~~515~~ 1826
ERCT	ERCOT All	~~1417~~ 1449
FRCC	FRCC All	~~1416~~ 1579
HIMS	HICC Miscellaneous	~~1595~~ 2046
HIOA	HICC Oahu	~~18591~~ 2046
~~MORE~~ MROE	MRO East	~~1971~~ 2135
MROW	MRO West	~~1957~~ 2432
NYLI	NPCC Long Island	~~1651~~ 1678
NEWE	NPCC New England	~~999~~ 1402
NYCW	NPCC NYC/Westchester	~~874~~ 1408
NYUP	NPCC Upstate NY	~~774~~ 1584
RFCE	RFC East	~~1224~~ 1874
RFCM	RFC Michigan	~~1680~~ 2084
RFCW	RFC West	~~1652~~ 2463
SRMW	SERC Midwest	~~1966~~ 2463
SRMV	SERC Mississippi Valley	~~1094~~ 1504
SRSO	SERC South	~~1601~~ 1864
SRTV	SERC Tennessee Valley	~~1623~~ 2160
SRVC	SERC Virginia/Carolina	~~1220~~ 1923
SPNO	SPP North	~~2106~~ 2451
SPSO	SPP South	~~1780~~ 1818
CAMX	WECC California	~~768~~ 1294

eGRID ~~2007~~ SUB-REGION ACRONYM	eGRID ~~2007~~ SUB-REGION NAME	~~2005~~ CO_2e RATE (lbs/MWh)
NWPP	WECC Northwest	~~958~~ 1698
RMPA	WECC Rockies	~~1999~~ 2088
AZNM	WECC Southwest	~~1391~~ 1473

~~a. Sources: EPA eGRID2007 Version 1.1, 2005 data; EPA eGrid regional gross grid loss factor.~~

Reason: Changes in electricity consumption (such as those attributable to a new building complying with IgCC) are not distributed uniformly within or across the grid. For this reason, it is important to distinguish between electricity conversion factors for inventory purposes and conversion factors for investment purposes. Although average primary energy and emissions calculations may be suitable for inventory and benchmarking purposes, they do not necessarily provide accurate information when making competitive energy efficiency design or investment decisions. The regional average factors in the 2012 IgCC do not reflect the impact of these decisions on incremental primary energy consumption or pollutant emissions and can be even more misleading than national average factors in many situations. This is especially true for regions that have large fractions of hydropower or nuclear power. Marginal calculation methodologies are more accurate than either national or regional average calculations for evaluating the impacts of changes in electricity consumption, such as comparing new building energy efficiency design options or evaluating competing retrofit measures.

Keith and Biewald developed a methodology implemented by the EPA for calculating marginal (or non-baseload) power plant emission rates based on the capacity factor of each plant. EPA implemented this methodology in the eGRID database to list the emissions of “non-baseload” power plants for application in marginal generation scenarios and analyses. The Keith and Biewald non-baseload methodology was used in development of the primary energy and CO2e emission factors for each eGRID sub-region in this proposal. The attached document and conference paper in the bibliography each provide additional details on the use of marginal methodologies including the Keith and Biewald non-baseload methodology.

Bibliography:

EPA eGRID original data:
http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html

Leslie, N. and Marek Czachorski. 2014. Options for Determining Marginal Primary Energy and Greenhouse Gas Emission Factors (NY-14-C057). ASHRAE Transactions, Vol. 120, pt.

1. Atlanta: American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc.

Cost Impact: Will not increase the cost of construction.

GEW32-14: TABLE602.1.2.1-HERRING1014

GEW33-14
602.1.2.1, Table 602.1.2.1, 602.2.1, Table 602.2.1

Proponent: Ben Edwards, Mathis Consulting Company, representing self

Revise as follows:

602.1.2.1 Modifications to Appendix G of ASHRAE 90.1. 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.

TABLE 602.1.2.1
ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY EPA eGRID SUB-REGION[a]

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB-REGION NAME	ENERGY CONVERSION FACTOR
AKGD	ASCC Alaska Grid	~~2.97~~ 3.27
AKMS	ASCC Miscellaneous	~~1.76~~ 1.93
ERCT	ERCOT All	~~2.93~~ 3.11
FRCC	FRCC All	~~2.97~~ 3.17
HIMS	HICC Miscellaneous	~~3.82~~ 3.78
HIOA	HICC Oahu	~~3.14~~ 3.29
MORE	MRO East	~~3.40~~ 3.28
MROW	MRO West	~~3.41~~ 3.49
NYLI	NPCC Long Island	~~3.20~~ 3.41
NEWE	NPCC New England	~~3.01~~ 2.94
NYCW	NPCC NYC/Westchester	~~3.32~~ 3.09
NYUP	NPCC Upstate NY	~~2.51~~ 2.55
RFCE	RFC East	~~3.15~~ 3.23
RFCM	RFC Michigan	~~3.05~~ 3.29
RFCW	RFC West	~~3.14~~ 3.27
SRMW	SERC Midwest	~~3.24~~ 3.33
SRMV	SERC Mississippi Valley	~~3.00~~ 3.13
SRSO	SERC South	~~3.08~~ 3.06
SRTV	SERC Tennessee Valley	~~3.11~~ 3.10
SRVC	SERC Virginia/Carolina	~~3.13~~ 3.23
SPNO	SPP North	~~3.53~~ 3.58
SPSO	SPP South	~~3.05~~ 3.22
CAMX	WECC California	~~2.61~~ 2.93

NWPP	WECC Northwest	~~2.26~~ 2.36
RMPA	WECC Rockies	~~3.18~~ 3.48
AZNM	WECC Southwest	~~2.95~~ 3.18

~~a. Sources: EPA eGrid2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4b and 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data.~~

602.2.1 Onsite electricity. Emissions associated with use of electric power shall be based on electric power excluding any renewable or recovered waste energy covered under Section 602.2.1. Emissions shall be calculated by converting the electric power used by the building at the electric utility meter or measured point of delivery, to MWHs, and multiplying by the CO2*e* conversion factor in Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

TABLE 602.2.1
ELECTRICITY EMISSION RATE BY EPA eGRID SUB-REGION[a]

eGRID ~~2007~~ SUB-REGION ACRONYM	eGRID ~~2007~~ SUB-REGION NAME	~~2005~~ CO_2e RATE (lbs/MWh)
AKGD	ASCC Alaska Grid	~~1270~~ 1577
AKMS	ASCC Miscellaneous	~~515~~ 639
ERCT	ERCOT All	~~1417~~ 1445
FRCC	FRCC All	~~1416~~ 1322
HIMS	HICC Miscellaneous	~~1595~~ 1566
HIOA	HICC Oahu	~~18591~~ 1873
~~MORE~~ MROE	MRO East	~~1971~~ 1813
MROW	MRO West	~~1957~~ 1851
NYLI	NPCC Long Island	~~1651~~ 1447
NEWE	NPCC New England	~~999~~ 813
NYCW	NPCC NYC/Westchester	~~874~~ 768
NYUP	NPCC Upstate NY	~~774~~ 590
RFCE	RFC East	~~1224~~ 1065
RFCM	RFC Michigan	~~1680~~ 1874
RFCW	RFC West	~~1652~~ 1711
SRMW	SERC Midwest	~~1966~~ 1976
SRMV	SERC Mississippi Valley	~~1094~~ 1221
SRSO	SERC South	~~1601~~ 1519
SRTV	SERC Tennessee Valley	~~1623~~ 1538
SRVC	SERC Virginia/Carolina	~~1220~~ 1180
SPNO	SPP North	~~2106~~ 2062
SPSO	SPP South	~~1780~~ 1860
CAMX	WECC California	~~768~~ 835

NWPP	WECC Northwest	~~958~~ 959
RMPA	WECC Rockies	~~1999~~ 2131
AZNM	WECC Southwest	~~1391~~ 1428

~~a. Sources: EPA eGRID2007 Version 1.1, 2005 data; EPA eGrid regional gross grid loss factor.~~

Reason: Updated factors based on the eGRID 2012 database (the most current eGRID data available) as described in detail in the peer-reviewed ASHRAE conference paper listed in the bibliography.

Bibliography:

EPA eGRID original data: http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html

Leslie, N. and Marek Czachorski. 2014. Options for Determining Marginal Primary Energy and Greenhouse Gas Emission Factors (NY-14-C057). ASHRAE Transactions, Vol. 120, pt. 1. Atlanta: American Society of Heating, Refrigerating and Air-conditioning Engineers, Inc..

Cost Impact: Will not increase the cost of construction.

GEW33-14: TABLE602.1.2.1-EDWARDS996

GEW34-14
Table 602.2.1, 602.2.3, 603.5.1

Proponent: Charles Foster, Steffes Corporation, representing self (cfoster20187@yahoo.com)

Revise as follows:

602.2.1 Onsite electricity. Emissions associated with use of electric power shall be based on electric power excluding any renewable or recovered waste energy covered under Section 602.2.1. Emissions shall be calculated by converting the electric power used by the building at the electric utility meter or measured point of delivery, to MWHs, and multiplying by the CO_2e conversion factor in Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

TABLE 602.2.1
ELECTRICITY EMISSION RATE BY EPA eGRID SUB-REGION[a]

eGRID ~~2007~~ 2012 SUB-REGION ACRONYM	eGRID ~~2007~~ 2012 SUB-REGION NAME	~~2005~~ 2009 CO_2e RATE (lbs/MWh)
AKGD	ASCC Alaska Grid	~~1270~~ 1281
AKMS	ASCC Miscellaneous	~~515~~ 521
ERCT	ERCOT All	~~1417~~ 1182
FRCC	FRCC All	~~1416~~ 1177
HIMS	HICC Miscellaneous	~~1595~~ 1352
HIOA	HICC Oahu	~~18591~~ 1593
~~MORE~~ MROE	MRO East	~~1971~~ 1592
MROW	MRO West	~~1957~~ 1629
NYLI	NPCC Long Island	~~1651~~ 0
NEWE	NPCC New England	~~999~~ 0
NYCW	NPCC NYC/Westchester	~~874~~ 0
NYUP	NPCC Upstate NY	~~774~~ 0
RFCE (except MD and DE)	RFC East	~~1224~~ 947
RFCM	RFC Michigan	~~1680~~ 1659
RFCW (except MD)	RFC West	~~1652~~ 1521
SRMW	SERC Midwest	~~1966~~ 1750
SRMV	SERC Mississippi Valley	~~1094~~ 1022
SRSO	SERC South	~~1601~~ 1326
SRTV	SERC Tennessee Valley	~~1623~~ 1358
SRVC	SERC Virginia/Carolina	~~1220~~ 1036
SPNO	SPP North	~~2106~~ 1816
SPSO	SPP South	~~1780~~ 1599

eGRID ~~2007~~ 2012 SUB-REGION ACRONYM	eGRID ~~2007~~ 2012 SUB-REGION NAME	~~2005~~ 2009 CO_2e RATE (lbs/MWh)
CAMX	WECC California	~~768~~ 0
NWPP (except CA)	WECC Northwest	~~958~~ 819
RMPA	WECC Rockies	~~1999~~ 1825
AZNM (except CA)	WECC Southwest	~~1391~~ 1191

a. Sources: EPA eGRID~~2007~~ 2012 Version ~~1.1~~ 1.0, ~~2005~~ 2009 data; EPA eGrid regional gross grid loss factor.

~~**602.2.3 Annual direct and indirect CO_2e emissions associated with onsite use of fossil fuels and purchased district energy.** Emissions associated with the use of natural gas, fuel oil and, propane shall be calculated by multiplying the natural gas, fuel oil, and propane delivered to the building at the utility meter by the corresponding emission factors in Table 602.2.2. Emissions associated with fossil fuels not listed shall be calculated by multiplying the fossil fuel delivered to the building at the utility meter by 250. Emissions associated with purchased district heating shall be calculated by multiplying the heating energy delivered to the building at the utility meter by 150 for hot water and steam, and for district cooling, the factors from Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.~~

603.5.1 Annual emissions. The data acquisition and management system shall be capable of providing the data necessary to calculate the annual CO2*e* emissions associated with the operation of the building and its systems using the results of annual energy use measured in accordance with Section 603.5. The calculation shall be based on energy measured for each form of energy delivered to the site on an annual basis. Where reporting of emissions is required, the determination of emissions shall be in accordance with Section 602.2.2 ~~602.2.3~~.

Reason: This proposal does two primary things:

1. it updates Table 602.2.1 with data from 2009, replacing the existing data in the table from 2005, and
2. it deletes Section 602.2.3 as duplicative with Section 602.2.2.

Updated Data.

Table 602.2.1 is updated with more current data taken from EPA's EGrid2012 publication, except for subregions where CO2 emissions are capped. In subregions where CO2 emissions are capped, a value of "0" is supplied.

Where upstream power plant emissions are capped by local, regional, or national laws, there is no impact on emissions as a result of building energy efficiency measures. The US Department of Energy has analyzed the impact of appliance efficiency standards on emissions, and for the past several years, uses the following language when discussing certain emissions that are capped. For example, in the Furnace Fan Motors Technical Support Document, June 2012 http://www.regulations.gov/#!documentDetail;D=EERE-2010-BT-STD-0011-0037 it states for Sulfur Dioxide (Chapter 15.2.2), which is capped on a national basis in the United States:

"While there remains some uncertainty about the ultimate effects of efficiency standards on SO2 emissions covered by the existing cap and trade system, the NEMS-BT modeling system that DOE uses to forecast emissions reductions currently indicates that no physical reductions in power sector emissions would occur for SO2."

It also states for Nitrogen Oxides (Chapter 15.2.3), which is capped on a regional basis in the United States: "Therefore, energy conservation standards for electric motors may have little or no physical effect on these emissions in the 28 eastern states and the D.C."

In the US in 2013, there are two regional programs that cap CO2e emissions from central station power plants: The Regional Greenhouse Gas Initiative (RGGI) that covers 9 states in the New England and mid-Atlantic area (CT, DE, MA, MD, ME, NH, NY, RI, VT) and the California greenhouse gas cap and trade program mandated under state law AB32 and implemented by the California Air Resources Board. In these areas, building energy efficiency improvements have no impact on upstream emissions.

Under the RGGI and CA programs, power plant CO2e emissions are capped. Building energy efficiency upgrades will have no impact on upstream emissions (per the DOE analysis of appliance energy efficiency standards for emissions that are capped at a national or regional level). See the following web sites:

http://www.regulations.gov/#!documentDetail;D=EERE-2010-BT-STD-0011-0037 (Chapter 15)

http://www.rggi.org/design/overview http://www.arb.ca.gov/cc/capandtrade/cap andtrade.htm

It is also a fact that when renewable electric production systems produce electricity, the power is dispatched to the grid, regardless of the time of day. In certain parts of the US, records have been set in terms of renewables as a percentage of the electricity dispatched.

For example: ERCOT Wind Integration Report for 11/10/2012, wind turbines produced 8,521 MW whem the peak load was 36,423 MW, for a wind integration value of 25.9%. During the peak hour of 1900 (7:00 PM), wind turbines produced 22.7% of the power that was used at that time.

On November 27, 2012 the Midwest Independent System Operator reported that on November 23, 2012, the peak wind output topped 10 GW and it represented 25% of the total output.

Xcel Energy in Colorado reported that on April 15, 2012, wind turbines produced 57% of the power used during the early morning hours.

http://money.cnn.com/2012/08/06/news/economy/wind-power-Colorado/index.htm
https://www.midwestiso.org/AboutUs/MediaCenter/PressReleases/Pages/WindOutputSurpasses10GW.aspx
http://www.ercot.com/content/gridinfo/generation/windintegration/2012/11/ERCOT%20Wind%20Integration%20Report%2011-10-12.pdf

Delete Section 602.2.3

Sections 602.2.2 and 602.2.3 are virtually identical and this proposal simply strikes the repetitive language. No substantive change to the code occurs as the result of removing Section 602.2.3.

Cost Impact: Will not increase the cost of construction.

GEW34-14: 602.2.3-FOSTER512

GEW35-14
602.2.1, Table 602.2.1

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

602.2.1 Onsite electricity. Emissions associated with use of electric power shall be based on electric power excluding any renewable or recovered waste energy covered under Section 602.2.1. Emissions shall be calculated by converting the electric power used by the building at the electric utility meter or measured point of delivery, to MWHs, and multiplying by the CO_2e conversion factor in Table 602.2.1 ~~based on the EPA eGRID Sub-region in which the building is located.~~

TABLE 602.2.1
ELECTRICITY EMISSION RATE BY EPA eGRID SUB-REGION[a]

~~eGRID 2007 SUB-REGION ACRONYM~~	~~eGRID 2007 SUB-REGION NAME~~	~~2005~~ CO_2e RATE AFTER 2015 (lbs/MWh)
~~AKGD~~	~~ASCC Alaska Grid~~ All regions of the US	~~1270~~ 0.0
~~AKMS~~	~~ASCC Miscellaneous~~	~~515~~
~~ERCT~~	~~ERCOT All~~	~~1417~~
~~FRCC~~	~~FRCC All~~	~~1416~~
~~HIMS~~	~~HICC Miscellaneous~~	~~1595~~
~~HIOA~~	~~HICC Oahu~~	~~18591~~
~~MORE~~	~~MRO East~~	~~1971~~
~~MROW~~	~~MRO West~~	~~1957~~
~~NYLI~~	~~NPCC Long Island~~	~~1651~~
~~NEWE~~	~~NPCC New England~~	~~999~~
~~NYCW~~	~~NPCC NYC/Westchester~~	~~874~~
~~NYUP~~	~~NPCC Upstate NY~~	~~774~~
~~RFCE~~	~~RFC East~~	~~1224~~
~~RFCM~~	~~RFC Michigan~~	~~1680~~
~~RFCW~~	~~RFC West~~	~~1652~~
~~SRMW~~	~~SERC Midwest~~	~~1966~~
~~SRMV~~	~~SERC Mississippi Valley~~	~~1094~~
~~SRSO~~	~~SERC South~~	~~1601~~
~~SRTV~~	~~SERC Tennessee Valley~~	~~1623~~
~~SRVC~~	~~SERC Virginia/Carolina~~	~~1220~~
~~SPNO~~	~~SPP North~~	~~2106~~

~~eGRID 2007 SUB-REGION ACRONYM~~	~~eGRID 2007 SUB-REGION NAME~~	~~2005~~ CO_2e RATE AFTER 2015 (lbs/MWh)
~~SPSO~~	~~SPP South~~	~~1780~~
~~CAMX~~	~~WECC California~~	~~768~~
~~NWPP~~	~~WECC Northwest~~	~~958~~
~~RMPA~~	~~WECC Rockies~~	~~1999~~
~~AZNM~~	~~WECC Southwest~~	~~1391~~

~~a. Sources: EPA eGRID2007 Version 1.1, 2005 data; EPA eGrid regional gross grid loss factor.~~

Reason: Table 602.2.1 has values that are significantly out of date (2005) and do not reflect the realities of indirect emissions from electricity production that will occur as a result of federal policies.

In terms of the numbers, the US Energy Information Administration has published the Electric Power Annual 2012, which can be accessed at the following web site: http://www.eia.gov/electricity/annual/. Table 9.1 of this document shows that between 2005 and 2012, the electric power sector has:

- -Reduced its emissions of CO2 by 15.2%.
- -Reduced its emissions of SO2 by 64.2%
- -Reduced its emissions of NOx by 45.8%

This occurred at the same time that overall net generation was down very slightly (-0.2% from 2005 to 2012). Therefore, the values shown in the table are overstated by at least 15% on a national level, and even more in certain sub-regions of the United States.

In addition, the table does not account for the fact that pwoer plant emissions are capped in CA and in all of the states that are part of the Regional Greenhouse Gas Initiative (RGGI) in the Northeastern part of the US.

Also, in September 2013, the US EPA published a rule that caps the emissions of greenhouse gases from all new fossil-fueled power plants that will be built in the United States. Information on this rule can be found at the following web site: http://www2.epa.gov/carbon-pollution-standards/regulatory-actions

EPA is also planning to regulate the emissions from all existing power plants in the United States. This rule is scheduled to be published by June 2014, to take effect in 2015 or 2016.

The impact of all of these regulations and programs is to "decouple" power plant emissions from building electricity use. Where upstream power plant emissions are capped by local, regional, or national laws, there is no impact on emissions as a result of building energy efficiency measures. The US Department of Energy analyzes the impact of appliance efficiency standards on emissions, and for the past several years, uses the following language when discussing the impact of appliance efficiency standards on certain emissions that are capped. For example, in the Furnace Fan Motors Technical Support Document, June 2012 http://www.regulations.gov/#!documentDetail;D=EERE-2010-BT-STD-0011-0037 it states for Sulfur Dioxide (Chapter 15.2.2), which is capped on a national basis in the United States: "While there remains some uncertainty about the ultimate effects of efficiency standards on SO2 emissions covered by the existing cap and trade system, the **NEMS-BT modeling system that DOE uses to forecast emissions reductions currently indicates that no physical reductions in power sector emissions would occur for SO2**." (emphasis added)

It also states for Nitrogen Oxides (Chapter 15.2.3), which is capped on a regional basis in the United States: "Therefore, energy conservation standards for electric motors may have little or no physical effect on these emissions in the 28 eastern states and the D.C."

After EPA finalizes its rules on new and existing power plants, the same logic will apply to greenhouse gases, that any changes to building electric usage as a result of this standard will have no impact on upstream and indirect emissions from power plants.

Therefore, the current table should be removed and replaced with the suggested table.

Cost Impact: Will not increase the cost of construction.

GEW35-14: 602.2.1-ROSENSTOCK506

GEW36-14
602.2.1, Table 602.2.1

Proponent: Jack Bailey, One Lux Studio, representing self (jbailey@oneluxstudio.com)

Revise as follows:

602.2.1 Onsite electricity. Emissions associated with use of electric power shall be based on electric power excluding any renewable or recovered waste energy covered under Section 602.2.1. Emissions shall be calculated by converting the electric power used by the building at the electric utility meter or measured point of delivery, to MWHs, and multiplying by the CO_2e conversion factor in Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

TABLE 602.2.1
ELECTRICITY EMISSION RATE BY EPA eGRID SUB-REGION[a]

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB- REGION NAME	2005 CO_2e RATE (lbs/MWh)
AKGD	ASCC Alaska Grid	1270
AKMS	ASCC Miscellaneous	515
ERCT	ERCOT All	1417
FRCC	FRCC All	1416
HIMS	HICC Miscellaneous	1595
HIOA	HICC Oahu	18591 1859
MORE	MRO East	1971
MROW	MRO West	1957
NYLI	NPCC Long Island	1651
NEWE	NPCC New England	999
NYCW	NPCC NYC/Westchester	874
NYUP	NPCC Upstate NY	774
RFCE	RFC East	1224
RFCM	RFC Michigan	1680
RFCW	RFC West	1652
SRMW	SERC Midwest	1966
SRMV	SERC Mississippi Valley	1094
SRSO	SERC South	1601
SRTV	SERC Tennessee Valley	1623
SRVC	SERC Virginia/Carolina	1220
SPNO	SPP North	2106
SPSO	SPP South	1780
CAMX	WECC California	768
NWPP	WECC Northwest	958
RMPA	WECC Rockies	1999
AZNM	WECC Southwest	1391

a. Sources: EPA eGRID2007 Version 1.1, 2005 data; EPA eGrid regional gross grid loss factor.

Reason: The value for HICC Oahu is wrong. It is 10 times higher than it should be.

Cost Impact: Will not increase the cost of construction.

GEW36-14: TABLE 602.2.1-BAILEY602

GEW37-14
602.2.2, Table 602.2.2

Proponent: Jack Bailey, One Lux Studio, representing self (jbailey@oneluxstudio.com)

Revise as follows:

602.2.2 Onsite nonrenewable energy. Emissions associated with the use of nonrenewable energy sources other than electrical power such as natural gas, fuel oil, and propane shall be calculated by multiplying the fossil fuel energy used by the building and its site at the utility meter or measured point of delivery by the national emission factors in Table 602.2.2 and the conversions required by this section. Emissions associated with fossil fuels not specified in Table 602.2.2 shall be calculated by multiplying the fossil fuel used by the building at the utility meter or measured point of delivery by 250. Emissions associated with purchased district energy shall be calculated by multiplying the energy used by the building at the utility meter by 150 for hot water and steam, and for district cooling, the factors from ~~Table 602.2.2~~ Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.

TABLE 602.2.2
FOSSIL FUEL EMISSION FACTORS

EMISSION RATE (lb/MMbtu HHV)	NATURAL GAS AS STATIONARY FUEL	FUEL OIL AS STATIONARY FUEL	PROPANE AS STATIONARY FUEL
CO_2e	137.35	200.63	162.85

For SI: MMBtu = 1,000,000 Btu = 10 terms: HHV = High-heating value.

Reason: Editorial. The phrase "at the utility meter or measured point of delivery" is used consistently in Section 602 and should be used in this paragraph as well. The Table reference has also been corrected (Table 602.2.2 does not have EPA eGRID Sub-regions).

Cost Impact: Will not increase the cost of construction.

GEW37-14: 602.2.2-BAILEY626

GEW38-14
602.2.3, 603.5.1

Proponent: Jack Bailey, One Lux Studio, representing self (jbailey@oneluxstudio.com)

Delete without substitution:

~~**602.2.3 Annual direct and indirect CO2*e* emissions associated with onsite use of fossil fuels and purchased district energy.** Emissions associated with the use of natural gas, fuel oil and, propane shall be calculated by multiplying the natural gas, fuel oil, and propane delivered to the building at the utility meter by the corresponding emission factors in Table 602.2.2. Emissions associated with fossil fuels not listed shall be calculated by multiplying the fossil fuel delivered to the building at the utility meter by 250. Emissions associated with purchased district heating shall be calculated by multiplying the heating energy delivered to the building at the utility meter by 150 for hot water and steam, and for district cooling, the factors from Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.~~

Revise as follows:

603.5.1 Annual emissions. The data acquisition and management system shall be capable of providing the data necessary to calculate the annual CO2*e* emissions associated with the operation of the building and its systems using the results of annual energy use measured in accordance with Section 603.5. The calculation shall be based on energy measured for each form of energy delivered to the site on an annual basis. Where reporting of emissions is required, the determination of emissions shall be in accordance with Section ~~602.2.3~~ 602.2.2.

Reason: Editorial. Section 602.2.3 is not referenced anywhere, and appears to contain only information that is already found in Section 602.2.2.

Cost Impact: Will not increase the cost of construction.

GEW38-14: 602.2.3-BAILEY622

GEW39-14
602.2.3, 603.5.1

Proponent: Neil Leslie, Gas Technology Institute, representing self (neil.leslie@gastechnology.org)

Delete without substitution

~~**602.2.3 Annual direct and indirect CO_2*e* emissions associated with onsite use of fossil fuels and purchased district energy.** Emissions associated with the use of natural gas, fuel oil and, propane shall be calculated by multiplying the natural gas, fuel oil, and propane delivered to the building at the utility meter by the corresponding emission factors in Table 602.2.2. Emissions associated with fossil fuels not listed shall be calculated by multiplying the fossil fuel delivered to the building at the utility meter by 250. Emissions associated with purchased district heating shall be calculated by multiplying the heating energy delivered to the building at the utility meter by 150 for hot water and steam, and for district cooling, the factors from Table 602.2.1 based on the EPA eGRID Sub-region in which the building is located.~~

Revise as follows:

603.5.1 Annual emissions. The data acquisition and management system shall be capable of providing the data necessary to calculate the annual CO2*e* emissions associated with the operation of the building and its systems using the results of annual energy use measured in accordance with Section 603.5. The calculation shall be based on energy measured for each form of energy delivered to the site on an annual basis. Where reporting of emissions is required, the determination of emissions shall be in accordance with ~~Section 602.2.3~~ <u>Sections 602.2.1 and 602.2.2</u>.

Reason: Sections 602.2.2 and 602.2.3 are entirely redundant. This proposal suggests deleting 602.2.3. Section 603.5.1 is also amended to remove the reference to 602.2.3 and adds the missing reference to 602.2.1 that should also be addressed for compliance in Section 603.5.1.

Cost Impact: Will not increase the cost of construction.

GEW39-14: 602.2.3-LESLIE971

GEW 40-14

603, 603.1, 603.1.1, 603.2, 603.2.1, 603.2.2, 603.2.3, 603.2.4, 603.2.5, 603.3, 603.3.1, 603.3.2, 603.3.3, 603.3.4, 603.3.5, 603.3.6, 603.3.7, 603.3.7.1, 603.3.7.2, 603.3.7.3, 603.3.7.4, 603.3.7.5, , 603.4, 603.4.1, 603.5, 603.5.1, 603.6

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com); Craig Conner (craig.conner@mac.com)

Revise as follows:

603 ENERGY METERING~~, MONITORING AND REPORTING~~

603.1 ~~Purpose~~ Scope. ~~Buildings that consume energy shall comply with Section 603. The purpose of this section is to provide requirements that will ensure that buildings are constructed or altered in a way that will provide the capability for their energy use, production and reclamation to be measured, monitored and reported. This includes the design of energy distribution systems so as to isolate load types, the installation of or ability to install in the future meters, devices and a data acquisition system, and the installation of, or the ability to provide, public displays and other appropriate reporting mechanisms in the future.~~

~~All forms of energy delivered to the building and building site, produced on the building site or in the building and reclaimed at the building site or in the building shall be metered and all energy load types measured in accordance with this section.~~

This section requires the capability to meter purchased energy. These requirements include the capability to separate energy use by end use category and fuel type, and providing a data acquisition system.

~~**603.1.1 Buildings with tenants.** In buildings with tenants, the metering required by Section 603.3 shall be collected for the entire building and for each tenant individually. Tenants shall have access to all data collected for their space.~~

603.2 ~~Energy distribution design requirements and load in buildings~~ Load type isolation. ~~Energy distribution systems within, on or adjacent to and serving a building shall be designed such that each primary circuit, panel, feeder, piping system or supply mechanism supplies only one energy use type as defined in Sections 603.2.1 through 603.2.5. The energy use type served by each distribution system shall be clearly designated on the energy distribution system with the use served, and adequate space shall be provided for installation of metering equipment or other data collection devices, temporary or permanent, to measure their energy use. The energy distribution system shall be designed to facilitate the collection of data for each of the building energy use categories in Section 603.4 and for each of the end use categories listed in Sections 603.2.1 through 603.2.5. Where there are multiple buildings on a building site, each building shall comply separately with the provisions of Section 603.~~

> ~~**Exception:** Buildings designed and constructed such that the total usage of each of the load types described in Sections 603.2.1 through 603.2.5 shall be permitted to be measured through the use of installed sub-meters or other equivalent methods as *approved*.~~

Energy distribution systems shall be designed such that each primary circuit, panel, feeder, piping system or supply mechanism supplies only one energy end use category as specified in Section 603.3. The energy end use served by each distribution system shall be clearly designated on the energy distribution system.

~~**603.2.1 HVAC system total energy use.** The HVAC system total energy use category shall include all energy used to heat, cool, and provide ventilation to the building including, but not limited to, fans, pumps, boiler energy, chiller energy and hot water.~~

~~**603.2.2 Lighting system total energy use.** The lighting system total energy use category shall include all interior and exterior lighting used in occupant spaces and common areas.~~

~~**603.2.3 Plug loads.** The plug loads energy use category shall include all energy use by devices, appliances and equipment connected to convenience receptacle outlets.~~

~~**603.2.4 Process loads.** The process loads energy use category shall include the energy used by any single load associated with activities within the building, such as, but not limited to, data centers, manufacturing equipment and commercial kitchens, that exceeds 5 percent of the peak connected load of the whole building.~~

~~**603.2.5 Energy used for building operations loads and other miscellaneous loads.** The category of energy used for building operations loads and other miscellaneous loads shall include all vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains and fireplaces, swimming pools, inground spas, snow-melt systems, exterior lighting that is mounted on the building or used to illuminate building facades and the use of any miscellaneous loads in the building not specified in Sections 603.2.1 through 603.2.4.~~

603.3 ~~**Energy-type metering**~~ **Separation of energy end use categories** ~~Buildings shall be provided with the capability to determine energy use and peak demand as provided in this section for each of the energy types specified in Sections 603.3.1 through 603.3.7. Utility energy meters or supplemental sub-meters are permitted to be used to collect whole building data, and shall be equipped with a local data port connected to a data acquisition system in accordance with Section 603.5.~~

Energy metering shall be capable of separating and reporting the energy end use categories specified in this section. Where the same equipment provides HVAC and service water heating, the HVAC and service water heating end uses shall be permitted to be combined. Separation of energy use into other end use categories shall be permitted where approved as appropriate to the use of the building.

HVAC including, but not limited to, fans, pumps, boiler energy, and chiller energy.

Service hot water heating including any associated pumps.

Lighting including both interior and exterior lighting.

Building operations including vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains and *fireplaces*, swimming pools, snowmelt systems, and other *building* operations.

Plug loads include the electric energy used by devices, appliances, and equipment connected to convenience receptacle outlets.

Process loads. Energy used by any single process load that exceeds 5 percent of the projected energy expenditures for the whole building. Process loads include, but are not limited to, data centers, manufacturing equipment, commercial kitchens.

Total building energy use, separated by purchased fuel type.

Exceptions: The following shall not require separation into end use categories:

1. Buildings containing less than 25,000 square feet of conditioned space.
2. End use categories projected to be less than 5 percent of the building's energy expenditures.
3. Spaces that are projected to use an average of less than 2 watts per square foot for all purchased energy.

603.3.1 ~~**Gaseous fuels**~~ **Use of utility energy meters.** ~~Gaseous fuels including, but not limited to, natural gas, LP gas, coal gas, hydrogen, landfill gas, digester gas and biogas shall be capable of being metered at the building site to determine the gross consumption and peak demand of each different gaseous fuel by each building on a building site. The installation of gas meters and related piping shall be in accordance with the *International Fuel Gas Code*.~~

Utility energy meters shall be permitted to be used to collect any data for which they satisfy the requirements of Section 603. Where utility energy meters provide the metered data, the data acquisition system shall be capable of automatically integrating the utility meter data with the other data storage and reporting.

603.3.2 ~~Liquid fuels.~~ Metering system data. ~~Liquid fuels including, but not limited, to fuel oil, petroleum-based diesel, kerosene, gasoline, bio diesel, methanol, ethanol and butane shall be capable of being metered at the building site to allow a determination of the gross consumption and peak demand of each liquid fuel use by each building on a building site. The installation of meters and related piping shall be in accordance with the *International Mechanical Code*.~~

The metering system shall be capable of collecting hourly data automatically. The system shall be capable of storing not less than 36 months of data . The system shall be capable of transferring the data for use in monitoring or analysis in real time.

~~**603.3.3 Solid fuels.** Solid fuels including, but not limited to, coal, charcoal, peat, wood products, grains, and municipal waste shall be capable of having their use determined at the building site to allow a determination of the gross consumption and peak demand of each solid fuel use by each building on a building site.~~

~~**603.3.4 Electric power.** Electric power shall be capable of being metered at the building site to allow a determination of the gross consumption and peak demand by each building on a building site. The installation of electric meters and related wiring shall be in accordance with NFPA 70.~~

~~**603.3.5 District heating and cooling.** Hot water, steam, chilled water, and brine shall be capable of being metered at the building site, or where produced on the building site, to allow a determination of the gross consumption of heating and cooling energy by each building on a building site. Energy use associated with the production of hot water, steam, chilled water or brine shall be determined based on the fuel used.~~

~~**603.3.6 Combined heat and power.** Equipment and systems with a connected load greater than 125,000 Btu/hr (36.63 kW) providing combined heat and power (CHP) shall be capable of being metered to allow a determination of the gross consumption of each form of delivered energy to the equipment. The output of CHP shall be metered in accordance with the applicable portions of Section 603 based on the forms of output from the CHP.~~

~~**603.3.7 Renewable and waste energy.** Equipment and systems providing energy from renewable or waste energy sources which is included in the determination of the building zEPI, shall be capable of being metered to allow a determination of the output of equipment and systems in accordance with Sections 603.3.7.1 through 603.3.7.5.~~

~~**603.3.7.1 Solar electric. E**quipment and systems providing electric power through conversion of solar energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.~~

~~**603.3.7.2 Solar thermal.** Equipment and systems providing heat to fluids or gases through the capture of solar energy shall be capable of being metered so that the peak thermal energy (Btu/h) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of heat captured (Btu) for delivery to the building and its systems can be determined intervals of 1 hour or less.~~

> ~~**Exception:** Systems with a rated output of less than 100 kBtu/hr shall not be required to have the capacity to be metered.~~

~~**603.3.7.3 Waste heat.** Equipment and systems providing energy through the capture of waste heat shall be capable of being metered so that the amount of heat captured and delivered to the building and its systems can be determined at intervals of 1 hour or less.~~

> ~~**Exception:** Systems with a rated output of less than 100 kBtu/hr shall not be required to have the capacity to be metered.~~

~~**603.3.7.4 Wind power systems.** Equipment and systems providing electric power through conversion of wind energy directly to electric power shall be capable of being metered so that the peak electric power (kW)~~

~~provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.~~

~~**603.3.7.5 Other renewable energy electric production systems.** Equipment and systems providing electric power through conversion of other forms of renewable energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.~~

603.4 ~~**Energy load type submetering.**~~ **Space for energy metering.** ~~For buildings that are not less than 25,000 square feet (2323 m2) in *total building floor area* the energy use of the categories specified in Section 603.2 shall be metered through the use of sub- meters or other *approved*, equivalent methods meeting the capability requirements of Section 603.3.~~

For buildings exempted from the installation of end use category metering in Section 603.3, space shall be shall be identified and reserved for the future installation of metering capable of compliance with Section 603.3.

~~**603.4.1 Buildings less than 25,000 square feet.** For buildings that are less than 25,000 square feet (2323 m2) in *total building floor area*, the energy distribution system shall be designed and constructed to accommodate the future installation of sub- meters and other *approved* devices in accordance with Section 603.4. This includes, but is not limited to, providing access to distribution lines and ensuring adequate space for the installation of sub-meters and other *approved* devices.~~

~~**603.5 Minimum energy measurement and verification.** Meters, sub-meters, and other *approved* devices installed in compliance with Sections 603.3 and 603.4 shall be connected to a data acquisition and management system capable of storing not less than 36-months worth of data collected by all meters and other *approved* devices and transferring the data in real time to a display as required in Section 603.6.~~

~~**603.5.1 Annual emissions.** The data acquisition and management system shall be capable of providing the data necessary to calculate the annual CO2*e* emissions associated with the operation of the building and its systems using the results of annual energy use measured in accordance with Section 603.5. The calculation shall be based on energy measured for each form of energy delivered to the site on an annual basis. Where reporting of emissions is required, the determination of emissions shall be in accordance with Section 602.2.3.~~

~~**603.6 Energy display** A permanent, readily accessible and visible display shall be provided adjacent to the main building entrance or on a publicly available Internet web site. The display shall be capable of providing all of the following:~~

1. ~~The current energy demand for the whole building level measurements, updated for each fuel type at the intervals specified in Section 603.3.~~
2. ~~The average and peak demands for the previous day and the same day the previous year.~~
3. ~~The total energy usage for the previous 18 months.~~

Reason: The section was overly complex. This proposal simplifies the provisions.

Cost Impact: Will not increase the cost of construction. The proposal removes provisions.

GEW 40-14: 603-KLEIN1202

GEW41-14
603.1.1

Proponent: Jim Edelson, New Buildings Institute, representing New Buildings Institute

Revise as follows:

603.1.1 Buildings with multiple tenants. In buildings with more than one tenant ~~tenants~~, the metering required by Section 603.3 shall be provided ~~collected~~ for the entire building and for each tenant space individually. ~~Tenants~~ Each tenant shall have access to all data collected for their space.

- **Exception:** Individual meters shall not be required for tenant spaces less than 5,000 square feet (465 m^2).

Reason: The load type segregation requirements of Section 603.2 will require 3-5 meters to meet the tenant sub-metering requirements of Section 603.1.1, not just one (depending on which of the five load types are delivered to the tenant space). Since loads will, in most cases, need to be delivered separately to the tenant space, they will be required to be separately metered.

This exemption keeps the complexity and cost of the tenant sub-metering requirement down by exempting smaller tenant spaces while leaving it in place only for larger spaces.

Cost Impact: Will not increase the cost of construction.

GEW41-14: 603.1.1-EDELSON1069

GEW42-14
603.2, 603.2.1, 603.2.2, 603.2.3, 603.2.4, 603.2.5

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, and High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

603.2 Energy distribution design requirements and load type isolation in buildings. Energy distribution systems within, on or adjacent to and serving a building shall be designed such that each primary circuit, panel, feeder, piping system or supply mechanism supplies only one energy use type as ~~defined~~ specified in ~~Sections 603.2.1 through 603.2.5~~ Table 603.2. The energy use type served by each distribution system shall be clearly designated on the energy distribution system with the use category served, and adequate space shall be provided for installation of metering equipment or other data collection devices, temporary or permanent, to measure their energy use. The energy distribution system shall be designed to facilitate the collection of data for each of the building energy use categories in Section 603.4 and for each of the end use categories ~~listed~~ specified in ~~Sections 603.2.1 through 603.2.5.~~ Table 603.2. Where there are multiple buildings on a building site, each building shall comply separately with the provisions of Section 603.

> **Exception:** Buildings designed and constructed such that the total usage of each of the load types ~~described~~ specified in ~~Sections 603.2.1 through 603.2.5~~ Table 603.2 shall be permitted to be measured through the use of installed sub-meters or other equivalent methods as *approved*.

TABLE 603.2(1)
ENERGY USE CATEGORIES

Load Category	Description of energy use
Total HVAC system	Heating, cooling and ventilation including, but not limited to fans, pumps, boilers, chillers and water heating.
Total lighting system	Interior and exterior lighting used in occupant spaces and common areas
Plug loads	Devices, appliances and equipment connected to convenience receptacle outlets
Process loads	Any single load of an activity within the building that exceeds 5 percent of the peak connected load of the whole building including, but not limited to data centers, manufacturing equipment and commercial kitchens
Building operations and other miscellaneous loads	Loads not includes elsewhere in this table including, but not limited to, vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas, snow-melt systems and exterior lighting that is mounted on the building or used to illuminate building facades

~~**603.2.1HVAC system total energy use.** The HVAC system total energy use category shall include all energy used to heat, cool, and provide ventilation to the building including, but not limited to, fans, pumps, boiler energy, chiller energy and hot water.~~

~~**603.2.2 Lighting system total energy use.** The lighting system total energy use category shall include all interior and exterior lighting used in occupant spaces and common areas.~~

~~**603.2.3 Plug loads.** The plug loads energy use category shall include all energy use by devices, appliances and equipment connected to convenience receptacle outlets.~~

~~**603.2.4 Process loads.** The process loads energy use category shall include the energy used by any single load associated with activities within the building, such as, but not limited to, data centers manufacturing equipment and commercial kitchens, that exceeds 5 percent of the peak connected load of the whole building.~~

~~**603.2.5 Energy used for building operations loads and other miscellaneous loads.** The category of energy used for building operations loads and other miscellaneous loads shall include all vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains and fireplaces, swimming pools, inground spas, snow-melt systems, exterior lighting that is mounted on the building or used to illuminate building facades and the use of any miscellaneous loads in the building not specified in Sections 603.2.1 through 603.2.4.~~

Reason: The format of the section is inconsistent with typical I-Code format. The subsections 603.2.1 through 603.2.5 do not contain any regulations but are merely descriptors (definitions) of 5 energy use (load) categories. The regulation contained in Section 603.2 requires each type of load /energy use to be separately metered. This proposal turns Sections 603.2.1 through 603.2.5 into a table of energy use types/categories. It then revises the paragraph to refer to the table. It also provides consistency in the language used regarding 'load types' and 'categories'. There were various proposals submitted for consideration in the IECC in 2013. While none were successful, most used this format to 'define' the loads. In addition to reformatting the 5 sections into a table, Section 603.2 has been edited to provide a consistent method of referring to the 5 categories. Currently the section and exception says the categories are "defined", "listed" and 'described". This proposal replaces all three of those with the phrase 'specified in Table".

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction. The proposal is editorial in nature and does not change the actual regulation of any element.

GEW42-14: 603.2-THOMPSON567

GEW43-14
603.2

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org); Brenda Thompson, Chair, Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

603.2 Energy distribution design requirements and load type isolation in buildings. Energy distribution systems within, on or adjacent to and serving a building shall be designed such that each primary circuit, panel, feeder, piping system or supply mechanism supplies only one energy use type as defined in Sections 603.2.1 through 603.2.5. The energy use type served by each distribution system shall be clearly designated on the energy distribution system with the use served, and adequate space shall be provided for installation of metering equipment or other data collection devices, temporary or permanent, to measure their energy use. The energy distribution system shall be designed to facilitate the collection of data for each of the building energy use categories in Section 603.4 and for each of the end use categories listed in Sections 603.2.1 through 603.2.5. Where there are multiple buildings on a building site, each building shall comply separately with the provisions of Section 603.

Exceptions:

1. Buildings designed and constructed such that the total usage of each of the load types described in Sections 603.2.1 through 603.2.5 shall be permitted to be measured through the use of installed sub-meters or other equivalent methods as *approved*.

2. Within Group I-2, Condition 2 occupancies, loads connected to critical, life safety and equipment branches shall be permitted to be monitored in the aggregate.

Reason: These metering requirements place an undue burden on hospitals (Group I-2, Condition 2) that have very sophisticated and integrated power systems. Many times the critical, life safety and essential electric system may have lighting, process loads and equipment loads connected in the same panelboard. The need to meter to the circuit level is very costly and difficult to manage for loads that would not be managed or optional.

The Essential Electrical System within a hospital is a system comprised of alternate sources of power and all connected distribution systems and ancillary equipment, designed to ensure continuity of electrical power to designated areas and functions of a health care facility during disruptions of normal power sources and also to minimize disruption within the internal wiring system. The internal wiring system is segregated into three branches, the Life Safety Branch, the Critical Branch and the Equipment Branch. These branches divide and prioritize the criticality of the equipment and functions served by the electrical system and provide for a hierarchy of electrical service based on life safety and clinical services. The division between these branches occurs at transfer switches where more than one transfer switch is required. The Equipment Branch is a system of feeders and branch circuits arranged for delayed, automatic, or manual connection to the alternate power source and that services primarily 3-phase power equipment. The Equipment Branch serves such items as: central suction systems, sump pumps, compressed air systems serving medical and surgical functions, smoke control systems, stair pressurization systems, kitchen hood supply or exhaust systems, HVAC systems for airborne infections/isolation rooms, protective environment rooms, operating rooms, critical care units, labor and delivery units, emergency rooms and general patient rooms, and lab and other hazardous area hood.

The Critical Branch is a system of feeders and branch circuits supplying power for task illumination, fixed equipment, select receptacles, and select power circuits serving areas and functions related to patient care that are automatically connected to alternate power sources by one or more transfer switches during interruption of the normal power system. The Critical Branch serves task illumination, fixed equipment, select receptacles and select power circuits serving the following areas and functions related to patient care: airborne infections/isolation rooms, protective environment rooms, operating rooms, critical care units, labor and delivery units, emergency rooms and general patient rooms, and medication preparation areas, pharmacy dispensing areas, nurse call systems, blood banks. The Life Safety Branch is a system of feeders and branch circuits supplying power for lighting, receptacles, and equipment essential for life safety that are automatically connected to alternate power sources by one or more transfer switches during interruption of the normal power source. The Life Safety Branch is limited to circuits essential to life safety and supplies power for lights, receptacles and equipment for: illumination of the means of egress, exit signs, hospital communication systems, elevator cab lighting and control, fire alarms and loads dedicated to proper function and maintenance of the emergency power supply. As can be seen from the listing of components and areas served each branch of the essential electrical system within hospitals is distributed throughout the facility. This is in direct conflict with the energy distribution design requirements and load type isolation in buildings required by Section 603.2. In order to allow for the proper power distribution design for hospitals this exception is necessary.

This proposal is cosponsored by the ICC Ad Hoc Committee for Healthcare (AHC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC).

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW43-14: 603.2-PAARLBERG430

GEW44-14
603.3.1

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org); Brenda Thompson, Chair, Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

603.3.1 Gaseous fuels. Gaseous fuels including, but not limited to, natural gas, LP gas, coal gas, hydrogen, landfill gas, digester gas and biogas shall be capable of being metered at the building site to determine the gross consumption and peak demand of each different gaseous fuel by each building on a building site. The installation of gas meters and related piping shall be in accordance with the *International Fuel Gas Code*.

> **Exception:** Gaseous fuels used for clinical purposes are not required to be metered.

Reason: Hospitals use flammable gaseous fuel in limited quantities due to their fire risk. Examples include ethylene oxide, hydrogen, methane which are used for clinical purposes such as sterilization and laboratory purposes. Since these are delivered in finite quantities, consumption can be monitored by reviewed the supplier's manifest records. Gases used for clinical purposes should not be required to be sub-metered to be able to determine the gross consumption and peak demand.

Other examples of non-flammable gases that could be considered as "fuel" include nitrogen. This could be considered a "fuel" as drives pneumatic patient care equipment such as drills, saws, operating room booms, etc. Gases used for these types of clinical purposes are not fuels, so with no energy component, this should not be a requirement in the Green code.

This proposal is cosponsored by the ICC Ad Hoc Committee for Healthcare (AHC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC).

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW44-14: 603.3.1-PAARLBERG432

GEW45-14
603.3.1

Proponent: Bruce Swiecicki, National Propane Gas Association, representing self (bswiecicki@npga.org)

Revise as follows:

603.3.1 Gaseous fuels. Gaseous fuels including, but not limited to, natural gas, LP gas, coal gas, hydrogen, landfill gas, digester gas and biogas shall be capable of being metered at the building site to determine the gross consumption and peak demand of each different gaseous fuel by each building on a building site. The installation of gas meters and related piping shall be in accordance with the *International Fuel Gas Code.*

> **Exception:** Gaseous fuels stored and replenished on site shall not be required to be metered for peak demand.

Reason: The concept of measuring and controlling "peak demand" at the building site is based on two primary considerations. First, controlling the peak demand at the building site allows the building owner or occupants to reduce their energy consumption during a time period that the energy provider is charging higher than normal prices for energy delivered to the building. Secondly, the reason energy providers charge more for energy during periods of peak consumption is that the energy "grid" or delivery infrastructure is to avoid operating the system at maximum or near maximum capacity. Sustained operation at these levels can potentially bring the system down in a "crash," leading to a brownout or blackout condition. Therefore, building owners and occupants relying on energy sources that are not within their control have an incentive to monitor and control the use of that energy during peak demand periods.

Buildings utilizing propane as an energy source are not subject to the same constraints as other energy sources. The source of propane is stored in a container on the building property and the container is replenished with propane periodically to maintain a steady supply. The building owner or occupants have already paid for the energy in the propane container and therefore are not subject to increased pricing during periods of heavier than normal use.

It is important to note that each ASME propane container is already provided with a volumetric liquid level gauge that is used to determine the remaining amount of propane in the container, which satisfies the requirement in 603.3.1 for metering the gross consumption of gas.

To summarize, the requirement for peak demand metering for gaseous fuel systems that are stored and replenished on site is a requirement that serves no useful purpose while imposing a needless burden on the building owner. It must be removed from the code.

Cost Impact: Will not increase the cost of construction.

GEW 45-14: 603.3.1-SWIECICKI797

GEW46-14
603.3.2

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org)

Revise as follows:

603.3.2 Liquid fuels. Liquid fuels including, but not limited, to fuel oil, petroleum-based diesel, kerosene, gasoline, bio diesel, methanol, ethanol and butane shall be capable of being metered at the building site to allow a determination of the gross consumption and peak demand of each liquid fuel use by each building on a building site. The installation of meters and related piping shall be in accordance with the *International Mechanical Code*.

> **Exception:** Stationary reciprocating internal combustion engines (RICE) provided for emergency and standby power are not required to be metered.

Reason: Certain stationary reciprocating internal combustion engines (RICE) are maintained in order to be able to respond to emergency power needs. The EPA allows exceptions for the emissions requirements for these generators as listed below in 40 CFR § 63.6640 Paragraph (f) and metering these for gross consumption and peak demand is an undue burden.

EPA § 63.6640 Paragraph (f) Requirements for emergency stationary RICE.

(1) If you own or operate an existing emergency stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions, a new or reconstructed emergency stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions that was installed on or after June 12, 2006, or an existing emergency stationary RICE located at an area source of HAP emissions, you must operate the emergency stationary RICE according to the requirements in paragraphs (f)(1)(i) through (iii) of this section. Any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as described in paragraphs (f)(1)(i) through (iii) of this section, is prohibited. If you do not operate the engine according to the requirements in paragraphs (f)(1)(i) through (iii) of this section, the engine will not be considered an emergency engine under this subpart and will need to meet all requirements for non-emergency engines.

(i) There is no time limit on the use of emergency stationary RICE in emergency situations.

(ii) You may operate your emergency stationary RICE for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, the manufacturer, the vendor, or the insurance company associated with the engine. Maintenance checks and readiness testing of such units is limited to 100 hours per year. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency RICE beyond 100 hours per year.

(iii) You may operate your emergency stationary RICE up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity; except that owners and operators may operate the emergency engine for a maximum of 15 hours per year as part of a demand response program if the regional transmission organization or equivalent balancing authority and transmission operator has determined there are emergency conditions that could lead to a potential electrical blackout, such as unusually low frequency, equipment overload, capacity or energy deficiency, or unacceptable voltage level. The engine may not be operated for more than 30 minutes prior to the time when the emergency condition is expected to occur, and the engine operation must be terminated immediately after the facility is notified that the emergency condition is no longer imminent. The 15 hours per year of demand response operation are counted as part of the 50 hours of operation per year provided for non-emergency situations. The supply of emergency power to another entity or entities pursuant to financial arrangement is not limited by this paragraph (f)(1)(iii), as long as the power provided by the financial arrangement is limited to emergency power.

(2) If you own or operate an emergency stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions that was installed prior to June 12, 2006, you must operate the engine according to the conditions described in paragraphs (f)(2)(i) through (iii) of this section. If you do not operate the engine according to the requirements in paragraphs (f)(2)(i) through (iii) of this section, the engine will not be considered an emergency engine under this subpart and will need to meet all requirements for non-emergency engines.

(i) There is no time limit on the use of emergency stationary RICE in emergency situations.

(ii) You may operate your emergency stationary RICE for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by the manufacturer, the vendor, or the insurance company associated with the engine. Required testing of such units should be minimized, but there is no time limit on the use of emergency stationary RICE in emergency situations and for routine testing and maintenance.

(iii) You may operate your emergency stationary RICE for an additional 50 hours per year in non-emergency situations. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

This proposal is cosponsored by the ICC Ad Hoc Committee for Healthcare (AHC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC).

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW46-14: 603.3.2-PAARLBERG436

GEW47-14
603.3.7.1, 603.3.7.2, 603.3.7.3, 603.3.7.4, 603.3.7.5

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

603.3.7.1 Solar electric. Equipment and systems providing electric power through conversion of solar energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.

> <u>**Exception:** Systems with a rated output of less than 3 kW shall not be required to have the capacity to be metered.</u>

603.3.7.2 Solar thermal. Equipment and systems providing heat to fluids or gases through the capture of solar energy shall be capable of being metered so that the peak thermal energy (Btu/h) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of heat captured (Btu) for delivery to the building and its systems can be determined intervals of 1 hour or less.

> **Exception:** Systems with a rated output of less than ~~100~~ <u>25</u> kBtu/hr shall not be required to have the capacity to be metered.

603.3.7.3 Waste heat. Equipment and systems providing energy through the capture of waste heat shall be capable of being metered so that the amount of heat captured and delivered to the building and its systems can be determined at intervals of 1 hour or less.

> **Exception:** Systems with a rated output of less than ~~100~~ <u>25</u> kBtu/hr shall not be required to have the capacity to be metered.

603.3.7.4 Wind power systems. Equipment and systems providing electric power through conversion of wind energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.

> <u>**Exception:** Systems with a rated output of less than 3 kW shall not be required to have the capacity to be metered.</u>

603.3.7.5 Other renewable energy electric production systems. Equipment and systems providing electric power through conversion of other forms of renewable energy directly to electric power shall be capable of being metered so that the peak electric power (kW) provided to the building and its systems or to off-site entities can be determined at 15-minute intervals and the amount of electric power (kWh) provided to the building and its systems can be determined at intervals of 1 hour or less.

> <u>**Exception:** Systems with a rated output of less than 3 kW shall not be required to have the capacity to be metered.</u>

Reason: Currently, renewable energy systems that produce thermal energy do not have to be metered if the output is less than 100,000 Btu per hour. However, all renewable energy systems that produce electric energy have to metered, even if the output is as low as 1 Watt (3.413 Btu's per hou r).

The proposed changes are designed to ensure that very small systems, regardless of whether they produce electric or thermal energy, are exempt from these requirements.

Cost Impact: Will not increase the cost of construction.

GEW47-14: 603.3.7.1-ROSENSTOCK530

GEW48-14
603.3.7.2, Chapter 12

Proponent: Jim Huggins, Solar Rating & Certification Corp., representing Solar Rating & Certification Corp.

Revise as follows:

603.3.7.2 Solar thermal. Equipment and systems providing heat to fluids or gases through the capture of solar energy shall be capable of being metered so that the peak thermal energy (Btu/h) provided to the building and its systems or to off-site entities can be determined at 15- minute intervals and the amount of heat captured (Btu) for delivery to the building and its systems can be determined intervals of 1 hour or less.

> **Exception:** Systems with a rated output of less than100 kBtu/hr shall not be required to have the capacity to be metered. T<u>he rated output shall be determined using listed and labeled solar collectors that have been tested in accordance with SRCC 100.</u>

Add new standard as follows:

SRCC

<u>Solar Rating & Certification Corporation</u>
<u>400 High Point Drive, Suite 400</u>
<u>Cocoa, FL 32926</u>

<u>SRCC 100-2013-11 Minimum Standards for Solar Thermal Collectors</u>

Reason: This section provides an exception to the requirement to meter solar thermal systems, but does not explain how to calculate the rated output of the system. This proposal adds a requirement to comply with the nationally recognized standard for solar collectors. This requirement is in the IRC, but not in the IMC or the IECC, so it is needed here to cover non-residential systems.

Compliance with the standard will provide the information needed by the design professional to calculate the rated output of the system.

Cost Impact: Will not increase the cost of construction. Certification of solar thermal collectors is already required by incentive programs, utilities, and many states so most solar thermal collectors are already certified and the efficiency equations are published. Rather than increasing the cost of construction, this modification should lower it by make it easier for the design professional to determine compliance with the 100kBtu/hr requirement.

Analysis: A review of the standard proposed for inclusion in the code, SRCC 100-2013--11, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2014.

GEW48-14: 603.3.7.2-HUGGINS1086

GEW49-14
603.3.7.6 (New), 603.3.7.7 (New)

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Add new text as follows:

603.3.7.6 Biogas energy systems. Equipment and systems providing energy through the use of biogas shall be capable of being metered so that the amount of heat captured and delivered to the building and its systems can be determined at intervals of 1 hour or less.

> **Exception:** Systems with a rated output of less than 25 kBtu/hr shall not be required to have the capacity to be metered.

603.3.7.7 Biomass energy systems. Equipment and systems providing energy through the use of biomass shall be capable of being metered so that the amount of heat captured and delivered to the building and its systems can be determined at intervals of 1 hour or less.

> **Exception:** Systems with a rated output of less than 25 kBtu/hr shall not be required to have the capacity to be metered.

Reason: The proposed changes will make this section consistent with other proposals to ensure that biogas and biomass energy systems are allowed to be used to meet the renewable energy requirements of this section.

In addition, the exception language is consistent with other proposals to exempt smaller systems from having to be metered.

Cost Impact: Will increase the cost of construction.

GEW49-14: 603.3.7.6 (NEW)-ROSENSTOCK532

GEW50-14
603.4, 603.4.1

Proponent: Paul Cabot, American Gas Association, representing American Gas Association (pcabot@aga.org)

Revise as follows:

603.4 Energy load type sub-metering. For buildings that are not less than 25,000 square feet (2323 m^2) in *total building floor area* the electric energy use of the categories specified in Section 603.2 shall be metered through the use of sub-meters or other *approved*, equivalent methods meeting the capability requirements of Section 603.3.

603.4.1 Buildings less than 25,000 square feet. For buildings that are less than 25,000 square feet (2323 m^2) in *total building floor area*, the electric energy distribution system shall be designed and constructed to accommodate the future installation of sub-meters and other *approved* devices in accordance with Section 603.4. This includes, but is not limited to, providing access to distribution lines and ensuring adequate space for the installation of sub-meters and other *approved* devices.

Reason: The two sections are being revised to limit sub metering to electric only. The imposition of sub metering for natural gas and other energy sources result in significant installation cost increases without any known energy conservation benefit. Electric energy sub metering can utilize utility rate structures and incentives to shed demand and control equipment operation scheduling, providing a economic benefit. Electrically driven equipment and systems vastly outnumber applications driven by natural gas and other energy sources. Electrically driven HVAC, refrigeration, lighting, pumps, fans, AV, plug loads, etc., offer economic opportunities for central motoring and control that sub meters could be used for. Natural gas and other energy source driven appliances mainly are space and water heating, and offer little control opportunities and no economic benefit for consumers and building users. While there may be some reporting applications that make sense for sub metering of natural gas and other energy sources, those opportunities do not justify code mandated installations.

Cost Impact: Will not increase the cost of construction.

GEW50-14: 603.4-CABOT753

GEW51-14
603.5

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org); Brenda Thompson, Chair, representing Sustainability, Energy, High Performance code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

603.5 Minimum energy measurement and verification. Meters, sub-meters, and other *approved* devices installed in compliance with Sections 603.3 and 603.4 shall be connected to a data acquisition and management system capable of storing not less than 36-months worth of data collected by all meters and other *approved* devices and transferring the data in real time to a display as required in Section 603.6.

> **Exception:** Stationary reciprocating internal combustion engines (RICE) provided for emergency and standby power are not required to be connected to a data acquisition and management system.

Reason: Certain stationary reciprocating internal combustion engines (RICE) are maintained in order to be able to respond to emergency power needs. The EPA allows exceptions for the emissions requirements for these generators as listed below in 40 CFR § 63.6640 Paragraph (f) and metering these for gross consumption and peak demand is an undue burden.

EPA § 63.6640 Paragraph (f) Requirements for emergency stationary RICE.

(1) If you own or operate an existing emergency stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions, a new or reconstructed emergency stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions that was installed on or after June 12, 2006, or an existing emergency stationary RICE located at an area source of HAP emissions, you must operate the emergency stationary RICE according to the requirements in paragraphs (f)(1)(i) through (iii) of this section. Any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as described in paragraphs (f)(1)(i) through (iii) of this section, is prohibited. If you do not operate the engine according to the requirements in paragraphs (f)(1)(i) through (iii) of this section, the engine will not be considered an emergency engine under this subpart and will need to meet all requirements for non-emergency engines.

(i) There is no time limit on the use of emergency stationary RICE in emergency situations.

(ii) You may operate your emergency stationary RICE for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, the manufacturer, the vendor, or the insurance company associated with the engine. Maintenance checks and readiness testing of such units is limited to 100 hours per year. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency RICE beyond 100 hours per year.

(iii) You may operate your emergency stationary RICE up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity; except that owners and operators may operate the emergency engine for a maximum of 15 hours per year as part of a demand response program if the regional transmission organization or equivalent balancing authority and transmission operator has determined there are emergency conditions that could lead to a potential electrical blackout, such as unusually low frequency, equipment overload, capacity or energy deficiency, or unacceptable voltage level. The engine may not be operated for more than 30 minutes prior to the time when the emergency condition is expected to occur, and the engine operation must be terminated immediately after the facility is notified that the emergency condition is no longer imminent. The 15 hours per year of demand response operation are counted as part of the 50 hours of operation per year provided for non-emergency situations. The supply of emergency power to another entity or entities pursuant to financial arrangement is not limited by this paragraph (f)(1)(iii), as long as the power provided by the financial arrangement is limited to emergency power.

(2) If you own or operate an emergency stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions that was installed prior to June 12, 2006, you must operate the engine according to the conditions described in paragraphs (f)(2)(i) through (iii) of this section. If you do not operate the engine according to the requirements in paragraphs (f)(2)(i) through (iii) of this section, the engine will not be considered an emergency engine under this subpart and will need to meet all requirements for non-emergency engines.

(i) There is no time limit on the use of emergency stationary RICE in emergency situations.

(ii) You may operate your emergency stationary RICE for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by the manufacturer, the vendor, or the insurance company associated with the engine. Required testing of such units should be minimized, but there is no time limit on the use of emergency stationary RICE in emergency situations and for routine testing and maintenance.

(iii) You may operate your emergency stationary RICE for an additional 50 hours per year in non-emergency situations. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

This proposal is cosponsored by the ICC Ad Hoc Committee for Healthcare (AHC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC).

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW51-14: 603.5-PAARLBERG437

GEW52-14
603.5.1, 603.6

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

603.5.1 ~~Annual~~ Daily and annual direct and indirect emissions. The data acquisition and management system shall be capable of providing the data necessary to calculate the daily and annual direct and indirect CO_2*e* emissions associated with the operation of the building and its systems using the results of daily and annual energy use measured in accordance with Section 603.5 or the results of on-site emissions monitoring. The calculation shall be based on energy measured for each form of energy delivered to the site on ~~an~~ a daily or annual basis. Where reporting of emissions is required, the determination of emissions shall be in accordance with Section 602.2.3 or through the use of an on-site emissions monitoring system.

603.6 Energy and emissions display. A permanent, readily accessible and visible display shall be provided adjacent to the main building entrance or on a publicly available Internet web site. The display shall be capable of providing all of the following:

1. The current energy demand for the whole building level measurements, updated for each fuel type at the intervals specified in Section 603.3.
2. The average and peak demands for the previous day and the same day the previous year.
3. The total energy usage for the previous ~~18~~ 13 months.
4. The current direct emissions for building equipment, updated for each fuel type.
5. The total direct emissions of building equipment for the previous day and the same day the previous year.
6. The total direct emissions of building equipment for the previous 13 months.

Reasons: The proposed changes improve this section for the following reasons:

- It requires reporting of direct and indirect emissions, which will vary considerably based on the type of energy used in building appliances and equipment.
- It requires the reporting of daily emissions, so that building owners may be alerted to equipment maintenance issues if there is a dramatic change in direct emissions (e.g., incomplete combustion leading to higher CO_2e emissions).
- It allows more flexibility for the reporting, by providing a choice of the use of on-site emissions monitors or the use of approved calculation methods.
- It requires the display to show emissions as well as energy information.
- It provides building specific emissions information that will be useful to building owners, occupants, and visitors.
- It breaks out the emissions information by fuel type, to allow parties to see the different amounts of emissions from different equipment.

Also, changing the recording period from 18 to 13 months will allow users to see the actual information for a year that is provided by energy suppliers based on their billing periods. For example, a "January" billing period may end on January 3, but show data that mostly covers the December calendar month (December 3 to January 3). So the January 2014 display will have information from December 2012 through December 2013, based on the information provided by the energy supplier. Then the data from the daily emissions calculations or monitoring can be aligned with the energy supplier billing periods for the display.

Cost Impact: Will not increase the cost of construction.

GEW52-14: 603.5.1-ROSENSTOCK536

GEW 53-14
604

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com)

Delete without substitution:

~~604 AUTOMATED DEMAND-RESPONSE (AUTO-DR) INFRASTRUCTURE~~

Reason: This section is too complicated, expensive and does not apply to many utilities.

Cost Impact: Will not increase the cost of construction. The proposal removes provisions.

GEW 53-14: 604-KLEIN1206

GEW54-14

202, 604.1, 604.2, 604.3, 604.3.1 (New), 604.4, 611.3.3.5 (New)

Proponent: Jim Edelson, New Buildings Institute, representing New Buildings Institute; Ryan Meres, Institute for Market Transformation (ryan@imt.org)

Add new definition(s) as follows:

<u>**DEMAND RESPONSE PERIOD:** A period of time during which electricity or other fuel loads are modified in response to a demand response signal.</u>

<u>**DEMAND RESPONSE SIGNAL**: A signal sent by the local utility, independent system operator (ISO), or designated curtailment service provider or aggregator, to a customer, indicating a price or a request to modify electricity consumption, for a limited time period.</u>

<u>**DEMAND RESPONSE ZONE**: A defined area within the building or building site from which a demand response signal can be received, an area to which a demand response signal can be sent, or an area in which a form of control can be executed.</u>

<u>**Critical:** A demand response zone serving a process where reset of the zone temperature setpoint during a demand shed event might disrupt the process, including but not limited to data centers, telecom and private branch exchange (PBX) rooms, and laboratories</u>

<u>**Non-Critical:** A demand response zone that is not defined as critical.</u>

<u>**OCCUPANT CONTROLLED SMART THERMOSTAT.** A control device that is capable of both receiving and responding to demand response signals with occupant override capabilities.</u>

Revise as follows:

604.1 Establishing an open and interoperable automated demand-response (Auto-DR) infrastructure. ~~Where this section is indicated to be applicable in Table 302.1, buildings that contain heating, ventilating, air-conditioning (HVAC) or lighting systems shall comply with Sections 604.1 through 604.4. A building energy management and control system (EMCS) shall be provided and integrated with building HVAC systems controls and lighting systems controls to receive an open and interoperable automated demand-response (Auto-DR) relay or Internet signal. Building HVAC and lighting systems and specific building energy-using components shall incorporate preprogrammed demand response strategies that are automated with a demand response automation Internet software client.~~

~~**Exception:** Auto-DR infrastructure is not required for the following:~~

1. ~~Buildings located where the electric utility or regional Independent System Operator (ISO) or Regional Transmission Operator (RTO) does not offer a demand response program to buildings regulated by this code.~~
2. ~~Buildings with a peak electric demand not greater than 0.75 times that of the standard reference design.~~
3. ~~Buildings that have incorporated onsite renewable energy generation to provide 20 percent or more of the building's energy demand.~~

<u>Where this section is indicated to be applicable in Table 302.1, buildings that contain heating, ventilating, air-conditioning (HVAC) or lighting systems shall comply with Sections 604.1 through 604.4.</u>

<u>**Exception:** Auto-DR infrastructure is not required for the following buildings and systems:</u>

1. Buildings located where the electric utility or regional independent system operator (ISO) or regional transmission operator (RTO) does not offer a demand response program to buildings regulated by this code.

2. Buildings with onsite renewable energy systems that have a minimum rated capacity no less than 20 percent of the building's peak energy demand.

3. Hospitals and critical emergency response facilities.

4. Spaces used for hazardous materials storage.

5. Building smoke exhaust systems.

6. Manufacturing process systems

7. Buildings with passive or active features that show peak electric energy use reduction of 15 percent or more during demand response periods identified by the code official. Modeled peak energy use shall be determined in accordance with Section 602 and shall demonstrate that the building reduces modeled peak daily electric energy use by not less than 15 percent from the baseline building for the demand response period identified by the code official.

8. Systems serving process loads where constant temperatures are necessary to prevent degradation of plants, animals, or other temperature-sensitive materials.

604.2 ~~Software clients~~ Heating,ventilation and air-conditioning (HVAC) systems equipped with direct digital control (DDC). ~~Demand response automation software clients shall be capable of communicating with a demand response automation server via the Internet or other communication relay.~~

HVAC systems with direct digital control (DDC) to the zone level shall be programmed to allow centralized demand shed for non-critical zones in accordance with the following:

1. The controls shall have a capability to remotely setup the operating cooling temperature set points by 4 degrees F. (2.2 degrees C) or more in all non-critical zones on signal from a centralized contact or software point within an energy management control system (EMCS).

2. The controls shall have a capability to remotely setdown the operating heating temperature set points by 4 degrees F. (2.2 degrees C) or more in all non-critical zones on signal from a centralized contact or software point within an EMCS.

3. The controls shall have capabilities to remotely reset the temperatures in all non- critical zones to original operating levels on signal from a centralized contact or software point within an EMCS.

4. The controls shall be programmed to provide an adjustable rate of change for the temperature setup and reset.

5. The controls shall have the following features:

   5.1. Be accessible to authorized facility operators.

   5.2. Be equipped with a manual control to allow adjustment of heating and cooling set points globally from a single point.

   5.3. Shall direct the space-conditioning systems to conduct a centralized demand shed, as specified for non-critical zones during the demand response period, upon receipt of a demand response signal.

604.3 Heating, ventilating and air-conditioning (HVAC) systems not equipped with DDC. ~~The Auto-DR strategy for HVAC systems shall be capable of reducing the building peak cooling or heating HVAC demand by not less than 10 percent when signaled from the electric utility, regional independent system operator (ISO) or regional transmission operator (RTO), through any combination of the strategies and systemic adjustments, including, but not limited to the following:~~

1. ~~Space temperature setpoint reset.~~
2. ~~Increasing chilled water supply temperatures or decreasing hot water supply temperatures.~~
3. ~~Increasing or decreasing supply air temperatures for variable air volume (VAV) systems.~~
4. ~~Limiting capacity of HVAC equipment that has variable or multiple-stage capacity control.~~
5. ~~Cycling of HVAC equipment or turning off noncritical equipment.~~
6. ~~Disabling HVAC in unoccupied areas.~~
7. ~~Limiting the capacity of chilled water, hot water, and refrigerant control valves.~~
8. ~~Limiting the capacity of supply and exhaust fans, without reducing the outdoor air supply below the minimum required by Chapter 4 of the *International Mechanical Code*, or the minimum required by ASHRAE 62.1.~~
9. ~~Limiting the capacity of chilled water or hot water supply pumps.~~
10. ~~Anticipatory control strategies to precool or preheat in anticipation of a peak event.~~

~~**Exception:** The Auto-DR strategy is not required to include the following buildings and systems:~~

1. ~~Hospitals and critical emergency response facilities.~~
2. ~~Life safety ventilation for hazardous materials storage.~~
3. ~~Building smoke exhaust systems.~~
4. ~~Manufacturing process~~ systems.

Unitary heating or cooling systems, including heat pumps, not controlled by a central energy management control system (EMCS) shall have an occupant controlled smart thermostat in accordance with Section 604.3.1.

EXCEPTION: Gravity gas wall heaters, gravity floor heaters, gravity room heaters, non- central electric heaters, fireplaces or decorative gas appliances, wood stoves, room air conditioners, and room air-conditioner heat pumps.

604.3.1 Occupant controlled smart thermostat (OCST). Occupant controlled smart thermostats (OCST) shall be capable of the following:

1. OCSTs shall include communication capabilities through either:
   1.1. Not less than one expansion port that allows for the installation of a removable module containing a radio or physical connection port to enable communication; or
   1.2. Onboard communication devices.
2. OCSTs shall be capable of both receiving and responding to demand response signals.
3. Event modes shall be capable of being overridden by the occupant.
4. OCSTs, with communications enabled, shall be capable of receiving and automatically responding to demand response signals by adjusting the thermostat setpoint by either the default number of degrees or the number of degrees established by the occupant.
5. In response to demand response signals, the OCST shall default to an event response that initiates setpoint offsets of +4°F for cooling and -4°F for heating relative to the current setpoint.
6. OCSTs shall be capable of manual adjustments to event responses, thermostat settings and setpoints at any time, including during demand response periods.
7. OCSTs shall have the capability to display information to the occupant including, but not limited to, communications system connection status, an indication that a demand response period is in progress, the currently sensed temperature and the current setpoint.

604.4 Lighting. ~~In Group B office spaces, the Auto-DR system shall be capable of reducing total connected power of lighting as determined in accordance with Section C405.5 of the *International Energy Conservation Code* by not less than 15 percent.~~

> ~~**Exception:** The following buildings and lighting systems need not be addressed by the Auto-DR system:~~
>
> 1. ~~Buildings or portions associated with lifeline services.~~
> 2. ~~Luminaires on emergency circuits.~~
> 3. ~~Luminaires located in emergency and life safety areas of a building.~~
> 4. ~~Lighting in buildings that are less than 5,000 square feet (465 m2) in total area.~~
> 5. ~~Luminaires located within a daylight zone that are dimmable and connected to automatic *daylight controls* complying with Section C405.2.2.3.2 of the *International Energy Conservation Code*.~~
> 6. ~~Signage used for emergency, life safety or traffic control~~ purposes.

<u>Where buildings have a floor area greater than 10,000 square feet, the Auto-DR system shall be capable of reducing the total connected lighting power by not less than 15 percent. The lighting power shall be determined in accordance with Section C405.5 of the *International Energy Conservation Code*.</u>

> <u>**Exception:** The following buildings and lighting systems need not be addressed by the Auto-DR system:</u>
>
> 1. <u>Luminaires or signage on emergency circuits.</u>
> 2. <u>Luminaires located within a *daylight zone* that are dimmable and connected to automatic *daylight controls* in accordance with the *International Energy Conservation Code*.</u>
> 3. <u>Luminaires or signage for which a lighting power reduction would endanger patient care, occupant safety or occupant security.</u>

<u>**611.3.3.5 Auto D-R Controls** For auto-DR lighting controls, the engagement of a shedding event shall be tested for light reduction to preset illuminance levels, and disengagement of a shedding event shall be tested for restoration to their original values.</u>

Reason: The proposed Section 604 supports greater DR participation by simplifying and standardizing the Auto-DR application to HVAC by describing three distinct situations: Energy Management Systems, Direct Digital Control, and Smart Thermostats. This equipment controls HVAC systems in non-critical zones. The systems are also able to communicate the changes in order for the building owner or operator to be compensated for responding to the price signal or demand response period. Section 604 proposed language requires that occupants can override system settings and calls out exceptions for certain types of equipment and sensitive or critical environments. Section 604.3.1 also ensures that the Auto-DR technology slowly return systems to normal operations in order to avoid rebound peaks. Relying on California Title 24's existing approach to HVAC controls and standardized communications protocols, the proposal provides simplified automated demand response (Auto-DR) infrastructure and communications language in Section 604.

Exception 7 addresses areas where passive load reduction can forestall the need for more aggressive demand reduction while at the same time reducing overall building energy use on an on-going basis. The proposed exception would provide an alternate approach to projects that would encourage the adoption of meaningful passive design strategies while also contributing to long-term grid stability. Features and systems that may allow buildings to qualify for this exemption include:

- actively controlled interior daylighting systems,
- thermal mass used actively to manage building internal temperatures as part of a night-ventilation control strategy,
- buildings designed to prevent direct solar penetration in cooling dominated climates,
- other building systems reviewed and approved by the AHJ

Sections 604.3.1 (Rebound Avoidance) is unchanged from the 2012 IgCC. Section 604.4 (Lighting) provisions are unchanged, but the scope extends beyond offices but coverage is reduced to building over 10000 square feet rather than 5000 square feet. Section 611.3.3.5 is added to describe the functional testing requirements for Auto-DR lighting reduction controls. And a row is added to the Commissioning Table 903.1 since that table includes a row for Lighting Auto-DR controls but not for HVAC Lighitng Auto-DR-Controls.

While the market will continue to incorporate auto-DR technology and communications into buildings, it is critical that the proposed language be incorporated into the IgCC to facilitate faster and more cost-effective adoption of DR and pricing programs that address changing electricity consumption demand patterns nationwide. With the proposed language in place, there will be benefits to both building energy consumers and electricity systems, and support provided to the grid that will avoid additional infrastructure expenses. Many states, utility commissions, and independent system operators (ISOs) are considering or already have DR and pricing programs and are exploring frameworks to accelerate and expand their role. Not only do these programs create system-wide benefits, but responsive demand in buildings has an enormous opportunity to contribute to the grid at a local distribution level, ensuring that the grid has resources at the right places at the right times. By standardizing Auto-DR system controls with this proposal, commercial buildings will become an even greater resource to very broad grid optimization efforts.

Cost Impact: Will not increase the cost of construction.

GEW54-14: 604.1-EDELSON1071

GEW55-14

302.1, 604.1

Proponent: Meg Waltner, National Resources Defense Council, representing Natural Resources Defense Council (mwaltner@nrdc.org)

Revise as follows:

604.1 Establishing an open and interoperable automated demand-response (Auto-DR) infrastructure. ~~Where this section is indicated to be applicable in Table 302.1, b~~Buildings that contain heating, ventilating, air-conditioning (HVAC) or lighting systems shall comply with Sections 604.1 through 604.4. A building energy management and control system (EMCS) shall be provided and integrated with building HVAC systems controls and lighting systems controls to receive an open and interoperable automated demand-response (Auto-DR) relay or Internet signal. Building HVAC and lighting systems and specific building energy-using components shall incorporate preprogrammed demand response strategies that are automated with a demand response automation Internet software client.

> **Exception:** Auto-DR infrastructure is not required for the following:
>
> 1. Buildings located where the electric utility or regional Independent System Operator (ISO) or Regional Transmission Operator (RTO) does not offer a demand response program to buildings regulated by this code.
> 2. Buildings with a peak electric demand not greater than 0.75 times that of the standard reference design.
> 3. Buildings that have incorporated onsite renewable energy generation to provide 20 percent or more of the building's energy demand.

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 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 CO_2e EMISSION REDUCTION			
302.1, 302.1.1, 602.1	zEPI of Jurisdictional Choice – The jurisdiction shall indicate a zEPI of 46 or less in each occupancy for which it intends to require enhanced energy performance.	Occupancy: ______ zEPI: ___________	
~~604.1~~	~~Automated demand response infrastructure~~	☐~~Yes~~	☐~~No~~

(portions of table not shown remain unchanged)

Reason: This proposal would make the automated demand-response infrastructure requirement applicable to all jurisdictions. Demand response is becoming an increasingly important tool to manage demand on the grid and integrate variable energy resources. Most recently, demand response played a critical role in preventing power outages during the extreme cold temperatures in January 2014. Demand response capabilities are easiest and cheapest to integrate into a building when it is first constructed and building systems and their controls are first installed. Many utilities, ISOs and RTOs already offer demand response programs and the number of programs and the need for demand response is only likely to grow going forward. Given the high benefits of and need for demand response, and the relative ease and low cost of integrating these capabilities at the time of construction, we recommend making the automated demand-response infrastructure requirement applicable in all jurisdictions that adopt the IgCC.

Cost Impact: Will increase the cost of construction.

GEW55-14: 604.1 #2-WALTNER1127

GEW56-14
604.1, 604.4

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

604.1 Establishing an open and interoperable automated demand-response (Auto-DR) infrastructure. Where this section is indicated to be applicable in Table 302.1, buildings that contain heating, ventilating, air-conditioning (HVAC) or lighting systems shall comply with Sections 604.1 through 604.4. A building energy management and control system (EMCS) shall be provided and integrated with building HVAC systems controls and lighting systems controls to receive an open and interoperable automated demand-response (Auto-DR) relay or Internet signal. Building HVAC and lighting systems and specific building energy-using components shall incorporate preprogrammed demand response strategies that are automated with a demand response automation Internet software client.

Exception: Auto-DR infrastructure is not required for the following:

1. Buildings located where the electric utility or regional Independent System Operator (ISO) or Regional Transmission Operator (RTO) does not offer a demand response program to buildings regulated by this code.

2. Buildings with a peak electric demand not greater than ~~0.75~~ 0.80 times that of the standard reference design.

3. Buildings that have incorporated onsite renewable energy generation designed to provide 20 percent or more of the building's peak energy demand during the period of the day when the building reaches its peak demand.

604.4 Lighting. In Group B office spaces, the Auto-DR system shall be capable of reducing total connected power of lighting as determined in accordance with Section C405.5 of the *International Energy Conservation Code* by not less than ~~15~~10 percent.

Exception: The following buildings and lighting systems need not be addressed by the Auto-DR system:

1. Buildings or portions associated with lifeline services.
2. Luminaires on emergency circuits.
3. Luminaires located in emergency and life safety areas of a building.
4. Lighting in buildings that are less than 5,000 square feet (465 m^2) in total area.
5. Luminaires located within a daylight zone that are dimmable and connected to automatic *daylight controls* complying with Section C405.2.2.3.2 of the *International Energy Conservation Code*.
6. Signage used for emergency, life safety or traffic control purposes.

Reason: The revised values shown in the proposed changes are designed to account for the changes that have occurred in cooling system and lighting system efficiency over the past few years.

1) For cooling systems, the efficiency of nearly all types of electric commercial cooling equipment was increased with the publication of ASHRAE 90.1-2013 and the latest version of the IECC. For equipment where the minimum efficiency was not raised at publication, the efficiency levels will be increased as of 1/1/2015 or 1/1/2016. For other types of cooling equipment that may be used, such as residential-sized central air conditioners, central heat pumps, and room air conditioners, efficiency levels will increase as of June 2014 (room air conditioners) or January 2015 (central air conditioners and heat pumps).

The percentage required has been lowered to account for the mandated efficiency increases, since they will reduce peak demand for nearly all commercial buildings.

2) In terms of renewable energy systems, suppose a building has a peak demand of 100 kW, and the renewable energy system provides 20 kW at night, and 0 kW during the day. In terms of peak demand, the renewable system is not providing any value. The proposed language provides the exception to systems that are providing energy when the energy production is coincident with the building's peak demand.

3) For lighting systems, the efficiency of the most common types of lighting equipment has increased or will be increased within the next year. The efficiency levels of general service fluorescent lamps, fluorescent lamp ballasts, general service incandescent lamps, incandescent reflector lamps, and metal halide lamp fixtures have increased significantly over the past few years, or will be increased within the next few years.

In addition, in the ASHRAE 90.1-2013 lighting section, the maximum lighting power density for office buildings under the Building Area Method has been reduced from 0.90 Watts/ft^2 (in the 2010 version of ASHRAE 90.1) to 0.82 Watts/ft^2, which corresponds to a 8.9% reduction.

The percentage required for lighting has been lowered to account for the mandated efficiency increases, since they will reduce peak demand for nearly all commercial buildings.

Cost Impact: Will not increase the cost of construction.

Analysis: The International Energy Conservation Code sections C405.5 and C405.2.2.3.2 referenced in the text of this proposal are section numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section numbers for the 2015 Editions will be C405.4 and C405.2.3, respectively.

GEW56-14: 604.1-ROSENSTOCK547

GEW57-14
604.1

Proponent: Charles Foster, Steffes Corporation, representing self (cfoster20187@yahoo.com)

Revise as follows:

604.1 Establishing an open and interoperable automated demand-response (Auto-DR) infrastructure. Where this section is indicated to be applicable in Table 302.1, buildings that contain heating, ventilating, air-conditioning (HVAC) or lighting systems shall comply with Sections 604.1 through 604.4. A building energy management and control system (EMCS) shall be provided and integrated with building HVAC systems controls and lighting systems controls to receive an open and interoperable automated demand-response (Auto-DR) relay or Internet signal. Building HVAC and lighting systems and specific building energy-using components shall incorporate preprogrammed demand response strategies that are automated with a demand response automation Internet software client.

Exception: Auto-DR infrastructure is not required for the following:

1. Buildings located where the electric utility, gas utility, or regional Independent System Operator (ISO) or Regional Transmission Operator (RTO) does not offer a demand response program to buildings regulated by this code.
2. Buildings with a peak electric or natural gas demand not greater than 0.75 times that of the standard reference design.
3. Buildings that have incorporated onsite renewable energy generation to provide 20 percent or more of the building's peak energy demand.

Reason: Currently, Section 604 does not address gas peak reductions in buildings even though some gas companies offer DR programs to customers. Moreover, gas supply infrastructure has become more taxed as exploration has increased in the United States.

Auto DR controls can reduce fossil fuel usage as well as electric usage (e.g., lower space heating thermostats and water heating thermostats in the winter). For item 2, it prevents any gaming by fuel switching. Lowering electric demand by increasing fossil fuel demand runs counter to the goals of a green building code.

Additionally, in cases where one energy demand occurs during one season (e.g., electric demand in the summer) and another energy demand occurs during a different season (e.g., fossil fuel demand in the winter), but the values are the same or very close to each other, the revised language will ensure that the building is designed to reduce all peak energy demands, and not allow any game playing that would result from fuel switching (such as increasing one energy type of peak demand to lower another energy type of peak demand).

Cost Impact: Will not increase the cost of construction.

GEW57-14 : 604.1-FOSTER556

GEW58-14
604.1

Proponent: Meg Waltner, National Resources Defense Council, representing Natural Resources Defense Council (mwaltner@nrdc.org)

Revise as follows:

604.1 Establishing an open and interoperable automated demand-response (Auto-DR) infrastructure. Where this section is indicated to be applicable in Table 302.1, buildings that contain heating, ventilating, air-conditioning (HVAC) or lighting systems shall comply with Sections 604.1 through 604.4. A building energy management and control system (EMCS) shall be provided and integrated with building HVAC systems controls and lighting systems controls to receive an open and interoperable automated demand-response (Auto-DR) relay or Internet signal. Building HVAC and lighting systems and specific building energy-using components shall incorporate preprogrammed demand response strategies that are automated with a demand response automation Internet software client.

Exception: Auto-DR infrastructure is not required for the following:

~~1.~~ ~~Buildings located where the electric utility or regional Independent System Operator (ISO) or Regional Transmission Operator (RTO) does not offer a demand response program to buildings regulated by this code.~~

~~2~~ <u>1</u>. Buildings with a peak electric demand not greater than 0.75 times that of the standard reference design.

~~3~~ <u>2</u>. Buildings that have incorporated onsite renewable energy generation to provide 20 percent or more of the building's energy demand.

Reason: This proposal would remove the current exception to the automated demand-response infrastructure requirement for buildings located where the utility or regional Independent System Operator (ISO) or Regional Transmission Operator (RTO) do not yet offer a demand response program. Demand response is becoming an increasingly important tool to manage demand on the grid and integrate variable energy resources. Most recently, demand response played a critical role in preventing power outages during the extreme cold temperatures in January 2014. Demand response capabilities are easiest and cheapest to integrate into a building when it is first constructed and building systems and their controls are first installed. Many utilities, ISOs and RTOs already offer demand response programs and the number of programs and the need for demand response is only likely to grow going forward. Even if a demand response program does not exist at the time of construction, it is likely that one will be developed over the life of the building. Furthermore, integrating demand-response infrastructure into buildings provides a demand response resource which will facilitate the creation of demand response programs. Given the high benefits of and need for demand response, and the relative ease and low cost of integrating these capabilities at the time of construction we recommend removing the exception for buildings located in an area without a current DR program.

Cost Impact: Will increase the cost of construction.

GEW58-14: 604.1 #1-WALTNER963

GEW59-14
604.3

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org); Brenda Thompson, Chair, representing the Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

604.3 Heating, ventilating and air-conditioning (HVAC) systems. The Auto-DR strategy for HVAC systems shall be capable of reducing the building peak cooling or heating HVAC demand by not less than 10 percent when signaled from the electric utility, regional independent system operator (ISO) or regional transmission operator (RTO), through any combination of the strategies and systemic adjustments, including, but not limited to the following:

1. Space temperature setpoint reset.
2. Increasing chilled water supply temperatures or decreasing hot water supply temperatures.
3. Increasing or decreasing supply air temperatures for variable air volume (VAV) systems.
4. Limiting capacity of HVAC equipment that has variable or multiple-stage capacity control.
5. Cycling of HVAC equipment or turning off noncritical equipment.
6. Disabling HVAC in unoccupied areas.
7. Limiting the capacity of chilled water, hot water, and refrigerant control valves.
8. Limiting the capacity of supply and exhaust fans, without reducing the outdoor air supply below the minimum required by Chapter 4 of the *International Mechanical Code*, or the minimum required by ASHRAE 62.1.
9. Limiting the capacity of chilled water or hot water supply pumps.
10. Anticipatory control strategies to precool or preheat in anticipation of a peak event.

Exception: The Auto-DR strategy is not required to include the following buildings and systems:

1. ~~Hospitals and~~ Group I-2 Condition 2
2. Critical emergency response facilities.
3. Life safety ventilation for hazardous materials storage.
4. Building smoke exhaust systems.
5. Manufacturing process systems.

Reason: The exception should pertain to all healthcare facilities that provide emergency and life sustaining services. The previous language does not use the standard ICC language to address hospitals and other emergency and life sustaining facilities. Using Group I-2, Condition 2 will provide the appropriate language for this exception.

This proposal is cosponsored by the ICC Ad Hoc Committee for Healthcare (AHC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC).

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW59-14: 604.3-PAARLBERG642

GEW60-14
604.4

Proponent: Glenn Heinmiller, Lam Partners, Inc, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

604.4 Lighting. In Group B office spaces, the Auto-DR system shall be capable of reducing total connected power of lighting as determined in accordance with Section C405.5 of the *International Energy Conservation Code* by not less than 15 percent.

Exception: The following buildings and lighting systems need not be addressed by the Auto-DR system:

1. ~~Buildings or portions associated with lifeline services.~~
2. Luminaires on emergency circuits.
3. ~~Luminaires located in emergency and life safety areas of a building.~~
4. Lighting in buildings that are less than 5,000 square feet (465 m^2) in total area.
5. Luminaires connected to *daylight responsive controls* ~~located within a daylight zone that are dimmable and connected to automatic *daylight controls* complying with Section C405.2.2.3.2 of the *International Energy Conservation Code*.~~
6. ~~Signage used for emergency, life safety or traffic control purposes.~~

Reason: Exception 1 is incomprehensible. It refers to "lifeline services." Whatever this is, it is not a defined term and not a commonly used term.
Exception 3 is redundant: luminaires in "emergency and life safety areas of a building" should also be connected to emergency circuits and thus would be covered by exception 2.
Exception 5 is updated to incorporate new terminology from in the 2015 IECC which came from CE294-13 AMPC1/3.
Exception 6 is not necessary because signage is not lighting, and additionally is already exempt from the total connected power for interior lighting in IECC C405.5 (Section C405.4 of 2015 code).

Cost Impact: Will not increase the cost of construction.

Analysis: The International Energy Conservation Code sections C405.5 and C405.2.2.3.2 referenced in the text of this proposal are section numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section numbers for the 2015 Editions will be C405.4 and C405.2.3, respectively.

GEW60-14: 604.4-HEINMILLER592

GEW61-14
604.4

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, and High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

604.4 Lighting. In Group B office spaces, the Auto-DR system shall be capable of reducing total connected power of lighting as determined in accordance with Section C405.5 of the *International Energy Conservation Code* by not less than 15 percent.

Exception: The following buildings and lighting systems need not be addressed by the Auto-DR system:

1. ~~Buildings or portions associated with lifeline services.~~
2. Luminaires on emergency circuits.
3. Luminaires located in emergency and life safety areas of a building.
4. Lighting in buildings that are less than 5,000 square feet (465 m^2) in total area.
5. Luminaires located within a daylight zone that are dimmable and connected to automatic *daylight controls* complying with Section C405.2.2.3.2 of the *International Energy Conservation Code*.
6. Signage used for emergency, life safety or traffic control purposes.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The SEHPCAC was concerned that the term 'lifeline services' was undefined and therefore unclear. As such the enforcement of this exception would be unclear. We learned that 'lifeline services' is a term of art used in disaster mitigation planning. It generally refers to the infrastructure systems which provide services to the population of an area such as water, sewer, power distribution and communications. While the committee agreed that these infrastructure systems shouldn't have power reduced via an Auto -DR system, this requirement is only for the lighting in Group B offices. There is no reason why the management offices of infrastructure systems shouldn't be included in the Auto DR system. Therefore the proposal is to eliminate the exception for office buildings associateed with a lifeline service.

Cost Impact: Will increase the cost of construction. Eliminating the exception for these buildings will therefore impose the requirement and increase the cost of constructing them.

Analysis: The International Energy Conservation Code sections C405.5 and C405.2.2.3.2 referenced in the text of this proposal are section numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section numbers for the 2015 Editions will be C405.4 and C405.2.3, respectively.

GEW61-14: 604.4-THOMPSON568

GEW62-14
202 (New), 604.5 (New)

Proponent: Charles Foster, Steffes Corportation, representing Steffes Corporation (cfoster20187@yahoo.com)

Add new definition as follows:

ENERGY STORAGE SYSTEM Equipment that are designed for and capable of receiving, storing and discharging energy. Common examples of energy storage systems include chemical batteries, flywheels, and thermal storage systems.

Add new text as follows:

604.5 Energy storage. Where an energy storage is used as a means to comply with the requirements of this section, Sections 606 or 607, the following information shall be submitted for review to the *code official*:

1. A narrative describing the operation of the energy storage system that identifies, among other things, the building end use loads being supplied by the energy storage system and the storage medium used.
2. A list of energy storage system components.
3. A calculation that shows the maximum charge level (KWh), maximum electric charge rate (KW) and electric or thermal discharge rate (KW) of the system.
4. The name of the utility, ISO, or RTO that will control the energy storage system.
5. Whether the energy storage system is to be dispatched by the serving grid operator, or micro-grid operator for frequency regulation, renewable integration, or grid stabilization purposes.
6. Other information requested by the code official.

Reason: For many years, energy storage has played an important role in the develoment of safe, reliable electric grids in North America. These traditional roles have included thermal energy space and water heater storage programs by electric utilities to manage power supply and demand while providing affordable – and sometimes even negative –operating costs for consumers.

More recently, however, Energy storage has taken on an even more important role as buildings move toward net-zero energy. Without cost effective energy storage, the development of grid-scale renewable energy is limited. Additionally, electric grid operators are struggling to balance the addition of renewable energy from wind and solar with their customer demands -- often renewable energy production peaks when customer demand is low. Electric grid imbalances caused by the addition of renewable energy during periods of low customer demand threaten grid stability.

For these reasons and others, the U.S. Department of Energy, Federal Energy Regulatory Commission, state public service commissions, ISO's and RTO's and others are giving great attention to energy storage.

This proposal is a baby step towards merging building science with the growing need for energy storage. In effect, this proposal simply states that, if a building is to be used as an energy storage facility, there are a few details that need to be provided to the authority having jurisdiction. The requirements are minimal and are things that are well known in the energy storage community.

It is anticipated that once this section is established it will be modified with more details in future editions of the IGCC but for the moment it would serve as a placeholder for this issue of rapidly growing importance. It would also help to establish the IGCC's *bona fides* as a leader in the green building arena.

Bibliography:

See article at:
http://www.pjm.com/about-pjm/exploring-tomorrows-grid/electricity-storage.aspx?p=1 for information on the value of ETS in the PJM Interconnection service territory.

See article at

http://www.sustainablebusinessoregon.com/articles/2012/04/bonneville-power-calls-for-first -wind.html?page=all for information on Bonneville Power curtailment of wind generation amounting to almost 100,000 MWH's in 2011.

See Kema Consulting report (Commissioned by the U.S. Department of Energy under the supervision of Sandia National Laboratory) noting significant reduction in carbon emissions at http://prod.sandia.gov/techlib/access-control.cgi/2008/088229.pdf.

See http://www.steffes.com/off-peak-heating/ets.html for more information on utility benefits of WTS, including energy savings associated with thermal storage and frequency regulation.

See Sandia National Laboratory website at http://www.sandia.gov/ess/ for information on the contributions of energy storage to electric grid stability.

For a detailed description of frequency regulation in North America see Department of Energy / National Energy Technology Laboratory Report Frequency Instability Problems in North American Interconnections, DOE/NETL-2011/1473, Final Report dated May 1, 2011 found at http://www.netl.doe.gov/energy-analyses/pubs/TransmissionFreqProb.pdf

Cost Impact: Will not increase the cost of construction.

GEW62-14: 604.5 (NEW)-FOSTER749

GEW63-14

202 (New), 604.3

Proponent: Charles Foster, Steffes Corporation, representing Steffes Corporation (cfoster20187@yahoo.com)

Revise as follows:

604.3 Heating, ventilating and air-conditioning (HVAC) systems. The Auto-DR strategy for HVAC systems shall be capable of reducing the building peak cooling or heating HVAC demand by not less than 10 percent when signaled from the electric utility, regional independent system operator (ISO) or regional transmission operator (RTO), through any combination of the strategies and systemic adjustments, including, but not limited to the following:

1. Space temperature setpoint reset.
2. Increasing chilled water supply temperatures or decreasing hot water supply temperatures.
3. Increasing or decreasing supply air temperatures for variable air volume (VAV) systems.
4. Limiting capacity of HVAC equipment that has variable or multiple-stage capacity control.
5. Cycling of HVAC equipment or turning off noncritical equipment.
6. Disabling HVAC in unoccupied areas.
7. Limiting the capacity of chilled water, hot water, and refrigerant control valves.
8. Limiting the capacity of supply and exhaust fans, without reducing the outdoor air supply below the minimum required by Chapter 4 of the *International Mechanical Code*, or the minimum required by ASHRAE 62.1.
9. Limiting the capacity of chilled water or hot water supply pumps.
10. Anticipatory control strategies to precool or preheat in anticipation of a peak event.
11. Use of grid-interactive electric thermal storage (GETS) systems.

Exception: The Auto-DR strategy is not required to include the following buildings and systems:

1. Hospitals and critical emergency response facilities.
2. Life safety ventilation for hazardous materials storage.
3. Building smoke exhaust systems.
4. Manufacturing process systems.

Revise definition as follows:

DEMAND RESPONSE (DR). The ability of a building system to ~~reduce~~ change the building's energy consumption for a specified time period after receipt of demand response signal typically from the power company or demand response provider. Signals requesting demand response are activated at times of peak usage or when power reliability is at risk.

DEMAND RESPONSE AUTOMATION SOFTWARE. Software that resides in ~~a~~ energy management control systems or equipment that can receive a demand response signal and automatically ~~reduce~~ change space heating, ventilation, air-conditioning ~~(HVAC)~~, service water heating and lighting system loads.

GRID-INTERACTIVE ELECTRIC THERMAL STORAGE (GETS). An electric-powered heat storage system for space heating units and service water heating units that is controlled by electric system grid operators such as utilities, independent system operators (ISOs) and regional transmission organizations (RTOs).

Reason: While not imposing any additional mandatory requirements, this proposal would add Grid-Interactive Electric Thermal Storage as one of the specifically identified means of meeting the requisites of the Demand Response section of Chapter 6. Section 601.2 of the IGCC states, "([t]his chapter is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve the effective use of energy."

Grid-Interactive Electric Thermal Storage is such an innovative approach with a growing reputation among market participants as a solution to some of today's most pressing energy issues.

1. Building owners like GETS because it provides affordable and dependable space and service water heating for their structures.
2. Electric grid operators like GETS because it helps them balance energy supply and demand in real time, thereby increasing grid stability while simultaneously reducing costs, energy and emissions. Maintaining grid stability becomes more challenging as the output of renewable energy generation (like wind and solar) is added to electric grids which explains why grid operators across the country (as well as the Federal Energy Regulatory Commission and the U.S. Department of Energy) have expressed their support for energy storage.
3. Renewable energy developers like GETS because it complements their projects by providing cost- effective energy storage when renewable energy production exceeds demand. Without adequate energy storage, these projects are often curtailed.

What is a Grid-Interactive Electric Thermal System ("GETS")?

For building owners and operators, GETS serve as traditional space and service water heating systems. GETS provide affordable and dependable space conditioning and domestic hot water. Nonetheless, GETS have significantly different operational and energy consumption characteristics from traditional space and service water heating systems as dexcribed in more detail below.

Thermal battery. Electric utilities dispatch their generators in the order from the most cost efficient (base load generation) to the least cost efficient (peaking load generation). GETS complements the efficient dispatch of generation by utilities by allowing the storage of energy that is produced more efficiently for use later, and by avoiding the requirement to operate less efficient generators at peak load conditions. GTS accomplishes this feat by charging (heating bricks, water, or other storage media) at times when utilities have excess capacity. Often this is at night but it can vary between utilities. Because the system is grid-interactive, an GTS can charge at times that are optimum for the utility, allowing utilities to efficiently manage their peak demands and their customer costs. Heat that is stored for later use effectively makes GETS a thermal battery.

Renewable energy. GETS is a unique complement to the generation of electricity from renewable energy like wind and solar. Many times peak power production from renewable energy sources does not coincide with a utility's demand for electricity. As an example, wind generation usually peaks at night when demand for energy is not usually the greatest. For that reason, Bonneville Power last year was forced to curtail the generation from wind generators at certain times because it didn't need all the electricity the wind generators were producing! GETS is a good fit for storing excess renewable energy and has been successfully deployed in Bonneville's service territory as well as the service territory of other electric utilities.

Reduces winter peak. When electrical demands on a utility's system grow, it is forced to dispatch less efficient generators to meet that demand, so to the extent demand is reduced the utility avoids costs (that would ultimately be passed on to customers) and saves energy. GETS allows the storage of energy produced by more efficient generators.

Replaces fossil fuel in utility grid control. When electrical demand on a utility's grid changes (up or down), the most immediate system response is for the grid's frequency to drift away from ideal (60 cycles per second). To control these frequency excursions, utilities have traditionally operated fossil fuels generators to add voltage to the grid to raise the frequency as it falls away from
60 cycles. Grid-interactive GETS can be dispatched in lieu of fossil fuel generators to remedy frequency excursions, thereby saving energy and costs. According to a Kema report, usage of a non- carbon emitting resource such as GETS for providing regulation services can reduce carbon emissions for regulation by nearly 65%.

GETS offer significant benefits to customers, including the ability to store renewable energy, the ability to reduce utility costs, and the ability to reduce the consumption of fossil fuel by utilities in the regulation of system frequency.

Bibliography:

See article at http://www.pjm.com/about-pjm/exploring-tomorrows-grid/electricity-storage.aspx?p=1 for information on the value of ETS in the PJM Interconnection service territory.

See article at http://www.sustainablebusinessoregon.com/articles/2012/04/bonneville-power-calls-for-first-wind.html?page=all for information on Bonneville Power curtailment of wind generation amounting to almost 100,000 MWH's in 2011.

See Kema Consulting report (Commissioned by the U.S. Department of Energy under the supervision of Sandia National Laboratory) noting significant reduction in carbon emissions at http://prod.sandia.gov/techlib/access-control.cgi/2008/088229.pdf.

See http://www.steffes.com/off-peak-heating/ets.html for more information on utility benefits of WTS, including energy savings associated with thermal storage and frequency regulation.

See Sandia National Laboratory website at http://www.sandia.gov/ess/ for information on the contributions of energy storage to electric grid stability.

For a detailed description of frequency regulation in North America see Department of Energy / National Energy Technology Laboratory Report Frequency Instability Problems in North American Interconnections, DOE/NETL-2011/1473, Final Report dated May 1, 2011 found at http://www.netl.doe.gov/energy-analyses/pubs/TransmissionFreqProb.pdf

Cost Impact: Will not increase the cost of construction.

GEW63-14: 604.5-FOSTER731

GEW64-14
605.1.1

Proponent: Jay Johnson, Thomas Associates, Inc., representing Metal Building Manufacturers Association (jjohnson@thomasamc.com)

Delete without substitution:

~~**605.1.1 Insulation and fenestration criteria.** The *building thermal envelope* shall exceed the requirements of Tables C402.1.2 and C402.3 of the *International Energy Conservation Code* by not less than 10 percent. Specifically, for purposes of compliance with this code, each U-factor, C-factor, F-factor and SHGC in the specified tables shall be reduced by 10 percent to determine the prescriptive criteria for this code. In Sky Type "C" locations specified in Section 808.4, the skylights shall not exceed 5 percent of the building roof area.~~

Reason: The across-the-board reduction of U-factors by 10% described in this section is an over- simplified approach that has no guarantee of achieving a significant reduction in energy use as intended. Reducing U-factors obviously does mitigate external heat gains and losses; however, in certain mild climates or in occupancies that require high ventilation rates, such as retail or institutional occupancies, it would have only a minor effect.

Furthermore, an arbitrary reduction of U-factors can greatly affect the type of insulation system chosen as it may not always be possible to find a system with the required U- factor and therefore the designer must choose the next lowest U-factor and may be pushed into a different type of system altogether. Thiscompounds the problem stated above.

A designer would typically refer to the IECC Table C402.1.2 for the Opaque Thermal Envelope Assembly Requirements for U-factors, C-factors, and F-factors, then determine the equivalent R-value assembly via the IECC Table 402.2. This simplifies the building official's review process by having both tables on hand within the IECC. By decreasing the factors by 10% now removes the use of the prescriptive R-value based IECC Table 402.2. An alternative, per footnote "a" would be to refer to ASHRAE 90.1 Appendix A for applicable assemblies to meet the reduction in factors. As a result, the building official would likely want to have on hand the ASHRAE 90.1 standard during the plan review process. As stated above, often times there is not a tested assembly that is close to the 10% reduced factor, as a result a more costly system may be required.

Cost Impact: Will not increase the cost of construction.

GEW64-14: 605.1.1-JOHNSON928

GEW65-14
605.1.1

Proponent: Larry Williams, Steel Framing Association, representing Steel Framing Industry Association (Williams@steelframingassociation.org)

Revise as follows:

605.1.1 Insulation and fenestration criteria. In climate zones 1, 2, 3, 4 and 5, the thermal resistance of the building thermal envelope shall be not less than ~~exceed~~ the requirements of Tables C402.1.2 and C402.3 of the International Energy Conservation Code ~~by not less than 10 percent. Specifically, for purposes of compliance with this code~~, In climate zones 6, 7, and 8, each U-factor, C-factor, F-factor and SHGC in ~~the specified~~ Tables C402.1.2 and C402.3 of the *International Energy Conservation Code* shall be reduced by 10 percent to determine the prescriptive criteria for this code. In Sky Type 'C' locations specified in Section 808.4, the skylights shall not exceed 5 percent of the roof area.

Reason: This proposal will reduce the application of an arbitrary U-factor reduction across the board to all climate zones despite the benefits of further decreases in envelope requirements being insignificant in the warmer climate zones.

A 10% U-factor decrease is not the same as a 10% increase in performance. It is discriminatory against some building materials due to the different U factors in the base IECC code. This creates a different "green standard" for performance for some materials versus others. The 10% is more stringent for those materials with higher U-factors in the IECC. This unlevel playing field is mitigated somewhat by applying the 10% only to the colder climate zones where the potential energy savings, although still small, is not as insignificant as in the warmer climate zones.

Cost Impact: Will not increase the cost of construction.

Analysis: The International Energy Conservation Code tables C402.1.2 and C402.3 referenced in the text of this proposal are numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the table numbers for the 2015 Editions will be C402.1.4 and C402.4, respectively.

GEW65-14: 605.1.1-WILLIAMS634

GEW66-14
605.1.1

Proponent: Paul Coats, American Wood Council, representing American Wood Council (pcoats@awc.org)

Revise as follows:

605.1.1 Insulation and fenestration criteria. The building thermal envelope shall exceed the requirements of Tables C402.1.2 and C402.3 of the *International Energy Conservation Code* by not less than ~~10~~ 5 percent. Specifically, for purposes of compliance with this code, each U-factor, C-factor, F-factor and SHGC in the specified tables shall be reduced by ~~10~~ 5 percent to determine the prescriptive criteria for this code. In Sky Type "C" locations specified in Section 808.4, the skylights shall not exceed 5 percent of the building roof area.

Reason: A five percent increase of the IECC, which could itself be considered green, could be considered sufficient and may lead to better use of the IgCC, and the other benefits it provides. Although an official DOE determination has not been issued, it is anticipated that the 2012 IECC improves on the previous edition of that code. The percent of building envelope improvement required by the IgCC should be adjusted to recognize this. If five percent is determined to not be the correct number, at least this proposal provides an opportunity for adjustment.

Cost Impact: Will not increase the cost of construction.

Analysis: The International Energy Conservation Code tables C402.1.2 and C402.3 referenced in the text of this proposal are numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the table numbers for the 2015 Editions will be C402.1.4 and C402.4, respectively.

GEW66-14: 605.1.1-COATS755

GEW67-14
605.1.1

Proponent: Martha VanGeem, Consulting Engineer, representing self (martha.vangeem@gmail.com)

Revise as follows:

605.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall exceed the requirements of Tables C402.1.2 and C402.3 of the *International Energy Conservation Code* by not less than 10 percent. Specifically, for purposes of compliance with this code, each U-factor, C-factor, F-factor and SHGC in the specified tables shall be reduced by 10 percent to determine the prescriptive criteria for this code. <u>Where Table C402.2 of the *International Energy Code* provides for no requirement (NR) for the R-value of an assembly, the U-factor is not required to be reduced.</u> In Sky Type "C" locations specified in Section 808.4, the skylights shall not exceed 5 percent of the building roof area.

Reason: This modification is needed for assemblies that do not require insulation in the IECC. For warm climates, the unheated slab-on-grade, floor, and below grade wall R-value is designated "NR" (no requirement) in the IECC. No insulation is required for these assemblies. However, a U-factor is provided for use in trade-off paths. In these cases, reducing the U-factor by 10% would mean adding a sliver of insulation. This would not be cost effective since applying the first level of insulation has a significant cost. Insulating slabs in these warm climates is problematic for termite inspection. Adding insulation below grade is not cost-effective in these warm climates because it negates the cooling effect of the ground in these climates. Adding insulation below floors in these warm climates is not cost-effective and is often the cause of moisture problems.

Cost Impact: Will not increase the cost of construction

Analysis: The International Energy Conservation Code tables C402.1.2, C402.3 and C402.2 referenced in the text of this proposal are numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the table numbers for the 2015 Editions will be C402.1.4, C402.4 and C402.1.3, respectively.

GEW67-14: 605.1.1-VANGEEM889

GEW68-14
605.1.1.1

Proponent: Eric DeVito, BBR&S representing Cardinal Glass Industries, representing Brickfield, Burchette, Ritts & Stone (eric.devito@bbrslaw.com)

Delete without substitution:

~~**605.1.1.1 Permanent shading devices for fenestration.** Vertical fenestration within 45 degrees (785 rad) of the nearest west, south, and east cardinal ordinate shall be shaded by permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.~~

~~**Exception:** Shading devices are not required for the following buildings and fenestrations:~~

1. ~~Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the *International Building Code* based on the exposure category and basic wind speed at the building site.~~
2. ~~Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line.~~
3. ~~Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.~~
4. ~~Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing shall be automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity. Functional testing of controls shall be conducted in accordance with Section C408.3.1 of the *International Energy Conservation Code*.~~

Reason: As it is currently written, the IgCC prescriptive shading option unnecessarily complicates what otherwise would be a very straightforward and simple-to-apply prescriptive compliance option based on a reasonable level of improvement over the IECC. The shading language alone is roughly double the length of the entire remainder of the IgCC's prescriptive building envelope systems compliance path (Section 605). Moreover, while there is no shading requirement in the IECC at all, this section of the IgCC singles out shading as the single new "energy efficiency" requirement for the thermal envelope under the prescriptive path. Deleting Section 605.1.1.1 will make the code more flexible and more usable without decreasing efficiency or sustainability. Although shading devices can be effective at reducing direct solar radiation in some circumstances, they are not appropriate or cost-effective for every building and every circumstance. The exceptions in the current code simply are not possible in many projects. Requiring permanent shading devices in nearly every building is too design- restrictive, and it makes the prescriptive compliance option very difficult or impossible to use. With the availability of low SHGC glazing, the need for permanent shading does not exist in many buildings and orientations.

The elimination of this prescriptive requirement will not weaken the code. Permanent shading devices are already incorporated as options into the prescriptive and performance options of the IECC, which recognizes that permanent shading devices are but one option to control SHGC. (The predominant method under the IECC is low SHGC glazing.) In fact, eliminating the prescriptive requirement from IgCC Section 605.1.1.1 eliminates the potential for "double-counting" permanent shading devices in the calculation of energy conservation measures (since the IECC permits higher SHGCs where permanent shading devices meet certain projection factors). Shading devices would remain one of several options for achieving a 10% improvement over the IECC per Section 605.1.1, instead of a near-mandatory requirement in itself.

Cost Impact: Will not increase the cost of construction. Deleting this section likely will decrease the cost of construction.

GEW68-14: 605.1.1.1-DEVITO833

GEW69-14
605.1.1.1

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, and High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

605.1.1.1 Permanent shading devices for fenestration. Vertical fenestration within ~~45~~ 135 degrees (~~785~~ 3316 rad) of the nearest ~~west~~, south, ~~and east~~ cardinal ordinate in buildings located in the northern hemisphere, or the nearest north cardinal ordinate in buildings located in the southern hemisphere, shall be shaded by permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area- weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.

Exception: Shading devices are not required for the following buildings and fenestrations:

1. Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the *International Building Code* based on the exposure category and basic wind speed at the building site.
2. Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line.
3. Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.
4. Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing shall be automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity. Functional testing of controls shall be conducted in accordance with Section C408.3.1 of the *International Energy Conservation Code*.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.
This proposal revises the language so that it addresses buildings outside of the U.S., including those in the southern hemisphere and near the equator. Note that there is essentially no difference between north and south in terms of the sun when standing at the equator.

Cost Impact: Will not increase the cost of construction. The proposal is intended to be editorial, clarifying application in other than northern hemisphere.

GEW69-14: 605.1.1.1#1-THOMPSON569

GEW70-14
605.1.1.1

Proponent: Garrett Stone, Brickfield, Burchette, Ritts & Stone, representing Brickfield, Burchette, Ritts & Stone (gas@bbrslaw.com); Brian Dean (Brian.Dean@icfi.com); William Prindle (william.prindle@icfi.com); Maureen Guttman (mguttman@ase.org); Harry Misuriello (misuriello@verizon.net)

Revise as follows:

605.1.1.1 Permanent shading devices for fenestration. Vertical fenestration within 45 degrees (785 rad) of the nearest west, south, and east cardinal ordinate shall be shaded by permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.

Exception: Shading devices are not required for the following buildings and fenestrations:

1. Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the *International Building Code* based on the exposure category and basic wind speed at the building site.

2. Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line.

3. Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.

<u>4. Where fenestration has an solar heat gain coefficient (SHGC) equal to or less than 0.25.</u>

~~4.~~ <u>5.</u> Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing shall be automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity. Functional testing of controls shall be conducted in accordance with Section C408.3.1 of the *International Energy Conservation Code*.

Reason: This proposal adds an efficient, practical, cost-effective and commercially-available exception to the current IgCC prescriptive requirement for permanent shading devices. The IgCC must have a simple set of prescriptive requirements for energy conservation measures. These requirements must be applicable to a wide range of climate zones and applications in order to ensure the usefulness and effectiveness of the IgCC. However, there must be enough flexibility to accommodate a wide range of design decisions and local constraints. The current prescriptive path applies a permanent shading requirement to every building unless one of four exceptions applies. These exceptions are extremely narrow, and as a result make the prescriptive compliance option very costly and difficult to use.

The new exception proposed above offers a very practical method for maintaining control of solar heat gain, which is the intended purpose of 605.1.1.1. It will also expand the potential options available to code users, and in turn could expand the ability to use the IgCC prescriptive envelope path when otherwise warranted. The new exception would permit code users to comply by installing fenestration that achieves a maximum of 0.25 SHGC. This change makes sense for a number of reasons:

Low-SHGC windows have consistently proven valuable in commercial construction because of typical daytime occupancy patterns and high internal loads. Low-SHGC windows reduce the impact of both direct and indirect solar radiation, regardless of orientation.

The 0.25 SHGC value is achieved by commonly available glazing technologies in all frame types. It is commercially available today around the country. In fact, the IECC has required a 0.25 SHGC in climate zones 1-3 since the 2006 edition. Although the SHGC can be increased under the IECC when the user utilizes the projection factor trade-off, some level of control over solar heat gain is still required in most climate zones, even in windows covered by overhangs.

Wherever permanent shading devices or one of the current exceptions is appropriate, code users will still be able to employ one of these options. However, for code users who are constrained by site planning, geography, safety issues, or economics, an exception for low-SHGC windows will provide necessary flexibility while maintaining energy savings.

Cost Impact: Will not increase the cost of construction.

GEW70-14: 605.1.1.1-STONE911

GEW71-14
605.1.1.1

Proponent: Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com)

Revise as follows:

605.1.1.1 Permanent shading devices for fenestration. Vertical fenestration within 45 degrees (785 rad) of the nearest west, south, and east cardinal ordinate shall be shaded by permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.

Exception: Shading devices are not required for the following buildings and fenestrations:

1. Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the *International Building Code* based on the exposure category and basic wind speed at the building site.
2. Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line.
3. Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.
4. Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing shall be automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity. Functional testing of controls shall be conducted in accordance with Section C408.3.1 of the *International Energy Conservation Code*.
5. <u>Fenestration used to enclose a vestibule.</u>

Reason: Many buildings are required to have a vestibule and should be exempt from the shading requirement since there is a buffer already established. The vestibule area is different than other vertical fenestration, any heat gain in these areas will not have an effect on the building and vestibules are already regulated by other regulations.

Cost Impact: Will not increase the cost of construction.

GEW71-14: 605.1.1.1-GREIVE1106

GEW72-14
605.1.1.1

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, and High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

605.1.1.1 ~~Permanent~~ Shading devices for fenestration. Vertical fenestration within 45 degrees (785 rad) of the nearest west, south, and east cardinal ordinate shall be shaded by one or a combination of the following methods:

1. Permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.

2. Automatically controlled shading devices capable of modulating in multiple steps the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity, that comply with all of the following:

   2.1. Exterior shading devices in the closed position shall cover not less than 90 percent of the fenestration.

   2.2. Interior shading devices in the closed position shall cover not less than 90 percent of the fenestration and have a minimum solar reflectance of 0.50 for the surface facing the fenestration.

   2.3. A manual override, where provided, shall override operation of automatic controls no longer than 4 hours.

   2.4. Commissioning shall be conducted as required by Section 611.4 to verify automatic controls for shading devices respond to changes in illumination or radiation intensity.

Exception: Shading devices are not required for the following buildings and fenestrations:

1. Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the *International Building Code* based on the exposure category and basic wind speed at the building site.
2. Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line.
3. Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.
4. Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing shall be automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity. Functional testing of the controls ~~shall be~~ of the dynamic glazing shall be conducted in accordance with Section 611.4. ~~C408.3.1 of the *International Energy Conservation Code*.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal adds automated shading systems (i.e. automatic window shading) as an alternative compliance option to fixed overhangs or louvers because they can save equal or more energy than the fixed overhangs. This is consistent with similar requirements in ASHRAE 189.1-2011 section 7.4.2.5 Permanent Projections.

Following is a summary of the advantages of automated shading systems vs. fixed overhangs taken from Lawrence Berkeley National Lab (LBNL). The full LBNL paper is attached separately.

1. Overhangs cannot be controlled once the design is complete and the system installed.
2. Overhangs will behave the same way in September as in March but March is typically still a heating season month whereas September is often still a severe cooling season month. Active dynamic glazing and shading systems can be operated to address these seasonal variations.
3. Dynamic systems (glazing/shading) can be operated to reject diffuse sky radiation as well as direct radiation.
4. Overhangs reduce useful daylight contributions when they should not, e.g. on overcast days, and during hours when the window is not in sunlight. Dynamic glazing and shading can be managed to be more transmissive when needed in order to admit daylight to reduce building lighting loads.

Cost Impact: Will increase the cost of construction. The proposal provides another option to provide shading for the glazing. The shutter systems may be more costly to install than other systems.

GEW72-14: 605.1.1.1#2-THOMPSON578

GEW73-14
605.1.1.1, 605.1.1.1.1 (New), 605.1.1.1.2 (New)

Proponent: Steven Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), representing American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

605.1.1.1 Permanent shading devices for fenestration. Vertical fenestration within 45 degrees (785 rad) of the nearest west, south, and east cardinal ordinate shall be shaded in accordance with Section 605.1.1.1 or 605.1.1.2 ~~by permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.~~

Exceptions: Shading devices are not required for the following buildings and fenestrations:

1. Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the *International Building Code* based on the exposure category and basic wind speed at the building site.
2. Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line.
3. Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.
4. Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing shall be automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity. ~~Functional testing~~ Commissioning of ~~controls shall~~ the dynamic glazing shall be conducted in accordance with Section ~~C408.3.1~~ 611.4. ~~of the *International Energy Conservation Code*.~~

605.1.1.1.1 Fixed shading devices for fenestration. Shading shall be provided by permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.

605.1.1.1.2 Automatic shading devices for fenestration. Shading shall be provided by automatically controlled exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Shading devices for fenestration shall be provided with automatic controls that comply with all of the following:

1. Shading devices shall be capable of modulating in multiple steps the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity

2. <u>Exterior shading devices in the closed position shall cover not less than 90 percent of the fenestration.</u>
3. <u>Interior shading devices in the closed position shall cover not less than 90 percent of the fenestration and shall have a minimum solar reflectance of 0.50 for the surface facing the fenestration.</u>
4. <u>Any manual override located in the same enclosed space as the vertical fenestration shall override operation of automatic controls no longer than 4 hours.</u>
5. <u>Commissioning for automatic controls for shading devices shall be conducted in accordance with Section 611.4.</u>

Reason: This proposal adds automated shading systems (i.e. automatic window shading) as alternative compliance option instead of fixed overhangs or louvers because they can save equal or more energy than the fixed overhangs. This is consistent with similar requirements in ASHRAE 189.1-2011 sections 7.4.2.5 Permanent Projections and 8.4.1.2 Office Space Shading.

Below is summary of the advantages of automated shading systems vs. fixed overhangs taken from Lawrence Berkeley National Lab (LBNL). The full LBNL paper is attached separately.

1. Overhangs cannot be controlled once the design is complete and the system installed.
2. Overhangs will behave the same way in September as in March but March is typically still a heating season month whereas September is often still a severe cooling season month. Active dynamic glazing and shading systems can be operated to address these seasonal variations.
3. Dynamic systems (glazing/shading) can be operated to reject diffuse sky radiation as well as direct radiation.
4. Overhangs reduce useful daylight contributions when they should not, e.g. on overcast days, and during hours when the window is not in sunlight. Dynamic glazing and shading can be managed to be more transmissive when needed in order to admit daylight to reduce building lighting loads.

The first couple of changes are simply clarifications and corrections. The change to exception 4 properly refers to the commissioning of “dynamic glazing” not “functional testing of lighting controls”. The appropriate section is for dynamic glazing commissioning is 611.4 Building Envelope Systems Commissioning and Completion Requirements.

In addition, this propsoal splits the requirements for fixed projections and projections that are automatically controlled (but not necessarily fixed). A designer will have the option to use either for compliance.

Cost Impact: Will not increase the cost of construction. This will not increase the cost of construction as it allows an additional compliance option for fenestration shading.

GEW73-14: 605.1.1.1.1(NEW)-FERGUSON1045

GEW74-14
605.1.1.1

Proponent: Marilyn Williams, National Electrical Manufacturers Association, representing NEMA (mar_williams@nema.org)

Revise as follows:

605.1.1.1 Permanent shading devices for fenestration. Vertical fenestration within 45 degrees (785 rad) of the nearest west, south, and east cardinal ordinate shall be shaded by permanent horizontal exterior projections with a projection factor greater than or equal to 0.25. Where different windows or glass doors have different projection factor values, each shall be evaluated separately, or an area-weighted projection factor value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing not less than one-half of the height of the glazing, except at building corners.

Exceptions: ~~Shading devices are not required for the following buildings and fenestrations~~:

1. Buildings located in hurricane-prone regions in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding the height limits specified in Table 1504.8 of the International Building Code based on the exposure category and basic wind speed at the building site.

2. Where fenestration is located in a building wall that is within 18 inches (457 mm) of the lot line.

3. Where equivalent shading of the fenestration is provided by buildings, structures, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.

4. Where fenestration contains dynamic glazing that has a lower labeled solar heat gain coefficient (SHGC) equal to or less than 0.12, and the ratio of the higher and lower labeled visible transmittance (VT) is greater than or equal to 5. Dynamic glazing shall be automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity. ~~Functional testing~~Commissioning of ~~controls shall~~the dynamic glazing be conducted in accordance with Section ~~C408.3.1~~611.4.~~of the *International Energy Conservation Code*.~~

5. Fenestration with automatically controlled shading devices capable of modulating in multiple steps the amount of solar gain and light transmitted into the space in response to daylight levels or solar intensity, that comply with all of the following:

   5.1. Exterior shading devices in the closed position shall cover not less than 90 percent of the fenestration.

   5.2. Interior shading devices in the closed position shall cover not less than 90 percent of the fenestration, and have a minimum solar reflectance of 0.50 for the surface facing the fenestration.

   5.3. Any manual override located in the same enclosed space as the vertical fenestration shall override operation of automatic controls no longer than 4 hours.

   5.4. Commissioning shall be conducted as required by Section 611.4 to verify automatic controls for shading devices respond to changes in illumination or radiation intensity.

Reason: This proposal adds automated shading systems (i.e. automatic window shading) as alternative compliance option instead of fixed overhangs or louvers because they can save equal or more energy than the fixed overhangs. This is consistent with similar requirements in ASHRAE 189.1-2011 sections 7.4.2.5 Permanent Projections and 8.4.1.2 Office Space Shading.

Below is summary of the advantages of automated shading systems vs. fixed overhangs taken from Lawrence Berkeley National Lab (LBNL). The full LBNL paper is attached separately.

1. Overhangs cannot be controlled once the design is complete and the system installed.

2. Overhangs will behave the same way in September as in March but March is typically still a heating season month whereas September is often still a severe cooling season month. Active dynamic glazing and shading systems can be operated to address these seasonal variations.

3. Dynamic systems (glazing/shading) can be operated to reject diffuse sky radiation as well as direct radiation.

4. Overhangs reduce useful daylight contributions when they should not, e.g. on overcast days, and during hours when the window is not in sunlight. Dynamic glazing and shading can be managed to be more transmissive when needed in order to admit daylight to reduce building lighting loads.

The first couple of changes are simply clarifications and corrections. We suggest removing the sentence that says "Shading devices are not required for the following buildings and fenestrations" as it is not needed and can cause confusion with the new additional proposed language. The second change properly refers to the commissioning of "dynamic glazing" not "functional testing of lighting controls". The appropriate section is for dynamic glazing commissioning is 611.4 Building Envelope Systems Commissioning and Completion Requirements.

Cost Impact: Will not increase the cost of construction. There is no cost impact. Automatic window shades typically provide a lower cost alternative to the existing requirement of permanent projections, such as overhangs, or dynamic glazing.

GEW74-14: 605.1.1.1-WILLIAMS1039

GEW75-14
605.1.1.1 (New)

Proponent: Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Add new text as follows:

<u>**605.1.1.1 Fenestration limitations.** Where buildings comply with Section C402.3 of the *International Energy Conservation Code*, the total area of vertical fenestration, other than opaque doors and opaque spandrel panels, shall not be greater than 20 percent of the gross area of the above grade walls.</u>

Reason: **U**nless a building is designed for daylighting, the prescriptive requirements for vertical fenestration limit the area to 30% of the gross above-grade wall area. This change proposal limits this area to 20%.

While a 10% minimum improvement over the IECC prescriptive criteria is arguably 'better' on paper, in reality it translates to little meaningful improvement to the thermal efficiency of the opaque wall surface. If meaningful improvements are desired, apply them where they will accomplish the most return. Note this change only impacts the application of the prescriptive energy efficiency requirements.

Cost Impact: Will not increase the cost of construction.

Analysis: The International Energy Conservation Code section C402.3 referenced in the text of this proposal are section numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section numbers for the 2015 Edition will be C402.4.

GEW75-14: 605.1.1.1(NEW)-THOMPSON879

GEW76-14

605.1.1.2 (New), Chapter 12

Proponent: Jonah Cecil Scheib, Urban Green Council, representing Urban Green Council (cs@urbangreencouncil.org)

Add new text as follows:

605.1.1.2 Maximum exterior building envelope heat transfer. The building thermal envelope shall have an average U-factor not greater than 0.20 Btu/hr-sf-°F. The average U-factorshall be calculated by averaging the U-factor of each included envelope component in accordance with Equation 6-xx:

Average U-factor = UAref/Atotal = (UA1 + UA2 + . . . UAn) / Atotal **(Equation 6-xx)**

In determining the average U-factor, the following shall apply:

1. The envelope shall include all above grade walls separating conditioned from non- conditioned space or from low energy spaces.

2. The roof shall be excluded from the determination.

3. Skylight area of the roof that exceeds that allowed by prescriptive compliance under this code shall be included in the determination.

4. UxAx is the U-factor for each individual thermal envelope component multiplied by the total area of such component incorporated in the building thermal envelope.

5. A total is the total area of the included elements of the thermal building envelope as described in this section.

6. The U-factor of a penetration of mechanical equipment through the building thermal envelope, where thermal performance data are not available, shall be assumed to be 0.5 Btu/hr-sf-°F.

7. The U-factor for each component shall be calculated by taking into account thermal bridging at metal studs and members, shelf angles, floor edges, projecting balconies, window frames, and other components passing through the thermal barrier. U-factors shall be determined using test results as required by this code, tabulations provided by this code, the methods of NFRC-100, or two-dimensional heat flow modeling or three- dimensional heat flow modeling.

8. Exposed slab edges shall be considered mass walls with a horizontal dimension equal to the horizontal dimension of the thicker of the adjacent exterior walls.

Add new standard as follows:

NFRC

100-2010 Procedure for Determining Fenestration Product U-Factors

Reason: Building envelope design has a major impact on both heat loss in winter and solar gain in summer. Using the flexibility in current energy codes, designers can meet energy- efficiency requirements by trading off the efficiency of mechanical and lighting equipment against the thermal integrity of the envelope. Since the building envelope will be in use for decades or more, this trade-off is short-sighted. By establishing fixed performance requirements for building envelopes which include real-world effects of exposed slab edges and mechanical wall penetrations with respect to heat loss, independent of mechanical and lighting equipment choices, the long-lived building envelope will at least a meet certain minimum standard.

The NFRC 100 standard is already referenced in the 2012 IECC.

Bibliography:

Urban Green Council, Green Codes Task Force, Energy Fundamentals Proposal 3 (Proposal)

Cost Impact: Will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, NRCC 100-2010, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2014.

GEW76-14: 605.1.1.2 (NEW)-SCHEIB1156

GEW77-14

202 (New), 605.1.2.1

THIS CODE CHANGE PROPOSAL IS ON THE AGENDA OF THE IgCC GENERAL CODE DEVELOPMENT COMMITTEE. SEE THE HEARING ORDER FOR THE IgCC GENERAL CODE DEVELOMPENT COMMITTEE.

Proponent: Jason Wilen, National Roofing Contractors Association, representing National Roofing Contractors Association (NRCA) (jwilen@nrca.net)

Revise as follows:

605.1.2.1 Air barriers. A continuous air barrier shall be provided for buildings in climate zones 1 through 8 in accordance with Section C402.4.1 of the *International Energy Conservation Code*. The exception in Section C402.4.1 of the *International Energy Conservation Code* shall not apply.

> **Exception:** Provided the energy use of the building is not increased, air barriers shall not be required for roof repair, roof recover, and roof replacement where the alterations, renovations or repairs to the building do not also include alteration, renovations or repairs to the remainder of the building envelope.

Add new definition as follows:

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

Reason: The purpose of this code change is to clarify the intent of the code. A public comment for proposal CE165-13 was approved during the Group B Public Comment Hearings and will therefore the same text proposed in this proposal will appear in IECC 2015. Arguments made by supporters of the approved proposal made clear the exception language is acknowledging that fact that, for a simple reroofing project, a functional building envelope air barrier is not achievable without also requiring a major and prohibitory expensive expansion of the project scope to include significant work to the non-roof portions of the building envelope. It is not the intent of the code to require a full-scale building envelope restoration in situations where, for example, a roof coating is added to an existing building. The same logic holds true for the IgCC. Even in an above minimum code environment with more stringent provisions, the proposed text clarifies the intent of the code for a building owner to be allowed to simply replace a failing roof system or enhance an existing roof system.

As with the exception approved for IECC 2015, the proposed change would not apply to new construction or extensive renovation where a functional building envelope air barrier can reasonably be incorporated into a project.

The proposed definitions will also appear in IECC 2015 (per proposal CE56-13 that was part of the consent agenda during the Group B Public Comment Hearing) and the inclusion of the terms in IgCC 2015 will ensure the terms are defined the same way in each document.

Cost Impact: Will not increase the cost of construction

Analysis: The International Energy Conservation Code sections C402.4.1 and C402.4.1 referenced in the text of this proposal are section numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section numbers for the 2015 Edition will be C402.5 and C402.5.1.

GEW77-14: 605.1.2.1-WILEN858

GEW78-14
605.1.2.2

Proponent: Maureen Traxler, City of Seattle, WA, representing Washington Assn of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

Revise as follows:

605.1.2.2 Testing requirement. The building thermal envelope air tightness shall be ~~considered to be acceptable where the~~ tested and the air leakage rate of the total area of the building thermal envelope ~~is less than~~ shall not exceed 0.25 cfm/ft^2 under a pressure differential of 0.3 in water column (1.57 lb/ft^2) (1.25 L/s.m^2 under a pressure differential of 75 Pa). Testing shall occur after rough-in and after installation of penetrations of the building envelope, including penetrations for utilities, heating, ventilating and air-conditioning (HVAC) systems, plumbing, and electrical equipment and appliances. Testing shall be done in accordance with ASTM E 779. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner. Where the tested rate exceeds 0.25 cfm/ft^2, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal leaks shall be submitted to the code official and the building owner, and shall be deemed to satisfy the requirements of this section.

Reason: This proposal allows a compliance option for buildings that fail to meet the air leakage test. The current code requires all buildings to have no more than 0.25 cfm/ft^2 of leakage through the envelope. While most buildings will pass the test, certain types of buildings present difficulties because of air volume or other causes. This proposal allows them to comply with the code by correcting deficiencies "to the extent practicable".

Cost Impact: Will not increase the cost of construction.

GEW78-14: 605.1.2.2-TRAXLER665

GEW79-14
605.1.2.3

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA (Air Movement and Control Association (amanda@intercodeinc.com)

Delete and substitute as follows:

605.1.2.3 Air curtains. ~~Where a building entrance is required to be protected with a vestibule in accordance with the *International Energy Conservation Code*, an air curtain tested in accordance with ANSI/AMCA 220 is permitted to be used as an alternative to separate conditioned space from the exterior.~~
Where air curtains are provided at building entrances or building entrance vestibules, the curtain shall have a minimum velocity of 2 m/s at the floor, be tested in accordance with ANSI/AMCA 220 and installed in accordance with manufacturer's instructions. Manual or automatic controls shall be provided that will operate the air curtain with the opening and closing of the door. Air curtains and their controls shall comply with Section C408.2.3 of the *International Energy Conservation Code*.

Reason: In its current form, the language in the IgCC is redundant and not needed. A similar provision for air curtains as alternatives to vestibules was recently approved into the 2015 IECC.

However, if this section of the IgCC is deleted rather than revised to what is being proposed, there will be no requirements for air curtains **when** they are installed to supplement the thermal protection of vestibules. Providing both a vestibule and an air curtain at a building entrance is a common practice in high-performance buildings. This proposal requires that **when** an air curtain is installed in addition to a vestibule, it must be tested to the appropriate standard, installed properly, and function as intended.

Cost Impact: Will not increase the cost of construction.

GEW79-14: 605.1.2.3-HICKMAN691

GEW80-14
605.1.2.3

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Delete without substitution:

~~**605.1.2.3 Air curtains.** Where a building entrance is required to be protected with a vestibule in accordance with the *International Energy Conservation Code*, an air curtain tested in accordance with ANSI/AMCA 220 is permitted to be used as an alternative to separate conditioned space from the exterior.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

CE192-13 was approved as modified by public comment in Atlantic City to add air curtains as an option for compliance in the IECC vestibule requirements. As a result, the additional option is no longer needed in the IgCC. The text of the IECC vestibule section for 2015 will be as follows:

C402.5.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions: Vestibules are not required for the following:

1. Buildings in *climate zones* 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m2) in area.
5. Revolving doors.
6. Doors that have an air curtain with a minimum velocity of 6.56 ft/s (2 m/s) at the floor that have been tested in accordance with ANSI/AMCA 220, and installed in accordance with the manufacturer's instructions. Manual or automatic controls shall be provided that will operate the air curtain with the opening and closing of the door. Air curtains and their controls shall comply with Section C408.2.3.

Cost Impact: Will not increase the cost of construction. Removes redundant provision.

GEW80-14: 605.1.2.3-THOMPSON575

GEW81-14
605.2

Proponent: Brenda Thompson, Chair, representing ICC Sustainability, Energy, and High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Delete without substitution:

~~**605.2 Roof replacement.** Above-deck insulation for roof replacement on an existing building with insulation entirely above the deck and where the roof slope is less than two units vertical in 12 units horizontal (17-percent slope) shall be in accordance with Section 1003.2.7.~~

Reason: Section 605.2 of the IECC is unnecessary because the IgCC is an overlay to the IECC and the 2015 IECC already contains this requirement. Furthermore, specific existing building provisions should not be referenced in the other chapters of the code. This provision is simply a referral to Section 1003.2.7. It is unnecessary. Having references to some existing provisions and not all results in inconsistency in the code that could have legal implications.

The requirements of Section 1003.2.7, as shown below, are not really requirements. Section 1003.2, the parent section, references Sections 1003.2.1 through 1003.2.7, and any combination of this sections, or any single section, can be used to comply with Section 1003.2.

1003.2.7 Roof replacement insulation. For roof replacement on an existing building with insulation entirely above the deck and where the roof slope is less than two units vertical in 12 units horizontal (16-percent slope), the insulation shall conform to the energy conservation requirements for insulation entirely above deck in the *International Energy Conservation Code*.

Exception: Where the required R-value cannot be provided due to thickness limitations presented by existing rooftop conditions, including heating, ventilating and air-conditioning equipment, low door or glazing heights, parapet heights, proper roof flashing heights, the maximum thickness of insulation compatible with the available space and existing uses shall be installed.

The 2015 IECC provisions related to this topic are as follows:

C503.3 Building envelope. New building envelope assemblies that are part of the alteration shall comply with Sections C503.3.1 through C503.3.3.

C503.3.1 Roof replacement. For roof replacements, where the existing roof assembly is part of the *building thermal envelope* and contains insulation entirely above deck, roof replacement shall include compliance with the requirements of Table C402.1.3 or Table C402.1.4.

(Balance of C503.3 subsections not shown)

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW81-14: 605.2-THOMPSON756

GEW82-14
605.3 (New)

Proponent: Amy Dickie, Global Cool Cities Alliance, representing Global Cool Cities Alliance (amy@globalcoolcities.org)

Add new text as follows:

605.3 Roof surfaces. Roof surfaces of buildings in climates zones 1, 2 and 3 shall comply with Section C402.2.1.1 of the *International Energy Conservation Code* and roofing materials shall comply with the following requirements:

1. A minimum three-year aged solar reflectance of 0.65;
2. A minimum three-year aged thermal emittance of 0.75;
3. A minimum three-year aged solar reflectance index of 78.

Reason: This proposal adds a new sub-section to Section 605 Building Envelope Systems in Chapter 6 to address roof reflectivity and to enhance the reflectivity requirements by the reference code, International Energy Conservation Code (IECC). The International Green Construction Code (IgCC) is a code which provides building construction and operations requirements which should be more sustainable than those provided by the IECC, IBC, IMC, or IPC alone. The roof reflectivity requirements included in Chapter 6 should match leading “green codes”, and should go above and beyond the reflectivity levels required in the IECC. This proposal requires that roofs materials comply with Section 402.3 of the IECC and with enhanced reflectivity requirements.

- We believe that IGCC should achieve parity with the reflectivity requirements in leading “green codes”. The minimum solar reflectance and SRI values are consistent with the requirements in CalGreen Tier 2.

- The increase in solar reflectance requirement proposed here would generate almost 30 percent additional energy savings benefit above the current requirements, compared with a base case. The following equation, provided by the Heat Island Group at Lawrence Berkeley National Laboratory, describes the increase in annual energy savings of boosting the solar reflectance requirement from 0.55 to 0.65: (0.65 -0.20) / (0.55 - 0.20) - 1 = 29%. That is, if the albedo 0.55 roof saved 100 units of energy or money, the albedo 0.65 roof would save 129 units of energy or money. This equation assumes that thermal emittance levels remain constant.

Cost Impact: Will not increase the cost of construction

Analysis: The International Energy Conservation Code section C402.2.1.1 referenced in the text of this proposal are section numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section number for the 2015 Editions will be C402.3.

GEW82-14: 605.3 (NEW) #2-DICKIE802

GEW83-14
605.3 (New)

Proponent: Amy Dickie, Global Cool Cities Alliance, representing Global Cool Cities Alliance (amy@globalcoolcities.org)

Add new text as follows:

605.3 Roof surfaces. Roof surfaces of buildings located in climate zones 4a and 4b shall comply with Section C402.2.1.1 of the *International Energy Conservation Code.*

Reason: This proposal adds a section to Ch 6 which requires that low-sloped roofs on commercial buildings in climate zones 4a and 4b comply with the reflectivity requirements provided by the International Energy Conservation Code (IECC).

IgCC is a code which provides building construction and operations requirements which should be more sustainable than those provided by the IECC, IBC, IMC, or IPC alone. Therefore, the roof surfaces requirements and should go above and beyond those required in the IECC and should take into account the urban heat island reduction benefits provided by reflective roofs. Reflective roofs have been proven to provide a number of benefits in climate zones 4a and 4b.

·Switching to reflective roofs across climate zones 4a and 4b generates net energy savings and net energy cost savings.

·Reflective roofs help reduce peak load in IECC climate zones 4a and 4b.

·The benefits of reflective roofs have been proven beneficial in major metropolitan areas within climate zones 4a and 4b. Several major cities in climate zone 4 have adopted the use of reflective roofs on commercial, low-sloped roofs into law.

·Reflective roofs provide a cooler environment for roof equipment, thus enabling better performance for rooftop equipment.

·In many cases roof construction can have a cool roof option with zero price premium. Some reflective roofs have small price premiums.

·Reflective roofs have many important co-benefits. For example, a large number of reflective roofs will reduce the summer air temperature in cities and therefore improve resiliency of urban populations to heat events.

Cost Impact: Will not increase the cost of construction

Analysis: The International Energy Conservation Code section C402.2.1.1 referenced in the text of this proposal are section numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section number for the 2015 Editions will be C402.3.

GEW83-14: 605.3 (NEW) #4-DICKIE944

GEW84-14
605, 606

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com); Craig Conner (craig.conner@mac.com)

Delete without substitution:

~~605 BUILDING ENVELOPE SYSTEMS~~

~~606 BUILDING MECHANICAL SYSTEMS~~

Reason: The intent of the proposal is to delete all of Sections 605 and 606. Building Envelop and Mechanical Systems should be deleted as that functionis in the IECC. A good deal of this is just confusing.

Cost Impact: Will not increase the cost of construction. The proposal removes provisions.

GEW 84-14: 606-KLEIN1207

GEW85-14
606.2.2.1, 606.2.2.2

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

606.2.2.1 Ground source or geothermal heat pumps. The efficiency of ground source or geothermal heat pumps with a rated cooling capacity of 65,000 Btu/h or less shall comply with the provisions of Table 606.2.2.1 based on the applicable referenced test procedure.

TABLE 606.2.2.1
ENERGY-EFFICIENCY CRITERIA FOR GROUND SOURCE HEAT PUMPS

PRODUCT TYPE[a]	MINIMUM EER	MINIMUM COP	TEST PROCEDURE
Water-to-Air Closed loop	~~14.1~~ 17.1	~~3.3~~ 3.6	ISO 13256-1
Water-to-Air Open loop	~~16.2~~ 21..1	~~3.6~~ 4.1	ISO 13256-1
Water-to-Water Closed loop	~~15.1~~ 16.1	~~3.0~~ 3.1	ISO 13256-2
Water-to-Water Open loop	~~19.1~~ 20.1	~~3.4~~ 3.5	ISO 13256-2
Direct Expansion (DX) or Direct GeoExchange (DGX)	~~15.0~~ 16.0	~~3.5~~ 3.6	AHRI 870

a. Efficiency values apply to systems with a maximum rated cooling capacity of 65,000 Btu/hour.

EER = Energy efficiency ratio, COP = Coefficient of performance.

606.2.2.2 Multi-stage ground source or geothermal heat pumps. The efficiency of multi-stage ground source or geothermal heat pumps shall comply with the provisions of Table 606.2.2.1 based on the applicable referenced test procedure.

Reason: This proposal updates the values in Table 606.2.2.1 to match the Tier 3 values for Energy Star geothermal heat pumps that went into effect in 2012. Information about these values can be found at the following web site: http://www.energystar.gov/index.cfm?c=geo_heat.pr_crit_geo_heat_pumps

In addition, there is the following language on the Energy Star web site: "Commercial (i.e., 3-phase) units are not eligible for qualification under the ENERGY STAR specification at this time." To make this table more technically accurate, there is new wording to show that these values are only for units that have capacities that are usually associated with single family homes.

Also, the web site only contains a definition for a geothermal heat pump, not a "ground source" heat pump, as shown below. To avoid market place confusion, the word geothermal has been added back in to this section.

Geothermal Heat Pump A geothermal heat pump uses the thermal energy of the ground or groundwater to provide residential space conditioning and/or domestic water heating. A geothermal heat pump model normally consists of one or more factory-made assemblies that include indoor conditioning and/or domestic water heat exchanger(s), compressors, and a ground-side heat exchanger. A geothermal heat pump model may provide space heating, space cooling, domestic water heating, or a combination of these functions and may also include the functions of liquid circulation, thermal storage, air circulation, air cleaning, dehumidifying or humidifying. A geothermal heat pump system generally consists of one or more geothermal heat pump models, the ground heat exchanger(s), the air and/or hydronic space conditioning distribution system(s), temperature controls, and thermal storage tanks.

Cost Impact: Will not increase the cost of construction

GEW85-14: 606.2.2.1-ROSENSTOCK509

GEW86-14
606.2.2.3

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA (Air Movement and Control Association) (amanda@intercodeinc.com)

Revise as follows:

606.2.2.3 ~~Minimum~~ Fan efficiency. ~~Stand-alone supply, return and exhaust~~ Fans ~~designed for operating with motors over 750~~ ~~watts (1 hp)~~ shall comply with the provisions of Section C403.2.12.3 of the *International Energy Conservation Code*, ~~have an energy efficiency classification of not less than FEG71~~ ~~as defined in AMCA 205~~ provided that the total efficiency of the fan at the design point of operation shall be within 10 percentage points of ~~either~~ the maximum total efficiency of the fan ~~or the static efficiency of the fan~~.

Reason: Fan efficiency language was recently approved into both the 2015 IECC and 2013 ASHRAE 90.1. Similar language is being finalized into ASHRAE 189.1 In order to better coordinate with these documents,this sections needs to be revised as proposed.

Cost Impact: Will not increase the cost of construction.

Analysis: The International Energy Conservation Code section referenced in the text of this proposal is a 2015 Edition reference. The provision referenced is new and does not exist in the 2012 IECC.

GEW86-14: 606.2.2.3-HICKMAN689

GEW87-14
606.2.2.4 (New), Table 606.2.2.4 (NEW), Chapter 12

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Add new text as follows:

606.2.2.4 Absorption Cooling Systems. The efficiency of absorption cooling systems shall comply with the provisions of Table 606.2.2.4 based on the test procedure referenced in the table.

TABLE 606.2.2.4
ENERGY-EFFICIENCY CRITERIA FOR ABSORPTION COOLING SYSTEMS

Product Type	***Minimum* IPLV**	***Minimum* COP**	**Test Procedure**
Air-Cooled, Single Effect	-	0.63	AHRI 560
Water-Cooled, Single Effect	-	0.74	AHRI 560
Indirect-Fired, Double Effect	1.10	1.05	AHRI 560
Direct Fired, Double Effect	1.05	1.05	AHRI 560

IPLV = Integrated part load value; COP = Coefficient of performance.

Add new standard as follows:

AHRI

560-00 Absorption Water Chilling and Water Heating Packages

Reason: This new table will ensure that absorption cooling systems, if used, will meet efficiency levels that are only about 5-6% improvements over their current minimums as shown in ASHRAE 90.1 and IECC. It should be noted that the minimum efficiency for this equipment has not changed since the 1999 version of ASHRAE 90.1, while the efficiency of nearly all, if not all other cooling equipment has increased significantly since that time.

These technologies with higher efficiencies are currently available on the market place, as shown on the following web sites:

http://www.khi.co.jp/english/news/detail/20130221_1e.html
http://www.hitachi-ap.com/products/business/chiller_heater/absorption/index.html
http://www.johnsoncontrols.com/content/dam/WWW/jci/be/integrated_hvac_systems/hvac_equipment/chiller_products/absorption_two_stage/155.17-EG1.pdf

Other factors to consider: Absorption technologies can be combined with solar hot water systems to use the solar heat to create cooling, thereby increasing the overall efficiency of the cooling system (which is very low compared to electric cooling systems). They also use water as the refrigerant.

Cost Impact: Will increase the cost of construction. There are higher initial costs associated with higher efficiency systems.

Analysis: The standard AHRI 560-00 is referenced by one or more 2012 I-codes.

GEW87-14: 606.2.2.4 (NEW)-ROSENSTOCK510

GEW88-14
606.3

Proponent: Marcelo Hirschler, gbh International, representing North American Flame Resistant Alliance (gbhint@aol.com)

Revise as follows:

606.3 Duct and plenum insulation, sealing and testing. Supply and return air ducts and plenums, air handlers and filter boxes shall be insulated and sealed in accordance with Section ~~C403.2.7.1.1~~ C403.2.7 of the *International Energy Conservation Code*. The exception in Section C403.2.7.1.1 shall not apply.

Reason: The reference to Section C403.2.7.1.1 of the IECC is an incorrect reference and inconsistent with the scope of this section of the IgCC since C403.2.7.1.1 addresses only some of the duct systems covered by the IgCC section. Section C403.2.7.1.1 of the IECC addresses purely low-pressure duct systems, while the IgCC section addresses duct and plenum insulation, sealing and testing. The proposed reference, section C403.2.7 of the IECC, addresses duct and plenum insulation and sealing and will, thus, cover the complete aspects of insulation, sealing and testing in accordance with the IMC and IECC. In particular, also, all the requirements associated with plenums, contained within section 602 of the IMC, are covered by section C403.2.7.1 of the IECC which sends the user to the IMC and, implicitly, to chapter 6 of the IMC. The relevant IECC sections are shown below.

C403.2.7 Duct and plenum insulation and sealing. All supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and a minimum of R-8 insulation where located outside the building. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation.

Exceptions:
1. Where located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8°C).

All ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

C403.2.7.1 Duct construction. Ductwork shall be constructed and erected in accordance with the International Mechanical Code.

C403.2.7.1.1 Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge (w.g.) (500 Pa) shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus embedded-fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the International Mechanical Code.

Exception: Continuously welded and locking type longitudinal joints and seams on ducts operating at static pressures less than 2 inches water gauge (w.g.) (500 Pa) pressure classification.

C403.2.7.1.2 Medium-pressure duct systems. All ducts and plenums designed to operate at a static pressure greater than 2 inches water gauge (w.g.) (500 Pa) but less than 3 inches w.g. (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the International Mechanical Code.

C403.2.7.1.3 High-pressure duct systems. Ducts designed to operate at static pressures in excess of 3 inches water gauge (w.g.) (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. In addition, ducts and plenums shall be leak-tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual with the rate of air leakage (CL) less than or equal to 6.0 as determined in accordance with Equation 4-5.

CL = F/P0.65 **(Equation 4-5)**

where:

F = The measured leakage rate in cfm per 100 square feet of duct surface. P = The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct area have been tested and that all tested sections meet the requirements of this section.

Cost Impact: Will not increase the cost of construction.

Analysis: The International Energy Conservation Code sections C403.2.7 and C403.2.7.1.1 referenced in the text of this proposal are section numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section numbers for the 2015 Editions will be C403.2.9 and C403.2.9.1.1, respectively.

GEW88-14: 606.3-HIRSCHLER951

GEW89-14
606.5.1, Table 606.5.1(1), Table 606.5.1(2)

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

606.5.1 Economizer systems. Each cooling system that has a fan shall include either an air economizer complying with Section 606.5.1.1 or a water economizer complying with Section 606.5.1.2.

Exception: Economizers are not required for the following:

1. ~~Individual fan-cooling units with a supply capacity less than the minimum listed in Table 606.5.1(1).~~ <u>In cooling systems for buildings located in climate zones 1A and 1B.</u>

2. <u>In climate zones other than 1A or 1B, where individual cooling units have a capacity of less than 33,000 Btu/h. The total supply capacity of all fan-cooling units not provided with economizers shall not exceed 20 percent of the total supply capacity of all fan-cooling units in the building nor 480,000 Btu/h, whichever is greater.</u>

<u>3.</u> In Group I-2 occupancies, hospitals, and Group B occupancies, ambulatory care facilities, where more than 75 percent of the air designed to be supplied by the system is to spaces that are required to be humidified above a 35°F (1.7°C) dew-point temperature to comply with applicable codes or accreditation standards. In other occupancies, where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above a 35°F (1.7°C) dew-point temperature to satisfy process needs.

~~3.~~ <u>4.</u> Systems that include a condenser heat recovery system that is designed to utilize 60 percent of the peak heat rejection load at design conditions and there is a documented need for that rejected heat for either service hot water or space heating during peak heat rejection design conditions.

~~4.~~ <u>5.</u> Systems that serve spaces estimated as having a sensible cooling load at design conditions, excluding transmission and infiltration loads, of less than or equal to transmission and infiltration losses at the temperature and relative humidity design conditions in accordance with Section 6.1 of ASHRAE 55.

~~5.~~ <u>6</u>. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.

~~6.~~ <u>7.</u> Where the cooling efficiency is equal to, or greater than, the efficiency improvement requirements in Table ~~606.5.1(2)~~ <u>606.5.1.</u>

~~TABLE 606.5.1(1)~~
~~ECONOMIZER REQUIREMENTS~~

~~CLIMATE ZONES~~	~~ECONOMIZER REQUIREMENT~~
~~1A, 1B~~	~~No requirement~~
~~2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8~~	~~Economizers on all cooling systems having a capacity ≥ 33,000 Btu/h[a]~~

~~For SI: 1 British thermal unit per hour = 0.293 W.~~
~~a. The total capacity of all systems without economizers shall not exceed 480,000 Btu/h per building or 20 percent of the building's air economizer capacity, whichever is greater.~~

TABLE 606.5.1~~(2)~~
EQUIPMENT EFFICIENCY PERFORMANCE EXCEPTION FOR ECONOMIZERS

CLIMATE ZONES	COOLING EQUIPMENT EFFICIENCY IMPROVEMENT (%)[a]
2A	17
2B	21
3A	27
3B	32
4A	42
4B	49

IPLV = Integrated part load value, IEER = Integrated energy-efficiency ratio, SEER = Seasonal energy-efficiency rating, EER = Energy-efficiency ratio, COP = Coefficient of performance

a. Where a unit is rated with an IPLV, IEER or SEER, the minimum values for these metrics shall be increased by the percentage listed in the table in order to eliminate the required air or water economizer. Where a unit is rated only with a full load metric such as EER or COP cooling, these metrics shall be increased by the percentage shown.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The intent of the change is to replace Table 606.5.1(1) with new exceptions 1 and 2. Table 606.5.1(1) is to be deleted and Table 606.5.1(2) to be renumbered. Code change CE243-13, shown below, was approved during the 2013 code development cycle. It reorganizes the parallel provisions in the IECC. The interaction between exception #1 and Table 606.5.1(1) is unclear. The exception states where economizers are not to be required, but the table appears to be a listing of economizer requirements. The intent is unclear as written. The proposal replaces the table with 2 exceptions which are clearly exceptions from an economizer requirement. The first exception addresses climate zones 1A and 1B where no economizers are required regardless of the system capacity. The second exception addresses the other climate zones currently covered by the last line of the table and the footnote. Similar revision was made to the Massachusetts Stretch Code to address the confusion of this section and table.

CE243 – 13

C403.3.1, Table C403.3.1(1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High
Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C403.3 Simple HVAC systems and equipment (Prescriptive). This section applies to buildings served by unitary or packaged HVAC
equipment listed in Tables C403.2.3(1) through C403.2.3(8), each serving one *zone* and controlled by a single thermostat in the *zone* served.
It also applies to two-pipe heating systems serving one or more *zones*, where no cooling system is installed.

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of
Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

~~1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).~~

1. In cooling systems for buildings located in climate zones 1A and 1B.

2. In climate zones other than 1A and 1B, where individual cooling units have a capacity of less than 33,000 Btu/h. The total supply capacity of all fan-cooling units not provide with economizers shall not exceed 20 percent of the total supply capacity of all fan-cooling units in the building nor 300,000 Btu/h, whichever is greater.

~~2.~~3. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above
35°F (1.7 °C) dew-point temperature to satisfy process needs.

~~3.~~4. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).

~~4.~~5. Systems expected to operate less than 20 hours per week.

~~5.~~6. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.

~~6~~. 7. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).

~~TABLE C403.3.1(1)~~
~~ECONOMIZER REQUIREMENTS~~

~~CLIMATE ZONES~~	~~ECONOMIZER REQUIREMENT~~
~~1A, 1B~~	~~No requirement~~
~~2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8~~	~~Economizers on all cooling systems ≥ 33,000 Btu/ha~~

~~For SI: 1 British thermal unit per hour = 0.2931 W.~~

~~a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this specific proposal:

The interaction between exception #1 and Table C403.3.1(1) is unclear. The exception states where economizers are not to be required, but the table appears to be a listing of economizer requirements. The intent is unclear as written. The proposal replaces the table with 2 exceptions which are clearly exceptions from an economizer requirement. The first exception addresses climate zones 1A and 1B where no economizers are required regardless of the system capacity. The second exception addresses the other climate zones currently covered by the last line of the table and the footnote. Similar revision was made to the Massachusetts Stretch Code to address the confusion of this section and table.

The same format occurs in a parallel section in the IgCC. If this proposal is successful, the SEHPCAC will submit a companion proposal in 2014 for the IgCC.

Cost Impact: Will not increase the cost of construction. The proposal is editorial and will have no impact on the cost of construction.

GEW89-14: 606.5.1-THOMPSON564

GEW90-14
606.5.1

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org); Brenda Thompson, Chair, representing Sustainability, Energy, High Performance, Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

606.5.1 Economizer systems. Each cooling system that has a fan shall include either an air economizer complying with Section 606.5.1.1 or a water economizer complying with Section 606.5.1.2.

Exception: Economizers are not required for the following:

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table 606.5.1(1).
2. In Group I-2, Condition 2 occupancies~~, hospitals~~, and ~~Group B occupancies,~~ ambulatory care facilities, where more than 75 percent of the air designed to be supplied by the system is to spaces that are required to be humidified above a 35°F (1.7°C) dew-point temperature to comply with applicable codes or accreditation standards. In other occupancies, where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above a 35°F (1.7°C) dew-point temperature to satisfy process needs.
3. Systems that include a condenser heat recovery system that is designed to utilize 60 percent of the peak heat rejection load at design conditions and there is a documented need for that rejected heat for either service hot water or space heating during peak heat rejection design conditions.
4. Systems that serve spaces estimated as having a sensible cooling load at design conditions, excluding transmission and infiltration loads, of less than or equal to transmission and infiltration losses at the temperature and relative humidity design conditions in accordance with Section 6.1 of ASHRAE 55.
5. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling efficiency is equal to, or greater than, the efficiency improvement requirements in Table 606.5.1(2).

TABLE 606.5.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems having a capacity ≥ 33,000 Btu/ha

For SI: 1 British thermal unit per hour = 0.293 W.
a. The total capacity of all systems without economizers shall not exceed 480,000 Btu/h per building or 20 percent of the building's air economizer capacity, whichever is greater.

TABLE 606.5.1(2)
EQUIPMENT EFFICIENCY PERFORMANCE EXCEPTION FOR ECONOMIZERS

CCLIMATE ZONES	COOLING EQUIPMENT EFFICIENCY IMPROVEMENT (%)a
2A	17
2B	21
3A	27
3B	32
4A	42
4B	49

IPLV = Integrated part load value, IEER = Integrated energy-efficiency ratio, SEER = Seasonal energy-efficiency rating, EER = Energy-efficiency ratio, COP = Coefficient of performance

a. Where a unit is rated with an IPLV, IEER or SEER, the minimum values for these metrics shall be increased by the percentage listed in the table in order to eliminate the required air or water economizer. Where a unit is rated only with a full load metric such as EER or COP cooling, these metrics shall be increased by the percentage shown.

Reason: This code change coordinates this section with terminology within the current 2015 versions of the I-codes. Based on the results of the Group A ICC hearing cycle, Group I-2 has been split into two separate conditions: Condition 1 includes nursing homes, Condition 2 includes hospitals. Note that the original code change, G257-12, received a floor modification that switched the conditions. The description above represents the final outcome.

Ambulatory care facilities are defined as Group B occupancies, therefore the "Group B occupancies" can be deleted. If it is not deleted, this section could be misinterpreted to mean all Group B.

This proposal is cosponsored by the ICC Ad Hoc Committee for Healthcare (AHC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC).

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC websitē at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both thetechnical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction

GEW90-14: 606.5.1-PAARLBERG643

GEW91-14
606.5.1, Table 606.5.1(1), Table 606.5.1(2)

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, and High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

606.5.1 Economizer systems. Each cooling system that has a fan shall include either an air economizer complying with Section 606.5.1.1 or a water economizer complying with Section 606.5.1.2.

Exception: Economizers are not required for the following:

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table 606.5.1(1).
2. In Group I-2 occupancies, hospitals, and Group B occupancies, ambulatory care facilities, where more than 75 percent of the air designed to be supplied by the system is to spaces that are required to be humidified above a 35°F (1.7°C) dew-point temperature to comply with applicable codes or accreditation standards. In other occupancies, where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above a 35°F (1.7°C) dew-point temperature to satisfy process needs.
3. Systems that include a condenser heat recovery system that is designed to utilize 60 percent of the peak heat rejection load at design conditions and there is a documented need for that rejected heat for either service hot water or space heating during peak heat rejection design conditions.
4. Systems that serve spaces estimated as having a sensible cooling load at design conditions, excluding transmission and infiltration loads, of less than or equal to transmission and infiltration losses at the temperature and relative humidity design conditions in accordance with Section 6.1 of ASHRAE 55.
5. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling efficiency is equal to,or greater than, the efficiency improvement requirements in Table 606.5.1(2).

TABLE 606.5.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems having a capacity ≥ 33,000 Btu/ha

For SI: 1 British thermal unit per hour = 0.293 W.
a. The total capacity of all systems without economizers shall not exceed 480,000 Btu/h per building or 20 percent of the building's air economizer capacity, whichever is greater.

TABLE 606.5.1(2)
EQUIPMENT EFFICIENCY PERFORMANCE EXCEPTION FOR ECONOMIZERS

CCLIMATE ZONES	COOLING EQUIPMENT EFFICIENCY IMPROVEMENT (%)~~a~~
2A	17
2B	21
3A	27
3B	32
4A	42
4B	49

~~IPLV = Integrated part load value, IEER = Integrated energy-efficiency ratio, SEER = Seasonal energy-efficiency rating, EER = Energy-efficiency ratio, COP = Coefficient of performance~~

~~a. Where a unit is rated with an IPLV, IEER or SEER, the minimum values for these metrics shall be increased by the percentage listed in the table in order to eliminate the required air or water economizer. Where a unit is rated only with a full load metric such as EER or COP cooling, these metrics shall be increased by the percentage shown.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The footnote (a) does not clearly provide differences in application of the code. The first sentence of the note says if the equipment is rated by IPLV, IEER or SEER then you use the percentages of the table. The second sentence says if the equipment is rated with EER or COP then you use the percentages in the table. If there is a category where you don't use these efficiency improvements, then that would be the type of information to have in a footnote. The text of Exception 6 of Section 606.5.1 specifically says economizers aren't required when the cooling efficiency is improved per the table. The units applied to the equipment are irrelevant because the footnote says they are to be treated the same. Once footnote a is eliminated, then there is no need to the explanative definitions immediately below the table.

Cost Impact: Will not increase the cost of construction. The proposal is editorial as it eliminates a footnote that has no impact on the regulation.

GEW91-14: TABLE 606.5.1 (2)-THOMPSON570

GEW92-14

606.5.1.1.1, 606.5.1.1.2, 606.5.1.1.3, Table 606.5.1.1.3(1), Table 606.5.1.1.3 (2), 606.5.1.1.4, 606.5.1.2.1, 606.5.1.2.2, 606.5.1.2.3, 606.5.1.2.4, 606.5.1.1, 606.5.1.2

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy and High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

606.5.1.1 Air economizers. Air economizers shall be designed in accordance with ~~Sections 606.5.1.1.1 through 606.5.1.1.4~~. the *International Energy Conservation Code.*

~~**606.5.1.1.1 Design capacity.** Air economizer systems shall be capable of modulating outdoor air and return air dampers to provide up to 100 percent of the design supply air quantity as outdoor air for cooling.~~

~~**606.5.1.1.2 Control signal.** Economizer dampers shall be capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed air temperature.~~

> ~~**Exception:** The use of mixed air temperature limit control shall be permitted for systems controlled from space temperature, such as single-zone systems.~~

~~**606.5.1.1.3 High-limit shutoff.** Air economizers shall be capable of automatically reducing outdoor air intake to the design minimum outdoor air quantity when the outdoor air intake will not reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table 606.5.1.1.3(1). High- limit shutoff control settings for the Table 606.5.1.1.3(1) control types shall be as specified in Table 606.5.1.1.3(2).~~

~~TABLE 606.5.1.1.3(1)~~
~~HIGH-LIMIT SHUTOFF CONTROL OPTIONS~~
~~FOR AIR ECONOMIZERS~~

~~CLIMATE ZONES~~	~~ALLOWED CONTROL TYPES~~	~~PROHIBITED CONTROL TYPES~~
~~1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8~~	~~Fixed dry bulb~~ ~~Differential dry bulb~~ ~~Electronic enthalpy[a]~~ ~~Differential enthalpy~~ ~~Dew-point and dry-bulb temperatures~~	~~Fixed enthalpy~~
~~1A, 2A, 3A, 4A~~	~~Fixed enthalpy~~ ~~Electronic enthalpy[a]~~ ~~Differential enthalpy~~ ~~Dew-point and dry-bulb temperatures~~	~~Fixed dry bulb~~ ~~Differential dry bulb~~
~~All other climates zones~~	~~Fixed dry bulb~~ ~~Differential dry bulb~~ ~~Fixed enthalpy~~ ~~Electronic enthalpy[a]~~ ~~Differential enthalpy~~ ~~Dew-point and dry-bulb temperatures~~	—

~~a. Electronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.~~

~~**TABLE 606.5.1.1.3(2)**~~
~~**HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS**~~

~~**DEVICE TYPE**~~	~~**CLIMATE ZONE**~~	~~**REQUIRED HIGH LIMIT (Economizer off when)**~~	
		~~**Equation**~~	~~**Description of equation**~~
~~Fixed dry bulb~~	~~1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8~~	~~T_{OA} > 75°F~~	~~Outdoor air temperature (T_{OA}) is greater than 75°F~~
	~~5A, 6A, 7A~~	~~T_{OA} > 70°F~~	~~Outdoor air temperature (T_{OA}) is greater than 70°F~~
	~~All other zones~~	~~T_{OA} > 65°F~~	~~Outdoor air temperature (T_{OA}) is greater than 65°F~~
~~Differential dry bulb~~	~~1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8~~	~~T_{OA} > T_{RA}~~	~~Outdoor air temperature (T_{OA}) is greater than return air temperature (T_{RA})~~
~~Fixed enthalpy~~	~~All~~	~~h_{OA} > 28 Btu/lb[a]~~	~~Outdoor air enthalpy (h_{OA}) is greater than 28 Btu/lb of dry air[a]~~
~~Electronic enthalpy~~	~~All~~	~~(T_{OA}/RH_{OA}) > A~~	~~Outdoor air temperature (T_{OA}) divided by RH_{OA} is greater than the "A" setpoint curve[b]~~
~~Differential enthalpy~~	~~All~~	~~h_{OA} > h_{RA}~~	~~Outdoor air enthalpy (h_{OA}) is greater than return air enthalpy (h_{RA})~~
~~Dew-point and dry bulb temperatures~~	~~All~~	~~DP_{OA} > 55°F or T_{OA} > 75°F~~	~~Outside dew point (DP_{OA}) is greater than 55°F or Outdoor air dry bulb (T_{OA}) is greater than 75°F~~

~~For SI: °C = [(°F) - 32]/1.8, 1 foot = 304.8 mm, 1 British thermal unit per pound = 2326 J/Kg.~~
~~a. At altitudes substantially different than sea level, the fixed enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.~~
~~b. Setpoint "A" corresponds to a curve on the psychometric chart that goes through a point at approximately 75°F and 40-percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high-humidity levels~~

~~**606.5.1.1.4 Relief of excess outdoor air.** Systems shall provide a means to relieve excess outdoor air during air economizer operation to prevent over-pressurizing of the building. The relief air outlets shall be located to avoid recirculation of the relief of air into the building.~~

606.5.1.2 Water economizer systems for HVAC equipment. Water Economizer systems for heating, ventilating and air-conditioning (HVAC) equipment shall be designed in accordance with ~~Sections 606.5.1.2.1 through 606.5.1.2.4~~. the *International Energy Conservation Code.*

~~**606.5.1.2.1 Design capacity.** Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at outdoor air temperatures of 50°F (10°C) dry bulb/45°F (7.2°C) wet bulb and below.~~

> ~~**Exception:** Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F (10°C) dry bulb/45°F (7.2°C) wet bulb, shall satisfy 100 percent of the expected system cooling load at 45°F (7.2°C) dry bulb/40°F (4.4°C) wet bulb.~~

~~**606.5.1.2.2 Maximum pressure drop.** Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall have a water-side pressure drop of less than 15 feet of water column (44 835 Pa) including the control valve or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling noneconomizer mode.~~

~~**606.5.1.2.3 Integrated economizer control.** Economizer systems shall be integrated with the mechanical cooling system and shall be capable of providing partial cooling whether or not additional mechanical cooling is required to meet the remainder of the cooling load.~~

~~**606.5.1.2.4 Economizer heating system impact.** Heating, ventilating and air-conditioning (HVAC) system design and economizer controls shall be so that economizer operation does not increase the building heating energy use during normal operation.~~

> ~~**Exception:** Economizers on variable air volume (VAV) systems that cause zone level heating to increase because of reduction in supply air temperature.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The provisions in the International Energy Conservation Code for 2015 that regulate economizers have been significantly revisedand made more stringent. Section 606.5.1 specifies when HVAC systems do, and do not, need to be provided with economizers. Section 606.5.1.1 provides installation standards for air economizers; Section 606.5.1.2 provides installation standards for water economizers. The details of these sections are not as comprehensive as the similar standards provided in the 2015 IECC. This proposal would maintain the requirements and exceptions for economizers, but then refers the code user to the IECC for the requirements of the two types of economizers. The text to be deleted includes deleting tables 606.5.1.1.3(1) and (2).

Cost Impact: Will not increase the cost of construction. As this change removes requirements which would be in conflict with the IECC, there is no cost increase created by this change. If there is a cost increase it occurred with the change in standards in the IECC.

GEW92-14: 606.5.1.1-THOMPSON565

GEW93-14
606.7

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Delete without substitution:

~~**606.7 Kitchen exhaust systems.** Kitchen ventilation and exhaust systems shall be in accordance with the *International Mechanical Code* and this section. Kitchen ventilation systems that deliver conditioned supply air to any space containing a kitchen hood shall not be capable of exceeding the greater of the following:~~

1. ~~The ventilation rate required to supply the space conditioning load; or~~

2. ~~The hood exhaust flow minus the available transfer air from adjacent spaces. For the purposes of this section, available transfer air is considered to be that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.~~

~~Where the total hood exhaust airflow rate of kitchen hoods in the space is greater than 5,000 cfm (2360 L/s) each hood shall have an exhaust rate in not greater than 110 percent of the minimum exhaust rate required by the *International Mechanical Code* and the ventilation system shall comply with one of the following:~~

1. ~~Not less than 50 percent of replacement air is transfer air that would otherwise be exhausted.~~

2. ~~Demand ventilation systems that are capable of reducing exhaust and replacement air system airflow rates by not less than 50 percent for not less than 75 percent of the exhaust air. The demand ventilation system shall include controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and when idle.~~

3. ~~Listed energy recovery devices with a sensible heat recovery effectiveness of not less than 40 percent shall be provided for not less than 50 percent of the total exhaust air.~~

~~Where a single hood, or hood section, is installed over appliances with different duty ratings, the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the appliance with the highest duty rating located under the hood or hood section.~~

> ~~**Exception:** Where not less than 75 percent of the replacement air provided by the kitchen ventilation and exhaust system is transfer air that would otherwise be exhausted, the provisions of this section shall not apply.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAChas held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Code change CE220-13 was approved in 2013. It results in new kitchen exhaust provisions being added to the IECC. Therefore, the provisions in the IgCC are not a significant energy improvement over the IECC. The SEHPCAC proposes to delete the provisions. If other proponents pursue proposals which will take the new IECC provisions and enhance their energy savings when applied under the IgCC, the SEHPCAC will consider withdrawal of this proposal. The text of the IECC kitchen exhaust provisions for 2015 are as follows:

C403.2.8 Kitchen exhaust systems. Replacement air introduced directly into the exhaust hood cavity shall not be greater than 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space containing a kitchen hood shall not exceed the greater of the ventilation rate required to meet the space heating or cooling load or the hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.

Where total kitchen hood exhaust airflow rate is greater than 5,000 cfm (2360 L/s), each hood shall be factory-built commercial exhaust hood listed by a nationally recognized testing laboratory in compliance with UL710. Each hood shall have a maximum exhaust rate as specified in Table C403.2.8 and shall comply with one of the following:

1. Not less than 50 percent of all replacement air shall be transfer air that would otherwise be exhausted.
2. Demand ventilation systems on not less than 75 percent of the exhaust air that are capable of no less than a 50 percent reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.
3. Listed energy recovery devices with a sensible heat recovery effectiveness of not less than 40 percent on not less than 50 percent of the total exhaust airflow.

Where a single hood, or hood section, is installed over appliances with different duty ratings, the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the highest appliance duty rating under the hood or hood section.

Exception: Where not less than 75 percent of all the replacement air is transfer air that would otherwise be exhausted

TABLE C403.2.8
MAXIMUM NET EXHAUST FLOW RATE, CFM PER LINEAR FOOT OF HOOD LENGTH

Type of Hood	Light Duty Equipment	Medium Duty Equipment	Heavy Duty Equipment	Extra Heavy Duty Equipment
Wall-mounted canopy	140	210	280	385
Single island	280	350	420	490
Double island (per side)	175	210	280	385
Eyebrow	175	175	NA	NA
Backshelf/Pass-over	210	210	280	NA

For SI: 1 cfm = 0.4179 L/s; 1 foot = 305 mm
NA = Not Allowed

Cost Impact: Will not increase the cost of construction. The proposal removes a requirement which is duplicative of a requirement in the IECC.

GEW 93-14: 606.7-THOMPSON306

GEW94-14
606.8

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org); Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Delete without substitution:

~~**606.8Laboratory exhaust systems.** Laboratory exhaust systems shall comply with the provisions of the *International Energy Conservation Code* except as specified in Section 606.8.1.~~

Reason: The International Energy Code does not include laboratory exhaust system requirements. So Section 606.8 is not needed. Section 606.8.1 can stand on it's own.

This proposal is cosponsored by the ICC Ad Hoc Committee for Healthcare (AHC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC).

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All
meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW94-14: 606.8-PAARLBERG645

GEW95-14
606.10 (New)

Proponent: Jonah Cecil Scheib, Urban Green Council, representing Urban Green Council (cs@urbangreencouncil.org)

Add new text as follows:

<u>**606.10 Fuel.** Boilers. furnaces, and service water heating equipment configured to use #4 or #6 heating oils shall not be installed.</u>

Reason: Requiring cleaner heating oils can improve public health. The types of pollution that results from burning heating oil (specifically PM2.5 and NOx) have been linked to many health problems, most notably asthma and other respiratory ailments. Conversion from dirtier-burning heating oils (such as #4 and #6 oil) to cleaner fuels (natural gas or #2 oil) can reduce this pollution, as well as CO2 emissions.

In 2011, New York City enacted rules that phase out #6 oil, prohibiting its burning after July 1, 2015.#4 oil, which is much less commonly used, is being phased out with a final prohibition date of January 1, 2030.

Bibliography:

NYC Green Codes Task Force, Proposal HT9: Phase Out Dirty Boiler Fuels (Proposal; Legislative Summary)
NYC Department of Environmental Protection Rules, Title 15, Chapter 2 (DEP Rule)

Cost Impact: Will not increase the cost of construction.

GEW95-14: 606.10 (NEW)-SCHEIB1113

GEW 96-14
607.1, 607.2, 607.2.1, 607.2.2, 607.3, 607.3.1, 607.4, 607.6, 607.7

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com); Craig Conner, representing self (craig.conner@mac.com)

Revise as follows:

607.1 ~~Prescriptive compliance.~~ Scope. ~~Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2,~~ Service water heating systems shall comply with the provisions of the *International Energy Conservation Code* and the provisions of this section.

~~**607.2 Service water heating (SWH) equipment performance requirements.** Service water heating equipment shall comply with Sections 607.2.1 and 607.2.2.~~

~~**607.2.1 Equipment covered by federal standards.** Equipment covered by federal minimum efficiency standards shall comply with the minimum efficiency requirements of the *International Energy Conservation Code*.~~

~~**607.2.2 Water heater controls for dwelling units.** Water heaters installed in dwelling units in buildings shall be equipped with external water temperature thermostat controls. The controls shall allow the occupant to set the water temperature at a setting that is below 100°F (38°C) and greater than or equal to 50°F (10°C).~~

~~**607.3 Pools, hot tubs and spas.** Pools, hot tubs and spas shall comply with the efficiency requirements of the *International Energy Conservation Code*.~~

~~**607.3.1 Pools in conditioned space.** For pools that are located within the conditioned space, not less than 25 percent of the annual energy consumption of pool operation and not less than 50 percent of the peak design space heating, ventilation, and cooling requirements for the space in which the pool is located shall be by one or both of the following:~~

1. ~~An onsite renewable energy system.~~
2. ~~A heat recovery system.~~

~~**607.4 Snowmelt systems.** Snow melt systems shall comply with the requirements of the *International Energy Conservation Code*. Hydronic systems shall supplement not less than 25 percent of the design snow melting total annual consumption measured in Btu/ft^2 (J/m^2), energy per unit area. Electric systems shall supplement not less than 50 percent of the design snow melt peak load demand. These requirements shall be supplied by one or both of the following:~~

1. ~~An onsite renewable energy system.~~
2. ~~A heat recovery system.~~

~~**Exception:** Emergency service ingress and egress are exempt from the requirements of Section 607.4.~~

~~**607.6 Service water heating piping insulation.** Service water heating piping shall be thermally insulated in accordance with Table 606.4. Where hot water distribution piping is installed within attics and crawlspaces, the insulation shall continue to cover the pipe for a distance not less than 6 inches (152 mm) beyond the *building thermal envelope*. Where hot water distribution piping is installed within walls, the insulation shall completely surround the pipe with not less than 1 inch (25 mm) of insulation. Where hot water piping is installed in a wall cavity of insufficient size to accommodate the pipe and insulation levels of Table 606.4, the insulation thickness shall be permitted to have the maximum thickness that the wall cavity can accommodate, but not less than $^1/_2$-inch (12 mm) thick.~~

~~**Exception:** Insulation is not required for the following:~~

1. ~~Factory-installed piping within service water heating equipment tested and rated in accordance with Section 606.4.~~
2. ~~Piping conveying fluids that is neither heated nor cooled, including cold water supply and natural gas piping.~~
3. ~~Hot water supply piping exposed under sinks, lavatories and similar fixtures.~~
4. ~~Hot water distribution piping buried within blown-in or sprayed roof/ceiling insulation, such as fiberglass or cellulose, where the insulation completely and continuously surrounds the pipe.~~

607.7 Circulating hot water systems. ~~Controls that allow continuous, timer, or water temperature-initiated (aquastat) operation of a circulating pump are prohibited. Gravity or thermosyphon circulation loops are prohibited. Pumps on circulating hot water systems shall be activated on demand by either a hard-wired or wireless activation control of one of the following types:~~

1. ~~A normally open, momentary contact switch.~~
2. ~~Motion sensors that make momentary contact when motion is sensed. After the signal is sent, the sensor shall go into a lock out mode for not less than 5 minutes to prevent sending a signal to the electronic controls while the circulation loop is still hot.~~
3. ~~A flow switch.~~
4. ~~A door switch.~~

~~The controls for the pump shall be electronic and operate on the principal of shutting off the pump with a rise in temperature. Electronic controls shall have a lock-out to prevent operation at temperatures greater than 105°F (41°C) in the event of failure of the device that senses temperature rise. The electronic controls shall have a lock out mode for not more than 5 minutes that prevents extended operation of the pump if the sensor fails or is damaged.~~

Reason: The sections that have been deleted are covered in the IECC or the IPC.

Cost Impact: Will not increase the cost of construction. The proposal removes provisions

GEW 96-14: 607.1-KLEIN1209

GEW97-14
607.5, Chapter 12

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, and High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

607.5 ~~Waste~~ Drain water heat recovery ~~system~~. The following ~~building types~~ occupancies shall be provided with a ~~waste~~ drain water heat recovery ~~system~~ units that will preheat the incoming water used for hot water functions by not less than
10°F (5.6°C):

1. Group A-2, occupancy restaurants and banquet halls;
2. Group F, occupancy laundries;
3. Group R-1, occupancy boarding houses ~~(transient)~~, hotels ~~(transient)~~, motels ~~(transient)~~;
4. Group R-2 occupancy buildings;
5. Group A-3, occupancy health clubs and spas; and
6. Group I-2, occupancy, Condition 1 hospitals, psychiatric hospitals and Condition 2 nursing homes.

Exception: ~~Waste~~ Drain water heat recovery systems ~~are~~ shall not be required for single-story slab-on-grade and single-story on crawl-space buildings.

Drain water heat recovery units shall comply with CSA B55.2. Potable water-side pressure loss shall be less than 10 psi at maximum design flow. For Group R occupancies, the efficiency of drain water heat recovery units shall be in accordance with CSA B55.1.

Add new standards as follows:

CSA

B55.1-2012 Test method for measuring efficiency and pressure loss of drain water heat recovery units.

B55.2-2012 Drain water heat recovery units.

Reason: This proposal has 2 goals:

1. Provide coordination with CE283-13 which was approved in 2013. It provides references to two standards for drain water heat recovery units in the 2015 IECC. However, the IECC doesn't require drain water heat recovery, but it does provide 2 referenced standards which must be met if and where drain water heating is installed in a building. Section 607.5 of the IgCC specifically requires drain water heat recovery in specified occupancies and uses. The text of the IECC drain water heat recovery provisions for 2015 are as follows:

> **C404.8 Drain water heat recovery units.** Drain water heat recovery units shall comply with CSA 55.2. Potable water-side pressure loss shall be less than 10 psi at maximum design flow. For Group R occupancies, the efficiency of drain water heat recovery unit efficiency shall be in accordance with CSA 55.1.

The proposal coordinates with the new terminology in the 2015 IECC while maintaining the requirement that the units be provided in the specified occupancies.

2. Clarifies the application of the section to various occupancies and not to 'buildings'. This will clarify that if a building is of mixed occupancy that the drain water heat recovery requirements be applied to the portions of the building containing the listed occupancies. This will prevent the misunderstanding such as an 10 story office building with a health club on the first floor having to provide drain water heat recovery for the whole building rather than just the health club portion. 'Transient' is deleted from the listings under the R-1 occupancy because the IBC specifies that R-1 occupancy is transient in nature.

Cost Impact: Will not increase the cost of construction

This is primarily an editorial proposal to coordinate the provisions of the IECC and the IgCC. If there is a cost increase, it was established by adding the reference standards in the IECC.

Analysis:

A review of the standard proposed for inclusion in the code, CSA B55.1-2012 and CSA B55.2-2012 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2014.

GEW97-14: 607.5-THOMPSON576

GEW98-14
607.5, A106.3.2

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org)

Revise as follows:

607.5 Waste water heat recovery system. The following building types shall be provided with a waste water heat recovery system that will preheat the incoming water used for hot water functions by not less than 10°F (5.6°C):

1. Group A-2, restaurants and banquet halls;
2. Group F, laundries;
3. Group R-1, boarding houses (transient), hotels (transient), motels (transient);
4. Group R-2 buildings;
5. Group A-3, health clubs and spas; and
6. Group I-2 facilities~~, hospitals, psychiatric hospitals and nursing homes~~.

Exception: Waste water heat recovery systems are not required for single-story slab-on-grade and single-story on crawl-space buildings.

A106.3.2 Occupancy. The building shall be designed to serve one of the following occupancies:

1. Group A-2, restaurants and banquet halls;
2. Group F, laundries;
3. Group R-1, boarding houses (transient), hotels (transient), motels (transient);
4. Group R-2 buildings;
5. Group A-3, health clubs and spas; and
6. Group I-2 facilities~~, hospitals, mental hospitals and nursing homes~~.

Reason: These changes are editorial. The list is not needed as it includes all Group I-2 facilities. Similar proposals are provided for Section 604.3, 606.5.1 and 607.5.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction

GEW98-14: 607.5 #1-PAARLBERG668

GEW99-14
607.5

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org)

Revise as follows:

607.5 Waste water heat recovery system. The following building types shall be provided with a waste water heat recovery system that will preheat the incoming water used for hot water functions by not less than 10°F (5.6°C):

1. Group A-2, restaurants and banquet halls;
2. Group F, laundries;
3. Group R-1, boarding houses (transient), hotels (transient), motels (transient);
4. Group R-2 buildings;
5. Group A-3, health clubs and spas; and
6. Group I-2, ~~hospitals, psychiatric hospitals and~~ nursing homes.

Exception: Waste water heat recovery systems are not required for single-story slab- on-grade and single-story on crawl-space buildings.

Reason: Legionellosis is a recognized hazard that can kill or cause serious physical harm to building occupants. The term Legionellosis refers collectively to two distinct clinical illnesses, Legionnaires' disease and Pontiac fever. Legionnaires' disease is the when the bacterium Legionella causes severe pneumonia. Pontiac fever is when Legionella infection results in a less severe, non-pneumonic, influenza-like illness. The US Centers for Disease Control and Prevention (CDC) has estimated that there are between 8,000 and 18,000 cases of Legionnaires' disease in the United States each year, and that more than 10 percent of these cases are fatal. Legionellosis results predominantly from exposure to Legionella associated with building water systems. Estimates suggest that 20% of Legionnaires' disease cases are outbreak related (more than one confirmed case in a one year period), but the majority are not outbreak-related (sporadic) (MMWR 2011). Outbreaks have been associated with whirlpool spas, cooling towers, decorative fountains, hotels, water systems of hospitals and nursing homes, and cruise ships. Persons at increased risk for legionellosis include, but are not limited to, the elderly, dialysis patients, persons who smoke, and persons with underlying medical conditions that weaken the immune system. However, a significant percentage of cases are in persons that are not part of any identified at-risk population. Building water systems vary substantially in their design and propensity for transmission of Legionella. Conditions that are favorable for the amplification of legionellae growth include the presence of other bacteria, amoebae and other protozoan hosts, water temperatures of 25-42°C (77-108°F), stagnation, scale, sediment and biofilms. Legionellosis is not transmitted person-to-person. Multiple modes have been identified for transmission of *Legionella* to humans; there is evidence for aerosolization, aspiration, and direct instillation into the lung during medical procedures. In most instances, transmission to humans occurs when water that contains *Legionella* is aerosolized in respirable droplets

Legionella Transmission From Nature to Human Disease

Steps 1 – 6 From The Environment To → **Legionnaires' Disease**

1. Legionella in Water Supply To Building (From Nature)	2. Amplification (Legionella Growth) (77°F - 108°F) (25°C - 42°C)	3. Transmission (Aerosolization from Faucet, Shower Head, Cooling Tower, Etc.)	4. Exposure of Susceptible Host (Water into lungs through inhalation or aspiration)	5. Multiply in Human Body	6. Diagnosis of Legionnaires' Disease
Factors: Temperature, pH, Nutrients, Microbial Associations	**Factors:** Temperature, Biocides, Water System Design, System Cleanliness, Nutrients, Microbial Associations	**Factors:** Humidity, Temperature, Aerosol Production, Distance from Source	**Factors:** Age, Disease, Immunodeficiency	**Factors:** Virulence, Age, Disease, Immunodeficiency	**Factors:** Symptoms, Lab Tests, Surveillance
	Apply Risk Reduction Practices	**Apply Risk Reduction Practices**	**Apply Risk Reduction Practices**		

Figure 1 Legionella Transmission: Factors and events leading to Legionnaires' disease.

Adapted from Barbaree (1991)[3]

The most effective control for most diseases, including legionellosis, is prevention of transmission at as many points as possible in the disease's chain of transmission. The rationale for this is that if one preventive measure fails, others will be in place and act as failsafe mechanisms. With this philosophy in mind, it may be desirable to design interventions to prevent transmission of legionellosis at as many points as possible in the disease's chain of transmission. General concepts are presented so that readers may develop an understanding of the types of conditions that may allow amplification and transmission of Legionella.

Maintaining hot and cold water temperatures within prescribed ranges throughout the entire system has been shown to reduce the proliferation of Legionella. Cold water should be distributed and delivered at temperatures below 77°F (25°C). If cold water temperatures exceed 77°F (25°C) in any part of the system, the potential for proliferation of Legionella increases significantly. ASHRAE GUIDELINE Reducing the Risk of Legionellosis Associated with Building Water Systems, Copyright 2000 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

A Waste Water Heat Recovery System is designed to recover heat from the hot water used in showers, bathtubs, sinks, dishwashers, and clothes washers. They generally have the ability to store recovered heat for later use. These systems will impact the ability to properly control the water temperature within parts of the plumbing systems providing prime opportunities for the proliferation of Legionella and other bacteria within the building water system and therefore expose the high risk population.

Cost Impact: Will not increase the cost of construction.

GEW99-14: 607.5 #2-PAARLBERG1142

GEW 100-14

607.5, Chapter 12

Proponent: Lisa Reiheld, Canadian Standards Association, representing CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

607.5 Waste water heat recovery system. The following building types shall be provided with a waste water heat recovery system in accordance with CSA B55 2 that will preheat the incoming water used for hot water functions by not less than 10˚F (5.6˚C):

1. Group A-2, restaurants and banquet halls;
2. Group F, laundries;
3. Group R-1, boarding houses (transient), hotels (transient), motels (transient);
4. Group R-2 buildings;
5. Group A-3, health clubs and spas; and
6. Group I-2, hospitals, psychiatric hospitals and nursing homes.

Exception: Waste water heat recovery systems are not required for single-story slab-on-grade and single-story on crawl-space buildings.

Add new standard as follows:

CSA

B55 2-2012 Drain water heat recovery units.

Reason: Addition of reference to CSA B55.2 "Drain water heat recovery units" provides minimum standard for waste water heat recovery systems to be in compliance with.

Cost Impact: Will not increase the cost of construction

Analysis: A review of the standard proposed for inclusion in the code, CSA B55.2-2012 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2014.

GEW 100-14: 607.5-REIHELD1204

GEW101-14
607.5

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com)

Delete and substitute as follows:

~~**607.5 Waste water heat recovery system.** The following building types shall be provided with a waste water heat recovery system that will preheat the incoming water used for hot water functions by not less than 10°F (5.6°C):~~

1. ~~Group A-2, restaurants and banquet halls;~~
2. ~~Group F, laundries;~~
3. ~~Group R-1, boarding houses (transient), hotels (transient), motels (transient);~~
4. ~~Group R-2 buildings;~~
5. ~~Group A-3, health clubs and spas; and~~
6. ~~Group I-2, hospitals, psychiatric hospitals and nursing homes.~~

~~**Exception:** Waste water heat recovery systems are not required for single-story slab- on-grade and single-story on crawl-space buildings.~~

607.5 Waste water heat recovery system. One or more drain water heat exchangers shall be installed in the drain piping system for the indicated plumbing fixtures and appliances in the following the building occupancies:

1. Laundry washing machines for laundry services in Group F occupancies.

2. Laundry washing machines that are connected to hot and cold water supplies, for boarding houses with transient occupants, hotels with transient occupants and motels with transient occupants in Group R-1 occupancies.

3. Shared shower facilities and laundry washing machines in Group R-2 occupancies.

4. Laundry washing machines that are connected to hot and cold water supplies, and showers for health clubs and spas in Group A-3 occupancies.

5. Laundry washing machines that are connected to hot and cold water supplies, patient showers for long-term care patients and staff showers for hospitals, mental hospitals and nursing homes in Group I-2 occupancies.

Exceptions: Drain water heat exchangers shall not be required for:

1. Laundry washing machines that are used by guests.

2. Laundry washing machines that are supplied with cold water only provided that space and access are available for adding a drain water heat exchanger to the drain system in the future.

3. Fixtures and appliances that are located on a concrete slab on grade.

4. Applications where a drain water heat exchanger cannot increase the incoming water temperature by 36 percent of the temperature difference between the incoming cold water and the drain water.

5. Applications where any portion of a drain water heat exchanger would be required to be located in a sump below grade.

6. Applications where a drain water heat exchanger would convey grease-laden waste that requires the installation of a grease or oil separator in accordance with Section 1003 of the *International Plumbing Code*.

Reason: The current wording in the 2012 IgCC was not clear as to what functions within the specified occupancies drain water heat exchangers should be installed on. In addition it is not practical to verify the percent reduction in energy usage for all hot water when only a few functions will be connected to the heat exchangers.

This proposal makes the requirements more specific, provides clearer exemptions and makes inspection easier to implement.

Cost Impact: Will not increase the cost of construction. These provisions are already in the 2012 IgCC.

GEW101-14: 607.5-KLEIN964

GEW102-14
607.6

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com)

Delete without substitution:

~~**607.6 Service water heating piping insulation.** Service water heating piping shall be thermally insulated in accordance with Table 606.4. Where hot water distribution piping is installed within attics and crawlspaces, the insulation shall continue to cover the pipe for a distance not less than 6 inches (152 mm) beyond the *building thermal envelope*. Where hot water distribution piping is installed within walls, the insulation shall completely surround the pipe with not less than 1 inch (25 mm) of insulation. Where hot water piping is installed in a wall cavity of insufficient size to accommodate the pipe and insulation levels of Table 606.4, the insulation thickness shall be permitted to have the maximum thickness that the wall cavity can accommodate, but not less than ½ -inch (12 mm) thick.~~

> ~~**Exception:** Insulation is not required for the following:~~
>
> 1. ~~Factory-installed piping within service water heating equipment tested and rated in accordance with Section 606.4.~~
> 2. ~~Piping conveying fluids that is neither heated nor cooled, including cold water supply and natural gas piping.~~
> 3. ~~Hot water supply piping exposed under sinks, lavatories and similar fixtures.~~
> 4. ~~Hot water distribution piping buried within blown-in or sprayed roof/ceiling insulation, such as fiberglass or cellulose, where the insulation completely and continuously surrounds the pipe.~~

Reason: I am proposing to delete this section because its provisions are now included in the 2015 IECC and the 2015 IPC. Proposal CE-271 Part 1 was approved at the Final Comment Hearing in 2013. A coordinating section was approved for inclusion in the IPC. Since the IgCC is an overlay code, there is no longer a need for this section.
I urge you to support this proposal. Thank you.

Cost Impact: Will not increase the cost of construction

Removal of this section will not increase the cost of construction since the provisions are included in the IECC.

GEW102-14: 607.6-KLEIN821

GEW103-14

607.6, 607.6.1(New), 607.6.2 (New), Table 607.6.2 (New)

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

607.6 Service water heating system piping insulation. Service water heating system piping that conveys heated water shall be ~~thermally~~ insulated in accordance with ~~Table 606.4~~ either Section 607.6.1 or Section 607.6.2. The insulation requirements of this section shall supersede the insulation requirements of the *International Energy Conservation Code*. Insulation shall be installed in accordance with the insulation manufacturer's instructions. Piping insulation shall be continuous except where the piping passes through a framing member. ~~Where hot water distribution piping is installed within attics and crawlspaces, the insulation shall continue to cover the pipe for a distance not less than 6 inches (152 mm) beyond the *building thermal envelope*. Where hot water distribution piping is installed within walls, the insulation shall completely surround the pipe with not less than 1 inch (25 mm) of insulation.~~ Where piping is installed in locations subject to freezing temperatures, Section 305.4 of the *International Plumbing Code* or Section P2603.4 of the *International Residential Code*, as applicable, shall apply. ~~Where hot water piping is installed in a wall cavity of insufficient size to accommodate the pipe and insulation levels of Table 606.4, the insulation thickness shall be permitted to have the maximum thickness that the wall cavity can accommodate, but not less than 1/2-inch (12 mm) thick.~~

Exceptions: Piping insulation ~~is~~ shall not be required for the following:

1. Factory-installed piping within service water heating equipment tested and rated in accordance with Section 606.4.
2. ~~Piping conveying fluids that is neither heated nor cooled, including cold water supply and natural gas piping.~~ Portions of piping that radiate heat to concrete slabs for the purposes of preventing ice and snow accumulation on the top surface of the slab.
3. ~~Hot water supply piping under sinks, lavatories and similar fixtures.~~ Tubing and connectors from the termination of the outlet end of fixture supply piping to a fixture fitting or a water consuming appliance.
4. ~~Hot water distribution piping buried within blown-in or sprayed roof /ceiling insulation, such as fiberglass or cellulose, where the insulation completely and continuously surrounds the pipe.~~
4. Valves, pumps, strainers and threaded unions in piping that is 1 inch or less in nominal diameter.
5. Piping from user-controlled shower, tub/shower, and tub mixing valves to the water outlets.
6. Cold water piping utilized by a demand recirculation water system.
7. Tubing from a hot drinking-water dispensing unit to the water outlet.

607.6.1 ~~**Buried piping.**~~ **Piping insulated with tube or sheet insulation.** Service ~~hot~~ water heating system piping ~~installed within a slab or below grade~~ conveying heated water shall be insulated ~~in accordance~~ with ~~Section 607.6~~ tube or sheet insulation having a thermal conductivity of not greater than 0.29 ~~and~~ Btu per inch/h×ft^2×F[0.42 W/(m×K)]. The wall thickness of the insulation shall be ~~placed within a physically protective, waterproof channel or sleeve having internal dimensions large enough so that the piping and insulation can be removed and replaced, and maintain its dimensional integrity during and after construction.~~ not less than the diameter of the pipe that is being insulated except that a wall thickness greater than 2 inches (50.8 mm) shall not be required.

~~**Exception:** For piping other than that located under building slabs, insulation is not required where the insulation manufacturer stipulates that the pipe insulation will maintain its insulating~~

~~value in underground applications in damp soil where installed in accordance with the manufacturer's instructions.~~

607.6.2 Piping insulated with building thermal envelope insulation. Service water heating system piping conveying heated water shall be insulated with building thermal envelope insulation. The minimum insulation R-value shall be not less than that indicated in Table 607.6.2. The required insulation shall completely surround the piping.

TABLE 607.6.2
MINIMUM BUILDING THERMAL ENVELOPE R-VALUE FOR INSULATING PIPE AND TUBING[a]

NOMINAL PIPE OR TUBE SIZE (Inch)	MINIMUM INSULATION R-VALUE
≤ 3/8	R-1.6
> 3/8 ≤ 1/2	R-2.1
> 1/2 ≤ 3/4	R-3.1
> 3/4 ≤ 1	R-4.2
> 1 ≤ 1½	R-6
> 1½ ≤ 2	R-8
> 2	R-8

For SI: 1 inch = 25.4 mm

a. The minimum required thickness of R-value rated insulation to be installed shall be the R-value in this table divided by the published R-value/inch of the insulation to be used.

Reason: The language of the section is very confusing and desperately needs repair and clarification. The main intent of the *existing* section is two- fold: 1) provide reasonable insulation thicknesses for smaller diameter piping utilizing a simple "wall thickness of insulation = size of pipe" approach and 2) provide an alternate way of insulating piping using the building thermal envelope insulation that is already being installed for insulating the building. The existing language is unclear and vague resulting in confusion on what the section requires and allows. Also, the *existing* language (poorly) attempts to cover the topic of protection of piping against freezing temperatures that is not within the scope of this code (the IPC addresses protection of piping against freezing).

The proposed modifications to this section are:

The reference to Table 606.4 (under the HVAC piping insulation section) was removed because it is poor code practice to use tables from other "unrelated" sections of the code for another purpose. The table in the other section could be changed without the knowledge that another section in the code refers to that table. This can lead to future problems in the code. Rather than make a new table for this section with one row ("hot water"), the requirement is best stated in code language that is being placed in new subsection 607.6.1. Another new subsection (Section 607.6.2) is added for clarifying the requirements for the alternate way to insulate piping by "nesting" or covering the piping with the building thermal envelope insulation that is already being installed for insulating the building. Discussions of new subsections 607.6.1 and 607.6.2 are provided later in this reason statement.

The new language "The insulation requirements of this section shall supersede the insulation requirements ofthe *International Energy Conservation Code*." may, at first reading, seem to imply that the insulation requirements of this section are more stringent than what is in the IECC. This is *not* necessarily the case. But don't throw out this proposal because of this perceived "reduced stringency" because the *existing* reference to Table 606.4 *already* forces the reader to address and resolve what appears to be conflict between the insulation requirements of the IECC and this section. For example, Table C403.2.8 of the 2012 IECC indicates the insulation wall thickness for 1 inch and smaller piping (with 105F-140F fluid temperature) to be 1 inch. So, if you have a 1/2 inch pipe, the insulation wall thickness needs to be 1 inch. A 3/8 inch pipe? 1 inch insulation wall thickness. IgCC Section 607.6 requires not less than a 1:1 ratio of insulation wall thickness to pipe diameter (i.e. "wall thickness of insulation = size of pipe"). Therefore, a ½ inch nominal size pipe is required to have ½ inch wall thickness insulation. A 3/8 inch nominal size pipe is required to have 3/8 inch wall thickness insulation. But which code's insulation thickness requirements should prevail? To answer this question, the reader must keep in mind that the intent of the IgCC is to be an overlay code to the other I-codes to "reduce the negative impacts and increase the positive impacts of the built environment on the natural environment and the building occupants". This section's *existing* piping insulation requirements (as opposed to the IECC's insulation requirements) are intended to prevail because:

1) Thick insulation for small diameter piping creates difficulty in getting the insulated piping (given the piping "crossover" issues) into a typical 3 ½ inch thick wall. To accommodate the thick insulation, walls need to be deeper which means deeper framing members or " furring out" of 3 ½ inch walls. Thicker walls (=more costly framing materials) less usable building spacelarger buildings for same usable floor areaè less "green".

2) The insulation provisions of the IECC do not consider the need for hot water piping diameters that are smaller than ½ inch nominal. Small diameter hot water piping is needed to reduce the amount of time (and reduce the amount of water waste) waiting for hot water to arrive at the point of use. Piping as small as 1/4 inch nominal could be necessary to accomplish this. Tube type insulation products with 1 inch wall thickness are not currently available for nominal pipe diameters smaller than ½ inch. It just doesn't make practical sense to insulate such small pipe diameters with the same insulation thickness that also serves a ¾ inch nominal pipe. Less insulation thickness for the smaller pipe diameters is more "green" because the thicker insulation is just not necessary given the limited amount of time that these small pipes are conveying hot water. The "energy savings" of thicker insulation is negligible/insignificant as compared to the real waste of energy and water caused by poor hot water distribution system design. The bottom line is: don't use more insulating materials than the application actually warrants! The fact that there is some level of insulation on the piping as opposed to no insulation on the piping is where the real energy savings occurs. In these small pipe diameters, where the flow of hot water is often intermittent, the insulation thickness is a very small part of energy savings.

For these reasons, the intent of this section in the 2012 IgCC was always to "override" the insulation requirements of the IECC. The statement "The insulation requirements of this section shall supersede the insulation requirements of the *International Energy Conservation Code*." is necessary to make it clear that the IgCC requirements in this section are not to be "trumped" by the IECC. Note that *this is not a new requirement* but a necessary clarification of what is already intended by Section 607.6 of the 2012 IgCC.

The new language "Insulation shall be installed in accordance with the insulation manufacturer's instructions." is a simple but meaningful addition. In applications where tube-style insulation is installed, some installers try to "cheat" by not taping/sealing joints and by not covering fittings properly. This sloppy practice defeats the purpose of installing the insulation in the first place. Insulation manufacturer's installation instructions are specific about how to achieve the rated insulation value from their products. It is absolutely critical that the instructions be followed.

The new language "Piping insulation shall be continuous except where the piping passes through a framing member." answers the significant question about whether the insulation needs to be continuous through framing members. Realize that even for a small diameter pipe such as ½ inch nominal size (about 5/8 inch actual OD), the outside diameter of the required insulation for the pipe is 1 5/8 inches. This requires a 1 ¾ inch diameter hole to be bored through wood framing and the webs of light frame steel framing. This weakens the framing member and often requires "doubling" of framing members or increasing the depth (thickness) of walls so that the deeper framing members are less affected by such a large hole. This is unnecessary as the short length of uninsulated pipe within the thickness of the "web" of the framing member will have negligible/insignificant heat loss, especially if attention is paid to assuring that the adjacent insulation is "butted- up to" the face of the "web" of the framing member.

The new language "Where piping is installed in locations subject to freezing temperatures, Section 305.4 of the *International Plumbing Code* shall apply." replaces the two previous sentences in the existing section. The original author's intent was to try to address situations where the water piping was installed in an attic, crawl space or exterior wall where one "side" of the insulated piping could be exposed to freezing temperatures (outdoor temperature). The original author's language for making sure that not less than 6 inches of building thermal envelope insulation covers the pipe where it is located in an attic or crawl space; and making sure that the piping in an [exterior] wall has at least 1 inch insulation around the pipe are merely "guidelines" that might only work for some climates. For example, those requirements *might* work for buildings in Texas but not work for buildings in North Dakota. This section in the IgCC needs to be concerned *only* with efficient use of insulation to maintain water temperature within the pipe, given that the temperature on the outside of the insulation around the pipe is somewhat above freezing. Section 305.4 of the IPC addresses the issue about protection of piping from freezing and that is all that needs to be said. Protection of piping from freezing is a design decision that varies with the geographic region that the building is located in. In many large commercial buildings where outdoor freezing temperatures could occur, piping is simply not located in "unconditioned areas" of the building. In in smaller commercial buildings, builders and code officials "know" from extensive experience in each geographic region where not to locate piping and how to "protect" piping against freezing. For example, locating water piping in attics of buildings in North Dakota just isn't done. But doing so in southern Florida is an accepted practice. This IgCC section should not attempt to address the freezing temperature issue (in the way that it has) because doing so seems to imply that this will work for ALL regions. This could lead to disastrous results. It is not a subject that needs to be addressed in the IgCC. Let the plumbing code deal with the issue as it has adequately done so for many years.

A number of the exceptions were clarified and added:

Existing exception 2 does not make sense. The section is about service water heating system piping so there is no need to discuss fluids neither heated or cooled, or natural gas piping. The main section has been revised to simply say that the section is about insulating piping conveying heated water. New exception language was put in place to cover ice and snow melt piping under slab-on-grade concrete slabs (as the IECC and the IgCC consider hot water for snowmelt systems as service heating water). Obviously, piping in those applications should *not* be insulated as the purpose of the piping is to give off heat to the concrete. (Piping for radiant heating for *comfort* is *not* covered under service water heating systems.)

Exception 3 is reworded to be more specific about what exposed piping is being discussed. Basically, the tubing or connectors from the fixture back to the outlet end termination of the fixture supply pipes do not have to be insulated as it would be much too difficult to install insulation on these small connectors and tubes – the heat loss from these small diameter tubes and connectors into a conditioned space is negligible/insignificant. Why complicate final plumbing connections and future fixture service work by requiring insulation that has no real benefit?

The purpose of existing exception 4 is to not require service water heating system piping to be insulated with pipe insulation where there is going to be building thermal envelope insulation installed where the pipe is located. The existing language of exception 4 is extremely vague about what constitutes 'buried'. Does that mean one inch or 6 inches of insulation around the piping? The phrase "hot water distribution" might lead a reader to believe that only *hot water* piping (IPC-defined as equal to, or greater than 110F) is permitted to use the "buried in blown-in or sprayed roof/ceiling fiberglass or cellulose insulation method". Note that first sentence of Section 607.6 was revised to clarify that the piping is conveying *heated water* because if water is heated, then energy can be lost from the piping on its way to the point of use. While the energy lost from heated water of a low temperature is minimal, the point is that *the desired water temperature might not ever reach the point of use if the piping was not insulated*. Because of the vagueness of existing exception 4, the exception was eliminated and those concepts put into new sections 607.2.1 and 607.2.2 (which will be discussed later in this reason statement).

New exception 4 provides relief from insulating "bulky" components in smaller diameter (1 inch or less) piping. The heat loss from these items is negligible/insignificant and it is not worth the time spent trying to insulate such components. This is simply a matter of practicality. Is it really necessary to insulate a shower mixing valve given the complexity of doing so compared to the limited amount of time that the mixing valve actually conveys heated water?

New exception 5 provides relief from insulating piping from the user-controlled valves indicated. Although a simple shower riser might not be too difficult to insulate, other piping for multiple shower heads, spray ports, transfer valves, etc. can be complex and the area that they are located in, congested. It just isn't worth the time and effort for this small amount of small diameter piping.

New exception 6 is simple to understand if one understands the type of demand recirculation system that uses a cold water pipe (near or at a fixture) for the return of heated water in a cold water pipe back to the water heater. The water pumped into a cold water line is really never "hot" (it's barely luke warm) and the only purpose for moving the "hot" water into the cold water line is to provide a return path back to the water heater. The barely luke warm water being returned serves no other purpose. There is no need to insulate cold water lines used for such purpose. It is actually better that the cold water pipe gives off some heat so that the cold water flow to the fixture is barely warm for only a second or two, depending on the fixture flow rate.

New exception 7 clarifies that tubing from under counter "insta-hot" units (used for making instant coffee and package soup mixes) do not need insulated. The tubing is so small and short that any heat lost is negligible/insignificant as compared to the heat loss from the unit itself.

New Section 607.6.1 is *not* adding a new set of requirements to the code. This new section simply puts into text, what the existing section's reference to Table 606.4 was trying to accomplish. The use of text instead of a table for these requirements is cleaner and straight forward. Section 607.6.1 provides the insulation requirements for where tube-type and sheet insulation is installed on piping (sheet product being used for large pipe diameters). The material is the familiar closed-cell-expanded-foam tube and sheet, and fiberglass insulation tube and sheet, that are commonly available to the plumbing/insulation trades. The thermal conductivity value of 0.29 Btu per inch/h●ft^2●F covers the largest value of those two materials at the maximum temperature that would be used for service hot water. Again, the 1:1 insulation- wall-thickness-to-nominal-pipe-diameter concept is *not* new – this is exactly what the existing section language required.

New Section 607.6.2 provides the insulation requirements for where building thermal envelope insulation (such as fiberglass batts, blown-in fiberglass, sprayed-in cellulose, sprayed (expanding) foams, polystyrene board or any one of a number of insulating products) is used for insulating buildings. Although this section is new, the concept was what was intended in the existing language of Section 607.6 of the 2012 IgCC. But the existing language did not make clear what was really intended. This new section adds to the existing concept by providing prescriptive language that can be easily understood given the variety of applications that will be encountered in the built environment.

The required R-values in Table 607.6.2 reflect the same insulating effect achieved as if the piping was insulated in accordance with minimum requirements of Section 607.6.1. These R-values come from the published data of one manufacturer of closed-cell-expanded-foam sheet material….the same material and density that is used to make the familiar closed-cell-expanded-foam tube [ref: Armacell technical bulletin #004]. This R-value information provides some basis for determining an equivalency between a pipe insulated with tube-type pipe insulation and a pipe that is insulated by the virtue of being "buried" in building thermal envelope insulation that is already required for the building. It really isn't important that complex mathematics and analysis are used to *exactly* determine this equivalency because in practice, the piping will be covered with far more insulation than is needed in most of the circumstances. All Table 607.6.2 does is establish a "minimum cover" dimension. Because building thermal envelope insulation is available in many forms, each having different R-values for a given thickness, Table 607.6.2 provides the minimum R-value so that along with table footnote a, the required minimum thickness can be determined for the type of building thermal envelope insulation to be installed.

For example, a 3/8 inch pipe is in a 3 ½ inch deep wall that will require R-13 insulation. Fiberglass batt insulation is chosen that is rated for R-13 for a 3 ½ inch installation depth. The R-value *rating* per inch of this product would be 13/3.5=3.7 per inch. The minimum R-value in Table 607.6.2 for 3/8 inch nominal size pipe is R-1.6. Using footnote a, the minimum thickness (cover) of this fiberglass insulation on the pipe must be not less than 1.6/3.7 = 0.43 inch. The plumbing installer then knows he has to locate the 3/8 inch pipe no closer to than 0.43 inch to either face of the wall. The installer will most likely round this number up to, say, ½", and install the piping in the wall cavity accordingly to accommodate the insulators work of "nesting" the piping into the insulation as the fiberglass batts are installed. There is no extra work for the insulators as they have to place insulation around piping and other items anyhow. And the piping doesn't require a layer of tube-type insulation before building thermal envelope insulation is installed (which eliminates redundancy of insulation materials).

As stated previously, in the majority of circumstances when using the method of Section 607.6.2, the piping will, overall, be covered with far more insulation than what Table 607.6.2 requires. Even though the insulation thickness from the outside of the pipe to the face of the wall might only be ½ inch, in a direction perpendicular to that, there will be many inches of insulation against the pipe. Table 607.6.2 is not really intended to be used for trying to create a "tube-type pipe insulation effect" using building thermal envelope insulation. For instance, someone cutting a strip of fiberglass insulation and wrapping it around a pipe to serve as the required pipe insulation. This practice would not benefit from the added insulating value from greater insulation thickness that would be present in a "nested into the cavity insulation" situation. The entire premise of developing the R-value equivalency using an approximation (and not rigid computational methods) depends on a greater thicknesses of insulation being present around most of the circumference of the piping. As such, it is not necessary to insulate over or through support clamps.

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Cost Impact: Will not increase the cost of construction

Providing for alternate methods and more efficient methods for insulating piping will, cost less than the methods that are required by the IECC.

GEW103-14: 607.6-THOMPSON442

GEW104-14
607.6.1

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

607.6.1 ~~Buried~~ Underground and below slab piping. ~~Service hot water~~ Insulated piping that is located under a concrete slab-on-grade floor or that is buried underground shall be installed in a waterproof conduit. The ends of the conduit shall terminate above the floor or above grade. ~~piping installed within a slab or below grade shall be insulated in accordance with Section 607.6 and shall be placed within a physically protective, waterproof channel or sleeve having internal dimensions large enough so that the piping and insulation can be removed and replaced, and maintain its dimensional integrity during and after construction.~~

> **Exception:** For underground insulated piping not ~~other than that~~ located under building slabs, ~~insulation~~ a waterproof conduit is not required for the piping where the insulation manufacturer ~~stipulates~~ indicates that the ~~pipe~~ piping insulation will retain ~~maintain it's~~ the design insulating value in underground damp soil applications ~~in damp soil~~ and where the insulated piping is installed in accordance with the insulation manufacturer's instructions.

Reason: The requirement for having insulated piping *removable* from the waterproof conduit does not save energy and is not a 'green' practice. It only serves to make the installation of the piping more expensive. The building industry has been burying millions of feet of service water heating system piping and none of it is removable because it doesn't need to be. If the type of piping is chosen correctly for the application and the design parameters for use of the piping are followed, the piping installation is a permanent installation. Yes, there might be some extremely isolated cases where piping might require repair or replacement but potential for that happening is the same for piping located anywhere in a building (above or below ground) whether the piping is hot or cold. The removability requirement is not feasible for large sizes or rigid types of piping. It is clear that the author of this section was only thinking about small diameter flexible tubing in a single family home application. The removability requirement is just not feasible for the vast majority of applications.

The exception was reworked because the wording didn't make sense: "insulation is not required where the insulation manufacturer…" . A few words were changed/added to make the exception read with more clarity.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW104-14: 607.6.1 #1-THOMPSON415

GEW105-14
607.6.1

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com)

Revise as follows:

607.6.1 Buried piping. Service hot water piping installed within a slab or below grade shall be insulated in accordance with Section ~~607.6~~ C404.5 of the *International Energy Conservation Code* and shall be placed within a physically protective, waterproof channel or sleeve having internal dimensions large enough so that the piping and insulation can be removed and replaced, and maintain its dimensional integrity during and after construction.

> **Exception:** For piping other than that located under building slabs, insulation is not required where the insulation manufacturer stipulates that the pipe insulation will maintain its insulating value in underground applications in damp soil where installed in accordance with the manufacturer's instructions.

Reason: The purpose of this proposal is to correlate the language with provisions that were approved for the 2015 IECC-CE.

Cost Impact: Will not increase the cost of construction These provisions were already in the 2012 IgCC.

Analysis: The International Energy Conservation Code section C404.5 referenced in the text of this proposal are section numbers for the 2012 Edition. Because of significant changes approved for the 2015 IECC, the section number for the 2015 Editions will be C404.4.

GEW105-14: 607.6.1 #1-KLEIN966

GEW106-14
607.6.1

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com)

Revise as follows:

607.6.1 Buried piping. ~~Service hot~~ Heated water piping installed within or under a slab or buried below grade shall be insulated in accordance with Section ~~607.6~~ C404.5 of the *International Energy Conservation Code* and shall be placed within a physically protective, waterproof channel or sleeve having internal dimensions large enough so that the piping and insulation can be removed and replaced, and maintain its dimensional integrity during and after construction.

> **Exception:** For piping other than that located within or under building slabs, ~~insulation~~ a physically protective, waterproof channel or sleeve is not required where the insulation manufacturer stipulates that the pipe insulation will maintain its insulating value in underground applications in damp soil where installed in accordance with the manufacturer's instructions.

Reason: The primary purpose of this proposal is to correlate the language with provisions that were approved for the 2015 IECC-CE. In addition, the language in the exemption has been corrected. Heated water piping still needs to be insulated; in some cases protective sleeving will not be required.

Cost Impact: Will not increase the cost of construction. These provisions were already in the 2012 IgCC.

Analysis: The International Energy Conservation Code section C404.5 referenced in the text of this proposal are section numbers for the 2012 Edition. Because significant changes were approved for the 2015 IECC, the section number for the 2015 Edition will be C404.4.

GEW106-14: 607.6.1 #2-KLEIN1181

GEW107-14
607.6.1

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

607.6.1 Buried piping. Service hot water heating piping installed within a slab or below grade shall be insulated in accordance with Section 607.6 and shall be placed within a physically protective, waterproof channel or sleeve having internal dimensions large enough so that the piping and insulation can be removed and replaced, and maintain its dimensional integrity during and after construction.

> **Exception:** ~~For piping other than that located under building slabs, insulation~~ A waterproof conduit shall not be ~~is not~~ required where the insulation manufacturer stipulates that the pipe insulation will maintain its insulating value in underground applications in damp soil and ~~where~~ the insulation is installed in accordance with the manufacturer's instructions.

Reason: Another SEHPCAC proposal for this section addresses the issue of removability of insulated piping from the waterproof conduit. This proposal addresses the exception that allows omission of the waterproof conduit for insulated piping.

The exception only covers underground piping that is not located under [concrete] slabs. Logically, piping that is under slabs is much more " protected" from moisture (rainwater, snowmelt) so the exception should apply to any insulated piping regardless of whether it is between buildings (subject to rainwater and snowmelt) or under a building (below a slab).

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW107-14: 607.6.1 #2-THOMPSON418

GEW108-14
607.7

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com)

Delete without substitution:

~~**607.7 Circulating hot water systems.** Controls that allow continuous, timer, or water temperature-initiated (aquastat) operation of a circulating pump are prohibited. Gravity or thermosyphon circulation loops are prohibited. Pumps on circulating hot water systems shall be activated on demand by either a hard-wired or wireless activation control of one of the following types:~~

1. ~~A normally open, momentary contact switch.~~
2. ~~Motion sensors that make momentary contact when motion is sensed. After the signal is sent, the sensor shall go into a lock out mode for not less than 5 minutes to prevent sending a signal to the electronic controls while the circulation loop is still hot.~~
3. ~~A flow switch.~~
4. ~~A door switch.~~

~~The controls for the pump shall be electronic and operate on the principal of shutting off the pump with a rise in temperature. Electronic controls shall have a lock-out to prevent operation at temperatures greater than 105°F (41°C) in the event of failure of the device that senses temperature rise. The electronic controls shall have a lock out mode for not more than 5 minutes that prevents extended operation of the pump if the sensor fails or is damaged.~~

Reason: I am proposing to delete this section because its provisions are now included in the 2015 IECC and the 2015 IPC. Proposal CE-279 Part 1 was approved at the Final Comment Hearing in 2013. A coordinating section was approved for inclusion in the IPC. Since the IgCC is an overlay code, there is no longer a need for this section.
I urge you to support this proposal. Thank you.

Cost Impact: Will not increase the cost of construction.

The discussion regarding the impact on the cost of construction was heard during the IECC hearings.

From CE-279's reason statement (covering both circulation and heat trace systems): The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Deleting this section will not increase the cost of construction.

GEW108-14: 607.7-KLEIN819

GEW109-14
607.7

Proponent: Greg Towsley, Grundfos, representing Grundfos (gtowsley@grundfos.com)

Revise as follows:

607.7 Circulating hot water systems. ~~Controls that allow continuous, timer, or water temperature-initiated (aquastat) operation of a circulating pump are prohibited. Gravity or thermosyphon circulation loops are prohibited. Pumps on circulating hot water systems shall be activated on demand by either a hard-wired or wireless activation control of one of the following types:~~

1. ~~A normally open, momentary contact switch.~~
2. ~~Motion sensors that make momentary contact when motion is sensed. After the signal is sent, the sensor shall go into a lock out mode for not less than 5 minutes to prevent sending a signal to the electronic controls while the circulation loop is still hot.~~
3. ~~A flow switch.~~
4. ~~A door switch.~~

~~The controls for the pump shall be electronic and operate on the principal of shutting off the pump with a rise in temperature. Electronic controls shall have a lock-out to prevent operation at temperatures greater than 105°F (41°C) in the event of failure of the device that senses temperature rise. The electronic controls shall have a lock out mode for not more than 5 minutes that prevents extended operation of the pump if the sensor fails or is damaged.~~

<u>Controls for circulating hot water system pumps shall comply with the requirements of the *International Energy Conservation Code*</u>.

Reason: The International Energy Conservation Code (IECC) was revised in Atlantic City, NJ in October 2013 to include code language that is equal or similar to the above but less prescriptive, allowing for newer technology to control the pumps upon demand for hot water. No new or additional wording is required beyond the language of the IECC.

Cost Impact: Will not increase the cost of construction. No cost impact as the language of the IECC is equal to or similar to that which is being deleted.

GEW109-14: 607.7-TOWSLEY563

GEW110-14
607.7

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee

Revise as follows:

607.7 Circulating ~~hot~~ heated water systems for service water heating systems. This section shall apply only to systems that circulate heated water from service water heating equipment to plumbing fixtures. Circulation shall be by one or more pumps. Gravity or thermosyphon circulation systems ~~loops are~~ shall be prohibited. ~~Controls that allow~~ Continuous, timer, or water temperature-initiated ~~(aquastat)~~ circulating pump operation of ~~a circulating are~~ shall be prohibited. The pumps ~~on circulating water systems hot water systems~~ shall be activated on demand by either a hard-wired or wireless activation control of one of the following types:

1. A normally open, momentary contact switch.

2. Motion sensors that make momentary contact when motion is sensed. After the signal is sent, the sensor shall go into a lock out mode for not less than 5 minutes to prevent sending a signal to the electronic controls while the circulation loop is still hot.

3. A flow switch.

4. A door switch.

The controls for the pump shall be electronic and shall operate on the principal of shutting off the pump with a rise in temperature. Electronic controls shall have a lock-out to prevent operation at water temperatures greater than 105°F (41°C) in the event of failure of the device that senses temperature rise. The electronic controls shall have a lock out mode for not more than 5 minutes that prevents extended operation of the pump if the sensor fails or is damaged.

Reason: The existing section fails to address which circulating pumps that the requirements relate to. This section is not intended to cover circulating pumps for hot water systems for comfort heating or for snowmelt systems but the language isn't specific. The use of the term "are" is not appropriate because the sentence with "are" is just a statement. Changing "are" to "shall" makes the sentence a mandatory command. Aquastat is a registered trademark of Honeywell. Trademarked names and words in parenthesis must not be used in code text. The section is reworded to be clear.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction.

GEW110-14: 607.7-THOMPSON419

GEW111-14
607.7

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org)

Revise as follows:

607.7 Circulating hot water systems. Controls that allow continuous, timer, or water temperature-initiated (aquastat) operation of a circulating pump are prohibited. Gravity or thermosyphon circulation loops are prohibited. Pumps on circulating hot water systems shall be activated on demand by either a hard-wired or wireless activation control of one of the following types:

1. A normally open, momentary contact switch.
2. Motion sensors that make momentary contact when motion is sensed. After the signal is sent, the sensor shall go into a lock out mode for not less than 5 minutes to prevent sending a signal to the electronic controls while the circulation loop is still hot.
3. A flow switch.
4. A door switch.

The controls for the pump shall be electronic and operate on the principal of shutting off the pump with a rise in temperature. Electronic controls shall have a lock-out to prevent operation at temperatures greater than 105°F (41°C) in the event of failure of the device that senses temperature rise. The electronic controls shall have a lock out mode for not more than 5 minutes that prevents extended operation of the pump if the sensor fails or is damaged.

Exception: Group I-2 Condition 2 and ambulatory care facilities shall not be required to comply with this section.

Reason: The "Guidelines for Design and Construction of Health Care Facilities" from the Facility Guidelines Institute (FGI) require a continuous circulating hotwater system in hospitals and ambulatory care facilities. This document is adopted by most states and used as licensing requirements for these facility types. It is also used by third-party healthcare accreditation companies, such as the Joint Commission. Restricting it here would be a potential rules conflict when states adopt both IgCC and FGI. Additionally, maintaining hot and cold water temperatures within prescribed ranges throughout a hospital water system has been shown to reduce the proliferation of Legionella. Cold water should be distributed and delivered at temperatures below 77°F (25°C). If cold water temperatures exceed 77°F (25°C) in any part of the system, the potential for proliferation of Legionella increases significantly. Hot water should be consistently above 130°F (55°C) throughout heating and storage vessels. If temperatures cannot be maintained and documented to be consistently at or above 130°F(55°C) —e.g., due to stratification—then hot water should be stored at or above 140°F (60° C). However, storage at 140°F (60°C) does not guarantee Legionella control in tanks, especially if there are significant issues with stratification or residence time. Not allowing a circulating hot water system will reduce the ability to control the water temperature exposing the at risk population within hospitals to life threating bacteria.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction.

GEW111-14: 607.7-PAARLBERG647

GEW112-14
608

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com); Craig Conner (craig.conner@mac.com)

Delete without substitution:

~~SECTION 608 BUILDING ELECTRICAL POWER AND LIGHTING SYSTEMS~~

Reason: Most of the provisions are already in the IECC.

Cost Impact: Will not increase the cost of construction. The proposal removes provisions.

GEW112-14: 608-KLEIN1212

GEW113-14
608.1, 608.1.1, 608.1.2, 608.1.3

Proponent: Glenn Heinmiller, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

608.1 General. Where buildings are designed using the prescriptive-based compliance path in accordance with Section 601.3.2, building electrical power and lighting systems shall comply with the provisions of the *International Energy Conservation Code* and the provisions of Section 608. *Occupant sensor controls*, *time switch controls*, and *daylight responsive controls* required by this section shall comply with Section C405.2 of the International *Energy Conservation Code*. *Daylight zones* shall be determined in accordance with Section C405.2 of the *International Energy Conservation Code*.

~~**608.1.1 Occupant sensor controls.** Occupant sensor controls shall comply with Section C405.2 of the *International Energy Conservation Code*.~~

~~**608.1.2 Time switch controls.** Time switch controls shall comply with Section C405.2 of the *International Energy Conservation Code*.~~

~~**608.1.3 Automatic daylight controls.** Automatic *daylight controls* shall comply with Section C405.2 of the *International Energy Conservation Code*.~~

Reason: There is no need to have three different subsections when these requirements can be written into one sentence.
Now that the daylighting provisions in the IECC have been updated by CE294 there is no need to retain a separate set of definitions for daylight zones / daylit areas and automatic daylight controls / daylight responsive controls in the IgCC.

Cost Impact: Will not increase the cost of construction.

GEW113-14: 608.1-HEINMILLER613

GEW114-14
608.2, 608.2.1

Proponent: Glenn Heinmiller, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

608.2 Sleeping unit controls. Sleeping units in Group R-1 and R-2 occupancies shall have a master control device that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants have left the room~~. an automatic control system or device that shuts off permanently wired luminaires and switched receptacles, except those in bathrooms, within 30 minutes of the unit being vacated~~.

> **Exception:** ~~Sleeping unit controls are not required in sleeping units where permanently wired luminaires and switched receptacles, except those in bathrooms, are connected to a~~ Luminaires and switched receptacles controlled by captive key controls.

608.2.1 Sleeping unit bathroom controls. Permanently wired luminaires located in bathrooms within sleeping units in Group R-1 and R-2 occupancies shall be equipped with occupant ~~sensors~~ sensor controls that require manual intervention to energize circuits.

> **Exception:** ~~Not more than 5 watts of lighting in each bathroom shall be permitted to be connected to the captive key control at the main room entry instead of being connected to the occupant sensor control.~~ Five watts or less of lighting capacity in each bathroom shall not be required to be controlled by the occupant sensor control where such lighting is connected to the master control device for the sleeping unit.

Reason: This proposal incorporates language from CE299 AM so that IgCC 2015 will not conflict with IECC 2015 requirements for "hotel and motel sleeping units and guest suites".

Section 608.2 is still necessary because it is more expansive than the IECC requirements, since it is applicable to all sleeping units in R-1 and R-2 occupancies, not just "hotel and motel sleeping units and guest suites". Furthermore, the IgCC requires that bathrooms within these sleeping units incorporate occupant sensors, which is not a requirement in the IECC.

Cost Impact: Will not increase the cost of construction.

GEW114-14: 608.2-HEINMILLER614

GEW115-14
608.3

Proponent: Glenn Heinmiller, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

608.3 Interior light reduction controls. Occupant sensor controls shall be provided to automatically reduce connected lighting power by not less than 45 percent during periods when occupants are not present in the following locations:

1. Corridors and enclosed stairwells.
2. ~~Storage and stack areas not open to the public; and~~
3. Parking garages.

Exception: Automatic power reduction is not required for the following:

1. Where occupant sensor controls are overridden by time switch controls that keep lights on continuously during peak occupancy periods.
2. Means of egress lighting required by the *International Building Code* or the *International Fire Code*.

Reason: Storage areas are already required to have occupant sensor control by the IECC.

Cost Impact: Will not increase the cost of construction.

GEW115-14: 608.3-HEINMILLER672

GEW116-14
202, 608.5

Proponent: Glenn Heinmiller, representing International Association of Lighting Designers (glenn@lampartners.com); Jim Edelson, New Buildings Institute, representing New Buildings Institute

Revise definitions as follows:

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

DAYLIGHT ZONE. That portion of a building's interior floor area that is ~~regularly~~ illuminated by natural light.

Revise as follows:

608.5 ~~Automatic~~ Daylight responsive controls. ~~Automatic daylight controls shall be provided in daylit areas complying with Section 808.3.1 or Section 808.3.2 to control the lights serving those areas. General lighting in a sidelighting daylit area that is within one window head height shall be separately controlled by automatic daylight controls.~~

> ~~**Exception:** Automatic daylight controls are not required for the following spaces and equipment:~~
>
> 1. ~~Toplighting daylit areas where the skylight is located in a portion of the roof that is shaded during the peak sun angle on the summer solstice by permanent features of the building or by permanent features of adjacent buildings.~~
> 2. ~~Sidelighting daylit areas where the fenestration is located in an obstructed exterior wall that does not face a public way or a yard or court complying with Section 1206 of the International Building Code or where the distance to any buildings, structures, or geological formations in front of the wall is less than two times the height of the buildings, structures, or geological formations.~~
> 3. ~~Daylit areas served by less than 90 watts of lighting.~~
> 4. ~~Spaces where medical care is directly provided.~~
> 5. ~~Spaces within dwelling units or sleeping units.~~
> 6. ~~Lighting required to comply with Section C405.2.3 of the *International Energy Conservation Code.*~~

Daylight responsive controls shall be provided to control the electric lights within daylight zones in the following spaces:

1. Spaces having a total of more than 90 watts of general lighting within sidelight daylight zones. General lighting does not include lighting that is required to have specific application control in accordance with Section C405.2 of the *International Energy Conservation Code.*
2. Spaces having a total of more than 90 watts of general lighting within toplight daylight zones.

> **Exceptions:** Daylight responsive controls are not required for the following:
>
> 1. Spaces in health care facilities where patient care is directly provided.
> 2. Dwelling units and sleeping units.
> 3. Lighting that is required to have specific application control in accordance with Section C405.2 of the *International Energy Conservation Code*.
> 4. Sidelight daylight zones on the first floor above grade in Group A-2 and Group M occupancies.

Reason: The 2012 IgCC included a mandatory requirement for automatic control of electric lights in spaces that received sufficient daylight so that electric lights could be regularly turned off. There was no similar requirement in the 2012 IECC. However, with the approval of CE294 AMPC1/3, the 2015 IECC will now have a similar requirement.

This proposal conforms the language of the IgCC to CE294 AMPC1/3 so that a separate determination of daylight-related controls requirements is not necessary under the IgCC. It also sets the bar higher in the IgCC from an efficiency standpoint by requiring that daylight responsive controls be provided in daylight zones with at least 90 watts of lighting, compared to 150 watts in the IECC.

Defintions are reivsed to match IECC-2015.

Cost Impact: Will not increase the cost of construction.

GEW116-14: 608.5-HEINMILLER616

GEW117-14
608.6

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

608.6 Plug load controls. Receptacles and electrical outlets in the following spaces shall be controlled by an occupant sensor or time switch as follows:

1. In ~~Group B~~ office spaces without furniture systems incorporating wired receptacles, not less than one controlled receptacle shall be provided for each 50 square feet (4.65 m2).

2. In ~~Group B~~ office spaces with furniture systems incorporating wired receptacles, not less than one controlled circuit shall be provided at each electrical outlet used for powering furniture systems.

3. In classrooms in Group B and Group E occupancies, not less than four controlled receptacles shall be provided in each classroom.

4. In copy rooms, print shops, and computer labs, not less than one controlled receptacle shall be provided for each data jack.

5. In spaces with an overhead cabinet above a counter or work surface, not less than one controlled receptacle shall be provided for each work surface.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Office spaces according to the IBC are Group B occupancies even when they are an accessory use of a building. According to Section 508 of the IBC, accessory uses are classified according to their use. Therefore the management offices at a school, retail store, factory or theater will be classified as Group B. Therefore stating Group B office space is redundant. In comparison, classrooms mentioned in item 3 can be Group B, Group E or Group A. Currently the code doesn't regulate the receptacles in a Group A classroom and therefore having Group B and Group E in item 3 is not redundant information and should remain.

Cost Impact: Will not increase the cost of construction. The change is editorial and will not affect where the regulation is applied.

GEW117-14: 608.6-THOMPSON571

GEW118-14
608.7

Proponent: Glenn Heinmiller, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

608.7 Fuel gas lighting systems. Fixtures that generate illumination by combustion of fuel gas shall be included in lighting power calculations required under ~~Sections C405.5 and C405.6~~ Section C405 of the *International Energy Conservation Code* by converting the maximum rated Btu/h of the luminaire into watts using Equation 6-5.

Wattage Equivalent = Maximum btu/h rating of the fuel gas lighting system divided by 3.413.

Equation 6-5

> ~~**Exception:** Fuel gas lighting at historic buildings in accordance with Section C101.4.2 of the *International Energy Conservation Code* is not included in the calculation.~~

Reason: The Section reference is made less specific.

The exception is no longer necessary. CE7 AMPC states that if "a report has been submitted to the code official and signed by 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," then that portion of the building system would not be required to comply with efficiency provisions of the IECC. So if fuel gas lighting systems are necessary to maintain the historic form, fabric, or function of a historic building, then they would already be exempt, and if they are not necessary to maintain the historic form, fabric, or function then they will not and should not be exempt.

Cost Impact: Will not increase the cost of construction.

GEW118-14: 608.7-HEINMILLER673

GEW119-14
608.7

Proponent: Neil Leslie, representing self (neil.leslie@gastechnology.org)

Delete without substitution:

~~**608.7 Fuel gas lighting systems.** Fixtures that generate illumination by combustion of fuel gas shall be included in lighting power calculations required under Sections C405.5 and C405.6 of the *International Energy Conservation Code* by converting the maximum rated Btu/h of the luminaire into watts using Equation 6-5.~~

~~Wattage Equivalent = Maximum btu/h rating of the fuel gas lighting system/3.413. **Equation 6-5**~~

> ~~**Exception:** Fuel gas lighting at historic buildings in accordance with Section C101.4.2 of the *International Energy Conservation Code* is not included in the calculation.~~

Reason: Gas lights are classified as decorative appliances by the manufacturers. They are installed to provide ambiance, similar to fireplaces, and are not designed or intended to provide lighting to the space. As such they are a process load and should not be included in the lighting allowance calculation.

Cost Impact: Will not increase the cost of construction.

GEW119-14: 608.7-LESLIE986

GEW120-14
608.7

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

608.7 Fuel gas <u>and liquid fuel</u> lighting systems. Fixtures that generate illumination by combustion of fuel gas <u>or liquid fuel</u> shall be included in lighting power calculations required under Sections C405.5 and C405.6 of the *International Energy Conservation Code* by converting the maximum rated Btu/h of the luminaire into watts using Equation 6-5.

Wattage Equivalent = Maximum btu/h rating of the fuel gas <u>or liquid fuel</u> lighting system/3.413.

Equation 6-5

> **Exception:** Fuel gas <u>or liquid fuel</u> lighting at historic buildings in accordance with Section C101.4.2 of the *International Energy Conservation Code* is not included in the calculation.

Reason: The proposed changes will ensure that all of the energy used by any interior or exterior lighting fixtures, regardless of the type of energy used to create the light, will be accounted for in the lighting power calculations. This change closes a potential loophole where the energy used by any light fixture using a liquid fuel (such as kerosene) would not be accounted for.

This change will ensure that green buildings account for all of the energy being used by all lighting fixtures used in the building or on the building site.

Cost Impact: Will not increase the cost of construction.

Analysis: The International Energy Conservation Code sections C405.5 and C405.6 referenced in the text of this proposal are numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section numbers for the 2015 Edition will be C405.4 and C405.5, respectively.

GEW120-14: 608.7-ROSENSTOCK504

GEW121-14

202, 608.8, 608.8.1, 608.8.1.1, Table 608.8.1.1(1), Table 608.8.1.1(2), Table 608.8.1.1(2), 608.8.1.2, 608.8.1.3, 608.8.2

Proponent: Jack Bailey, One Lux Studio, representing self (jbailey@oneluxstudio.com)

Delete definition without substitution:

~~**LOW VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMER.** A NEMA 'Class 1' transformer that is air-cooled, does not use oil as a coolant, has an input voltage ≤ 600 volts, and is rated for operation at a frequency of 60 hertz.~~

Revise as follows:

608.8 Electrical system efficiency. Electrical systems shall comply with Sections 608.8.1 and 608.8.2.

608.8.1 ~~Prescriptive compliance~~ Voltage drop in feeders. ~~Prescriptive compliance for electrical systems shall be in accordance with Sections 608.8.1.1 through 608.8.1.3.~~ The voltage drop in feeder conductors shall not exceed 1.5 percent at design load.

~~**608.8.1.1 Transformer efficiency.** Distribution transformers installed on the load side of the service disconnecting means shall comply with the provisions of Tables 608.8.1.1(1), 608.8.1.1(2) and 608.8.1.1(3), and the Energy Policy Act of 2005 as applicable.~~

> ~~**Exception:** The following transformers are exempt from the efficiency standards of Section 608.8.1.1:~~
>
> 1. ~~Transformers not covered by the Energy Policy Act of 2005.~~
> 2. ~~Transformers for special purpose applications, and not used in general purpose applications.~~
> 3. ~~Transformers with multiple voltage taps where the highest tap is not less than 20 percent more than the lowest tap.~~
> 4. ~~Drive transformers, rectifier transformers, auto-transformers, uninterruptible power supply transformers, impedance transformers, regulating transformers, sealed and nonventilating transformers, machine tool transformers, welding transformers, grounding transformers, and testing transformers.~~

~~**TABLE 608.8.1.1(1)**~~
~~**LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS**~~
~~**(Maximum 600 Volt Primary)**~~[a]

~~SINGLE PHASE~~		~~THREE PHASE~~	
~~kVA Rating~~	~~Minimum Efficiency (%)~~	~~kVA Rating~~	~~Minimum Efficiency (%)~~
~~15~~	~~97.7~~	~~15~~	~~97.0~~
~~25~~	~~98.0~~	~~30~~	~~97.5~~
~~37.5~~	~~98.2~~	~~45~~	~~97.7~~
~~50~~	~~98.3~~	~~75~~	~~98.0~~
~~75~~	~~98.5~~	~~112.5~~	~~98.2~~
~~100~~	~~98.6~~	~~150~~	~~98.3~~

~~SINGLE PHASE~~		~~THREE PHASE~~	
~~167~~	~~98.7~~	~~225~~	~~98.5~~
~~250~~	~~98.8~~	~~300~~	~~98.6~~
~~333~~	~~98.9~~	~~500~~	~~98.7~~
~~—~~	~~—~~	~~750~~	~~98.8~~
~~—~~	~~—~~	~~1000~~	~~98.9~~

~~a. All efficiency values for low-voltage transformers are at 35 percent of nameplate-rated load, determined in accordance with the DOE test procedure. 10 CFR Part 431, Sub-part K, Appendix A.~~

~~TABLE 608.8.1.1(2)~~
~~MEDIUM-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS~~
~~(Maximum 34,500 Volt Primary, Maximum 600 Volt Secondary)~~[a]

~~SINGLE PHASE~~				~~THREE PHASE~~			
~~kVA Rating~~	~~20-45 kV BIL Minimum Efficiency (%)~~	~~46-95 kV BIL Minimum Efficiency (%)~~	~~>96 kV BIL Minimum Efficiency (%)~~	~~kVA Rating~~	~~20-45 kV BIL Minimum Efficiency (%)~~	~~46-95 kV BIL Minimum Efficiency (%)~~	~~>96 kV BIL Minimum Efficiency (%)~~
~~15~~	~~98.10~~	~~97.86~~	~~—~~	~~15~~	~~97.50~~	~~97.18~~	~~—~~
~~25~~	~~98.33~~	~~98.12~~	~~—~~	~~30~~	~~97.90~~	~~97.63~~	~~—~~
~~37.5~~	~~98.49~~	~~98.30~~	~~—~~	~~45~~	~~98.10~~	~~97.86~~	~~—~~
~~50~~	~~98.60~~	~~98.42~~	~~—~~	~~75~~	~~98.33~~	~~98.12~~	~~—~~
~~75~~	~~98.73~~	~~98.57~~	~~98.53~~	~~112.5~~	~~98.49~~	~~98.30~~	~~—~~
~~100~~	~~98.82~~	~~98.67~~	~~98.63~~	~~150~~	~~98.60~~	~~98.42~~	~~—~~
~~167~~	~~98.96~~	~~98.83~~	~~98.80~~	~~225~~	~~98.73~~	~~98.57~~	~~98.53~~
~~250~~	~~99.07~~	~~98.95~~	~~98.91~~	~~300~~	~~98.82~~	~~98.67~~	~~98.63~~
~~333~~	~~99.14~~	~~99.03~~	~~98.99~~	~~500~~	~~98.96~~	~~98.83~~	~~98.80~~
~~500~~	~~99.22~~	~~99.12~~	~~99.09~~	~~750~~	~~99.07~~	~~98.95~~	~~98.91~~
~~667~~	~~99.27~~	~~99.18~~	~~99.15~~	~~1000~~	~~99.14~~	~~99.03~~	~~98.99~~
~~833~~	~~99.31~~	~~99.23~~	~~99.20~~	~~1500~~	~~99.22~~	~~99.12~~	~~99.09~~
~~—~~	~~—~~	~~—~~	~~—~~	~~2000~~	~~99.27~~	~~99.18~~	~~99.15~~
~~—~~	~~—~~	~~—~~	~~—~~	~~2500~~	~~99.31~~	~~99.23~~	~~99.20~~

~~BIL = Basic impulse insulation level.~~

~~a. All efficiency values for medium-voltage transformers are at 50 percent of nameplate-rated load, determined in accordance with the DOE test procedure. 10 CFR Part 431, Sub-part K, Appendix A.~~

~~**TABLE 608.8.1.1(3)**~~
~~**MEDIUM-VOLTAGE LIQUID-IMMERSED**~~
~~**DISTRIBUTION TRANSFORMERS**~~
~~**(Maximum 34,500 Volt Primary, Maximum 600 Volt Secondary)**~~[a]

~~SINGLE PHASE~~		~~THREE PHASE~~	
~~kVA Rating~~	~~Minimum Efficiency (%)~~	~~kVA Rating~~	~~Minimum Efficiency (%)~~
~~10~~	~~98.62~~	~~15~~	~~98.36~~
~~15~~	~~98.76~~	~~30~~	~~98.62~~
~~25~~	~~98.91~~	~~45~~	~~98.76~~
~~37.5~~	~~99.01~~	~~75~~	~~98.91~~
~~50~~	~~99.08~~	~~112.5~~	~~99.01~~
~~75~~	~~99.17~~	~~150~~	~~99.08~~
~~100~~	~~99.23~~	~~225~~	~~99.17~~
~~167~~	~~99.25~~	~~300~~	~~99.23~~
~~250~~	~~99.32~~	~~500~~	~~99.25~~
~~333~~	~~99.36~~	~~750~~	~~99.32~~
~~500~~	~~99.42~~	~~1000~~	~~99.36~~
~~667~~	~~99.46~~	~~1500~~	~~99.42~~
~~883~~	~~99.49~~	~~2000~~	~~99.46~~
—	—	~~2500~~	~~99.49~~

~~a. All efficiency values for medium-voltage transformers are at 50 percent of nameplate-rated load, determined in accordance with the DOE test procedure. 10 CFR Part 431, Sub-part K, Appendix A.~~

~~**608.8.1.2 Voltage drop in feeders.**~~ ~~The voltage drop in feeder conductors shall not exceed 1.5 percent at design load.~~

~~**608.8.1.3**~~ **608.8.2** **Voltage drop in branch circuits.** The voltage drop in branch circuit conductors shall not exceed 1.5 percent at design load.

Reason: CE329 AS added transformer efficiency standards to the IECC. Since these are included in the IECC they are no longer needed in the IgCC. No change has been proposed for the voltage drop requirements, just a renumbering of sections.

Cost Impact: Will not increase the cost of construction.

GEW121-14: 608.8-BAILEY1133

GEW122-14
608.8.1.1, 903.1

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Delete without substitution:

~~**608.8.1.1 Transformer efficiency.** Distribution transformers installed on the load side of the service disconnecting means shall comply with the provisions of Tables 608.8.1.1(1), 608.8.1.1(2) and 608.8.1.1(3), and the Energy Policy Act of 2005 as applicable.~~

~~**Exception:** The following transformers are exempt from the efficiency standards of Section 608.8.1.1:~~

1. ~~Transformers not covered by the Energy Policy Act of 2005.~~
2. ~~Transformers for special purpose applications, and not used in general purpose applications.~~
3. ~~Transformers with multiple voltage taps where the highest tap is not less than 20 percent more than the lowest tap.~~
4. ~~Drive transformers, rectifier transformers, auto-transformers, uninterruptible power supply transformers, impedance transformers, regulating transformers, sealed and nonventilating transformers, machine tool transformers, welding transformers, grounding transformers, and testing transformers.~~

~~**TABLE 608.8.1.1(1)**~~
~~**LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS**~~
~~**(Maximum 600 Volt Primary)**~~[a]

~~SINGLE PHASE~~		~~THREE PHASE~~	
~~kVA Rating~~	~~Minimum Efficiency (%)~~	~~kVA Rating~~	~~Minimum Efficiency (%)~~
~~15~~	~~97.7~~	~~15~~	~~97.0~~
~~25~~	~~98.0~~	~~30~~	~~97.5~~
~~37.5~~	~~98.2~~	~~45~~	~~97.7~~
~~50~~	~~98.3~~	~~75~~	~~98.0~~
~~75~~	~~98.5~~	~~112.5~~	~~98.2~~
~~100~~	~~98.6~~	~~150~~	~~98.3~~
~~167~~	~~98.7~~	~~225~~	~~98.5~~
~~250~~	~~98.8~~	~~300~~	~~98.6~~
~~333~~	~~98.9~~	~~500~~	~~98.7~~
—	—	~~750~~	~~98.8~~
—	—	~~1000~~	~~98.9~~

~~a. All efficiency values for low-voltage transformers are at 35 percent of nameplate-rated load, determined in accordance with the DOE test procedure. 10 CFR Part 431, Sub-part K, Appendix A.~~

TABLE ~~608.8.1.1~~(2)
~~MEDIUM-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMERS~~
~~(Maximum 34,500 Volt Primary, Maximum 600 Volt Secondary)[a]~~

~~SINGLE PHASE~~				~~THREE PHASE~~			
~~kVA Rating~~	~~20-45 kV BIL Minimum Efficiency (%)~~	~~46-95 kV BIL Minimum Efficiency (%)~~	~~>96 kV BIL Minimum Efficiency (%)~~	~~kVA Rating~~	~~20-45 kV BIL Minimum Efficiency (%)~~	~~46-95 kV BIL Minimum Efficiency (%)~~	~~>96 kV BIL Minimum Efficiency (%)~~
~~15~~	~~98.10~~	~~97.86~~	—	~~15~~	~~97.50~~	~~97.18~~	—
~~25~~	~~98.33~~	~~98.12~~	—	~~30~~	~~97.90~~	~~97.63~~	—
~~37.5~~	~~98.49~~	~~98.30~~	—	~~45~~	~~98.10~~	~~97.86~~	—
~~50~~	~~98.60~~	~~98.42~~	—	~~75~~	~~98.33~~	~~98.12~~	—
~~75~~	~~98.73~~	~~98.57~~	~~98.53~~	~~112.5~~	~~98.49~~	~~98.30~~	—
~~100~~	~~98.82~~	~~98.67~~	~~98.63~~	~~150~~	~~98.60~~	~~98.42~~	—
~~167~~	~~98.96~~	~~98.83~~	~~98.80~~	~~225~~	~~98.73~~	~~98.57~~	~~98.53~~
~~250~~	~~99.07~~	~~98.95~~	~~98.91~~	~~300~~	~~98.82~~	~~98.67~~	~~98.63~~
~~333~~	~~99.14~~	~~99.03~~	~~98.99~~	~~500~~	~~98.96~~	~~98.83~~	~~98.80~~
~~500~~	~~99.22~~	~~99.12~~	~~99.09~~	~~750~~	~~99.07~~	~~98.95~~	~~98.91~~
~~667~~	~~99.27~~	~~99.18~~	~~99.15~~	~~1000~~	~~99.14~~	~~99.03~~	~~98.99~~
~~833~~	~~99.31~~	~~99.23~~	~~99.20~~	~~1500~~	~~99.22~~	~~99.12~~	~~99.09~~
—	—	—	—	~~2000~~	~~99.27~~	~~99.18~~	~~99.15~~
—	—	—	—	~~2500~~	~~99.31~~	~~99.23~~	~~99.20~~

~~BIL = Basic impulse insulation level.~~

~~a. All efficiency values for medium-voltage transformers are at 50 percent of nameplate-rated load, determined in accordance with the DOE test procedure. 10 CFR Part 431, Sub-part K, Appendix A.~~

~~TABLE 608.8.1.1(3)~~
~~MEDIUM-VOLTAGE LIQUID-IMMERSED DISTRIBUTION TRANSFORMERS~~
~~(Maximum 34,500 Volt Primary, Maximum 600 Volt Secondary)[a]~~

~~SINGLE PHASE~~		~~THREE PHASE~~	
~~kVA Rating~~	~~Minimum Efficiency (%)~~	~~kVA Rating~~	~~Minimum Efficiency (%)~~
~~10~~	~~98.62~~	~~15~~	~~98.36~~
~~15~~	~~98.76~~	~~30~~	~~98.62~~
~~25~~	~~98.91~~	~~45~~	~~98.76~~
~~37.5~~	~~99.01~~	~~75~~	~~98.91~~
~~50~~	~~99.08~~	~~112.5~~	~~99.01~~
~~75~~	~~99.17~~	~~150~~	~~99.08~~
~~100~~	~~99.23~~	~~225~~	~~99.17~~

~~SINGLE PHASE~~		~~THREE PHASE~~	
~~167~~	~~99.25~~	~~300~~	~~99.23~~
~~250~~	~~99.32~~	~~500~~	~~99.25~~
~~333~~	~~99.36~~	~~750~~	~~99.32~~
~~500~~	~~99.42~~	~~1000~~	~~99.36~~
~~667~~	~~99.46~~	~~1500~~	~~99.42~~
~~883~~	~~99.49~~	~~2000~~	~~99.46~~
—	—	~~2500~~	~~99.49~~

a. ~~All efficiency values for medium-voltage transformers are at 50 percent of nameplate-rated load, determined in accordance with the DOE test procedure. 10 CFR Part 431, Sub-part K, Appendix A.~~

Revise as follows:

903.1 General. Where application is made for construction as described in this section, the registered design professional in responsible charge or approved agency shall perform commissioning during construction and after occupancy as required by Table 903.1. Where Table 903.1 specifies that commissioning is to be done on a periodic basis, the registered design professional in responsible charge shall provide a schedule of periodic commissioning with the submittal documents that shall be reviewed and *approved* by the *code official*.

The approved agency shall be qualified and shall demonstrate competence, to the satisfaction of the *code official*, for the commissioning of the particular type of construction or operation. The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency provided those personnel meet the qualification requirements of this section to the satisfaction of the *code official*. The approved agency shall provide written documentation to the *code official* demonstrating competence and relevant experience or training. Experience or training shall be considered relevant where the documented experience or training is related in complexity to the same type of commissioning activities for projects of similar complexity and material qualities.

TABLE 903.1
COMMISSIONING PLAN

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
Chapter 6: Lighting						
Auto demand reduction control system functionality	X	X	Functional testing	Final inspection	18-24 months	604.4
Plug load controls	X	None	Functional testing	Final inspection	None	608.6
Connection of appliances to switched receptacles	—	X	Field inspection	None	18-24 months	608.6
~~Specified transformer nameplate efficiency rating~~	~~X~~	~~None~~	~~Field inspection~~	~~Final inspection~~	~~None~~	~~608.8.1.1~~
Verification of lamp	X	X	Field inspection	Final inspection	18-24 months	608.10
Verification of ballast	X	None	Field inspection	Final inspection	None	608.10
Lighting controls						

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
a. Installation	X	None	Field inspection	Post-installation	None	608.11
b. Calibration	X	X	System installer/contractor or commissioning agent	Post-installation	18-24 months	611.3.3

For SI: 1 square foot = 0.0929 m^2.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Code change CE329-13 was approved in 2013. It added electrical transformer requirements to the IECC. The resulting text of the 2015 IECC is shown below. Therefore, the provisions in the IgCC are not a significant energy improvement over the IECC. The SEHPCAC proposes to delete the provisions. If other proponents pursue proposals which will take the new IECC provisions and enhance their energy savings when applied under the IgCC, the SEHPCAC will consider withdrawal of this proposal. This proposal is to delete the transformer section of the IgCC in Chapter 6 and to remove the related provisions from Table 903 addressing commissioning requirements.

C405.7 Electrical transformers (Mandatory). Electric transformers shall meet the minimum efficiency requirements of Table C405.7 as tested and rated in accordance with the test procedure listed in DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the transformer manufacturer.

Exceptions: The following transformers are exempt:

1. Transformers that meet the Energy Policy Act of 2005 exclusions based on the DOE 10 CFR 431 definition of special purpose applications.
2. Transformers that meet the Energy Policy Act of 2005 exclusions that are not to be used in general purpose applications based on information provided in DOE 10 CFR 431
3. Transformers that meet the Energy Policy Act of 2005 exclusions with multiple voltage taps where the highest tap is at least 20 percent more than the lowest tap.
4. Drive transformers
5. Rectifier transformers
6. Auto-transformers
7. Uninterruptible power system transformers
8. Impendance transformers
9. Regulating transformers
10. Sealed and nonventilating transformers
11. Machine tool transformer
12. Welding transformer
13. Grounding transformer
14. Testing transformer

TABLE C405.7
Minimum Nominal Efficiency Levels for 10 CFR 431 Low Voltage Dry-Type Distribution Transformers

Single Phase Transformers		Three Phase Transformers	
kVA[a]	Efficiency (%)[b]	kVA[a]	Efficiency (%)[b]
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6
333	98.9	500	98.7

		750	98.8
		1000	98.9

a. kiloVolt-Amp rating.
b. Nominal efficiencies shall be established in accordance with the DOE 10 CFR 431 test procedure for low voltage dry-type transformers.

Cost Impact: Will not increase the cost of construction. The proposal removes potentially conflicting provisions between the IECC and IgCC.

GEW122-14: 608.8.1.1-THOMPSON577

GEW123-14
608.9

Proponent: Glenn Heinmiller, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

608.9 Exterior lighting. Exterior lighting <u>on building sites</u> shall comply with <u>the lighting power and control requirements of</u> Section~~s~~ C405.6~~.1and C405.6.2~~ of the *International Energy Conservation Code* regardless of how the power for that lighting is supplied.

Exception: Lighting for the following purposes is exempt:

1. Where *approved* because of historical, safety, signage, or emergency lighting considerations.
2. Roadway lighting required by governmental authorities.

Reason: The proposed change is editorial in nature. The Section reference is more general, and the language indicates what type of requirements will be found in Section C405.6. This will make the code easier to use because users will not need to refer to the IECC to understand what this requirement means.

The IgCC is unique in that it includes the entirety of building sites within its' scope, whereas the IECC only includes lighting that is powered from the building's electrical service, which is why this section of the IgCC is necessary.

Cost Impact: Will not increase the cost of construction.

Analysis: The International Energy Conservation Code section C405.6 referenced in the text of this proposal are section numbers for the 2012 Edition. Due to significant changes approved for the 2015 IECC, the section number for the 2015 Editions will be C405.5.

GEW123-14: 608.9-HEINMILLER674

GEW124-14
608.10, 608.11, 903.1, Table 903.1

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Delete without substitution:

~~**608.10 Verification of lamps and ballasts.** Prior to issuance of a certificate of occupancy, the field inspector shall confirm the installation of luminaires, type and quantity; lamps, type, wattage and quantity, and ballasts, type and performance for not less than one representative luminaire of each type, for consistency with the *approved* construction documents. Where a discrepancy is found, energy calculations shall be revised and resubmitted.~~

~~**608.11 Verification of lighting controls.** Prior to issuance of a certificate of occupancy, the field inspector shall confirm the installation of lighting controls shown on the *approved* construction documents. Where a discrepancy is found, the installation shall be reviewed for conformance to the *International Energy Conservation Code* and Sections 608.2, 608.3, 608.4, 608.5, and 608.6.~~

Revise as follows:

903.1 General. Where application is made for construction as described in this section, the registered design professional in responsible charge or approved agency shall perform commissioning during construction and after occupancy as required by Table 903.1. Where Table 903.1 specifies that commissioning is to be done on a periodic basis, the registered design professional in responsible charge shall provide a schedule of periodic commissioning with the submittal documents that shall be reviewed and *approved* by the *code official*.

The approved agency shall be qualified and shall demonstrate competence, to the satisfaction of the *code official*, for the commissioning of the particular type of construction or operation. The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency provided those personnel meet the qualification requirements of this section to the satisfaction of the *code official*. The approved agency shall provide written documentation to the *code official* demonstrating competence and relevant experience or training. Experience or training shall be considered relevant where the documented experience or training is related in complexity to the same type of commissioning activities for projects of similar complexity and material qualities.

TABLE 903.1
COMMISSIONING PLAN

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
Chapter 6: Lighting						
Auto demand reduction control system functionality	X	X	Functional testing	Final inspection	18-24 months	604.4
Plug load controls	X	None	Functional testing	Final inspection	None	608.6
Connection of appliances to switched receptacles	—	X	Field inspection	None	18-24 months	608.6

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
Specified transformer nameplate efficiency rating	X	None	Field inspection	Final inspection	None	608.8.1.1
Verification of ~~lamp~~ installed lighting efficiencies	X	X	Field inspection	Final inspection	18-24 months	~~608.10~~ 608.1, 608.9
Verification of ballast	X	None	Field inspection	Final inspection	None	~~608.10~~ 608.1, 608.9
Lighting controls						
a. Installation	X	None	Field inspection	Post-installation	None	~~608.11~~ 608.1, 608.2, 608.3, 608.4, 608.5, 608.6
b. Calibration	X	X	System installer/contract or or commissioning agent	Post-installation	18-24 months	611.3.3

(Portions of Table not shown remain unchanged)

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The provisions are unnecessary as they are simply restating the basic process of inspecting the building, building elements and installed equipment prior to issuing a certificate of occupancy. All inspections are based on the approved construction documents. Every inspector knows what to do if the installation doesn't comply with the plans. There is no reason for restatement in Section 608. Deletion of these sections requires clarification in Table 903.1 for commissioning and inspection efforts. The intent of the commissioning/inspection requirement of verification of lamps is to determine that the correct installations are made to obtain planned efficiencies. Lighting controls are specified in Sections 608.1 through 608.6. Compliance with those provisions should be specified in Table 903.1

The committee has submitted a more comprehensive change addressing commissioning, inspection and Chapter 9. This change to remove these sections needs to be addressed separately.

Cost Impact: Will not increase the cost of construction. The change is editorial in nature. It eliminates text which is procedural in nature and not needed within a typical construction code.

GEW124-14: 608.10-THOMPSON572

GEW125-14
608.13 (New)

Proponent: Jonah Cecil Scheib, Urban Green Council, representing Urban Green Council (cs@urbangreencouncil.org); Jim Edelson, representing NBI; Ryan Meres (ryan@imt.org)

Add new text as follows:

608.13 Temporary Generator and Boiler. Buildings containing Group I, R-1, or R-2 occupancies shall be provided with a means to connect a temporary external generator that is capable of providing power for exit signs and means of egress illumination serving such occupancy, fire alarm systems serving such occupancy, not less than one elevator that serves all floors; and lighting in sleeping spaces and as required for the provision of medical services. Such connecting means shall be located at or above the design flood elevation.

Buildings containing Group I occupancies having their boiler plants located below the design flood elevation shall be provided with a means to connect a temporary external boiler that is capable of maintaining design comfort temperatures in the building. Such connecting means shall be located at or above the design flood elevation.

> **Exception:** A connecting means for a temporary generator is not required for buildings having emergency or standby power systems, including on-site renewable energy systems, that are permanently installed above the design flood elevation and that are capable of providing power for the systems and loads listed in this section for a time period of not less than 72 hours.

Reason: Convenient hookups for generators can make power outages – such as those caused by flooding – much easier to manage because buildings can directly attach temporary equipment. If these permanent hookups are not installed, buildings often use ad hoc connections that can present a safety risk or that may cause unexpected interruption of services. To maintain heat in buildings housing sick or elderly people, health care facilities, nursing homes and other group care facilities where there is a risk of losing boiler operation due to flooding should be required to install "quick-connect" hookups for boilers as well as generators.

New York City established a similar regulation in 2013.

Bibliography:

NYC Building Resiliency Task Force, Proposal 20: Add Hookups for Temporary Generators & Boilers (Proposal)

NYC Local Law 108 of 2013 (Law; Legislation at a Glance)

NYC Administrative Code Section 28-315.8.2 and 28-315.8.3 (Code Reference) NYC Building Code Appendix G, Section 311.2 and 311.3 (Code Reference)

Cost Impact: Will not increase the cost of construction.

GEW125-14: 608.13 (NEW)-SCHEIB988

GEW 126-14
609

Proponent: Craig Conner, Building Quality (craig.conner@mac.com), representing self

Delete without substitution:

~~SECTION 609~~
~~SPECIFIC APPLIANCES AND EQUIPMENT~~

Reason: Some of the section is out of scope. Some is in the IECC. Elevators and Escalators are not normally handled by the same code staff.

Cost Impact: Will not increase the cost of construction. The proposal removes provisions.

GEW 126-14: 609-KLEIN1214

GEW127-14
609.1, Table 609.1

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

609.1 General. This section provides requirements for appliances and equipment installed in the building or on the building site. Permanent appliances and equipment shall comply with the provisions of Section 609.2, and portable appliances and equipment shall comply with the provisions of Section 609.3.

Exception: Section 609 does not apply to appliances and equipment in compliance with Sections 605 through 608 and those specified in Table 609.1.

TABLE 609.1
APPLIANCES AND EQUIPMENT COVERED BY FEDERAL EFFICIENCY STANDARDS

RESIDENTIAL PRODUCTS	COMMERCIAL PRODUCTS
~~Battery chargers[a]~~ Ceiling fans and ceiling fanlight kits Clothes dryers Clothes washers Dehumidifiers Dishwashers Fluorescent and incandescent lamps ~~Fluorescent lamp ballasts[a]~~ ~~Microwave ovens[a]~~ Ranges and ovens Refrigerators, refrigerator-freezers, and freezers Room air conditioners Torchieres	Automatic ice makers Commercial clothes washers Distribution transformers ~~Electric motors[a]~~ ~~HD lamps[a]~~ Metal halide lamp fixtures ~~Refrigerated beverage vending machines[a]~~ Walk-in coolers and walk-in freezers

a. ~~These products currently have no federal standards. NOTE: U.S. Department of Energy rulemakings are underway or scheduled.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The title of the table is that these appliances are covered by Federal efficiency standards and therefore exempt from Section 609. The footnote indicates that where shown in that table, the specific equipment doesn't have a federal standard. Since these 6 types of equipment are without federal standards, they shouldn't be included in a table listing those that have such standards. If the Department of Energy has since issued minimum efficiency standards for the 6 listed pieces of equipment, then DOE should submit the appropriate change. The code shouldn't list in a table of equipment with efficiency standards, those which don't have any such standard.

Cost Impact: Will not increase the cost of construction. Editorial revision.

GEW127-14: TABLE 609.1-THOMPSON573

GEW128-14
609.1, Table 609.1

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

609.1 General. This section provides requirements for appliances and equipment installed in the building or on the building site. Permanent appliances and equipment shall comply with the provisions of Section 609.2, and portable appliances and equipment shall comply with the provisions of Section 609.3.

> **Exception:** Section 609 does not apply to appliances and equipment in compliance with Sections 605 through 608 and those specified in Table 609.1.

TABLE 609.1
APPLIANCES AND EQUIPMENT COVERED BY FEDERAL EFFICIENCY STANDARDS

RESIDENTIAL PRODUCTS	COMMERCIAL PRODUCTS
Battery chargers[a]	Automatic ice makers
	Commercial air conditioners and heat pumps
Boilers	Commercial clothes washers
Ceiling fans and ceiling fanlight kits	
	Commercial packaged boilers Commercial unit heaters Commercial refrigerators, refrigerators-freezers, and freezers Commercial warm air furnaces Commercial water heaters Commercial room air conditions
	Distribution transformers
Central air conditioners and heat pumps	
Clothes dryers Clothes washers	Electric motors[a] HD lamps[a]
Compact fluorescent lamps Dehumidifiers	Illuminated exit signs Metal halide ballasts and lamp fixtures
Direct heating equipment	
Dishwashers	Refrigerated beverage vending machines[a]
External power supplies	
General service fluorescent and incandescent lamps	Small electric motors Traffic signal and pedestrian modules

RESIDENTIAL PRODUCTS	COMMERCIAL PRODUCTS
Fluorescent lamp ballasts[a] Furnaces Furnace fans Microwave ovens[a] Pool heaters Ranges and ovens Refrigerators, refrigerator-freezers, and freezers Room air conditioners Torchieres	Walk-in coolers and walk-in freezers

a. ~~These products currently have no federal standards. NOTE: U.S.~~ Department of Energy rulemakings are underway or scheduled.

Reason: This will update and revise the information in Table 609.1. The information in the table is not complete or up to date, and this revision will make sure that the table information is accurate.

Cost Impact: Will not increase the cost of construction. There are no costs associated with updating this table.

GEW128-14: TABLE609.1-ROSENSTOCK453

GEW129-14
609.2.1.2.1

Proponent: Marilyn Williams, National Electrical Manufacturers Association, representing NEMA (mar_williams@nema.org)

Revise as follows:

609.2.1.2.1 Motor. Induction motors with a Class IE2 efficiency rating, as defined by IEC EN 60034-30, or alternative technologies, such as permanent magnet synchronous motors that have equal or better efficiency, shall be used. <u>Induction electric motors that are covered by U.S. statutory efficiency standards shall meet not less than IEC IE2 or IE3 levels of efficiency, depending on the type of induction electric motor.</u>

Reason: What we proposed being added merely advises the user that there are certain other efficiency requirements that need to be considered for use in the US (namely DOE requirements) that include certain levels of efficiency that may be in addition to those cited in the IEC 60034-30 Standard.

Cost Impact: Will not increase the cost of construction.

GEW129-14: 609.2.1.2.1-WILLIAMS991

GEW130-14
609.2.2.3

Proponent: Maureen Traxler, City of Seattle, representing Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

Delete without substitution:

~~**609.2.2.3 Energy recovery.** Down-running escalators equipped with direct variable frequency drives shall use regenerative drives and return recovered energy to the building electrical power system.~~

Reason: A provision requiring regenerative drive was added to the 2015 IECC by CE332-13. Section 405.8 of the 2015 IECC will be as follows:

"**C405.8 Regenerative drive**. An escalator designed either for one-way down operation only or for reversible operation shall have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight exceeds 750 pounds."

Cost Impact: Will not increase the cost of construction.

GEW130-14: 609.2.2.3-TRAXLER663

GEW131-14
609.2.2.5

Proponent: Maureen Traxler, City of Seattle, representing Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

Revise as follows:

609.2.2.5 Standby mode. ~~During standby mode, escalators and moving walkways shall be capable of being automatically~~ ~~slowed to not greater than 50 percent of nominal speed.~~ Escalators and moving walkways shall be capable of being automatically turned off when the building is unoccupied or outside of facility operations. In locations where multiple escalators serve the same passenger load, not less than 50 percent of the escalators shall have the capability of being turned off in response to reduced occupant traffic.

Reason: This subject will be covered in the 2015 IECC. CE333-13, which was approved as submitted, added the following language:

"C405.2 Escalators and moving walks. Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers."

Cost Impact: Will not increase the cost of construction.

GEW131-14: 609.2.2.5-TRAXLER475

GEW 132-14

202, 610, 610.1, 610.1.1, 610.1.2, 610.2, 610.2.1, 610.2.2, 610.2.2.1, 610.3, 610.3.1, 610.4, 610.5, 610.5.1, 610.5.2, 610.6 (New), A106, A106.6,

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com); Craig Conner (craig.conner@mac.com)

Revise definition as follows:

ONSITE RENEWABLE ENERGY SYSTEM. An energy generation system located on the building or building site that derives its energy from a renewable energy source.

RENEWABLE ENERGY CREDIT (REC). An REC represents the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation. An REC~~, and its associated attributes and benefits,~~ is sold separately from the ~~underlying physical~~ electricity associated with ~~an onsite~~ a renewable energy source. ~~REC's allow organizations to support renewable energy development and protect the environment where renewable power products are not locally available. There are two approaches to verifying REC ownership and the right to make environmental claims: (1) REC contracts from a list of *approved* providers, including an audit of the chain of custody; and (2) REC tracking systems.~~

RENEWABLE ENERGY SOURCE~~, ONSITE~~. Energy derived from solar radiation, wind, waves, tides, biogas, biomass, or geothermal energy. ~~The energy system providing onsite renewable energy is located on or adjacent to the building site, and generate energy for use on the building site or to send back to the energy supply system.~~

Revise as follows:

610 ~~BUILDING~~ RENEWABLE ENERGY SYSTEMS

610.1 Renewable energy ~~systems~~ requirements. ~~Buildings that consume energy shall comply with this section. Each building or surrounding lot or building site where there are multiple buildings on the building site shall be equipped with one or more renewable energy systems in accordance with this section.~~

~~Renewable energy systems shall comply with the requirements of Section 610.2 for solar photovoltaic systems, Section 610.3 for wind systems, or Section 610.4 for solar water heating systems, and Section 610.5 for performance monitoring and metering of these systems as *approved* by the *code official*. These systems shall be commissioned in accordance with the requirements of Section 611.~~

~~**Exception:** Renewable energy systems are not required for the following:~~

1. ~~Buildings or building sites where there are multiple buildings on the building site providing not less than 2 percent of the total estimated annual energy use of the building, or collective buildings on the site, with onsite renewable energy using a combination of renewable energy generation systems complying with the requirements of Section 610.2, 610.3, or 610.4.~~
2. ~~Where not less than 4 percent of the total annual building energy consumption from renewable generation takes the form of a 10-year commitment to *renewable energy credit* ownership, confirmed by the *code official*.~~
3. ~~Where the combined application of onsite generated renewable energy and a commitment to *renewable energy credit* ownership as confirmed by the *code official*, totals not less than 4 percent of the total annual building energy consumption from renewable generation.~~

Buildings shall include *onsite renewable energy systems* that provide not less than 2 percent of the estimated annual electrical energy used for heating, cooling, ventilation, lighting, and service water heating.

~~**610.1.1 Building performance-based compliance.** Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.1, performance- based compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than 2 percent of the total calculated annual energy use~~

~~of the building, or collective buildings on the site.~~

~~**610.1.2 Building prescriptive compliance.** Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.2, prescriptive compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than 2 percent of the total estimated annual energy use of the building, or collective buildings on the building site, with onsite renewable energy by calculation demonstrating that onsite renewable energy production has a rating of not less than 1.75 Btu/h (0.5 W) or not less than 0.50 watts per square foot of conditioned floor area, and using any single or combination of renewable energy generation systems meeting the requirements of Sections 610.2, 610.3, or 610.4.~~

610.2 ~~Solar photovoltaic systems.~~ Building averaging. ~~Solar photovoltaic systems shall be sized to provide not less than 2 percent of the total estimated annual electric energy consumption of the building, or collective buildings on the building site in accordance with Section 610.1.1 or 610.1.2.~~

The required renewable energy shall be computed for each building or for a group of buildings.

~~**610.2.1 Limitation.** Solar photovoltaic systems shall not be used to comply with Section 610.1 where building sites have total global insolation levels lower than 2.00 kWh/m2/day as determined in accordance with NREL SERI TR-642-761.~~

~~**610.2.2 Requirements.** The installation, inspection, maintenance, repair and replacement of solar photovoltaic systems and system components shall comply with the manufacturer's instructions, Section 610.2.2.1, the *International Fire Code*, the *International Building Code* and NFPA 70.~~

~~**610.2.2.1 Performance verification.** Solar photovoltaic systems shall be tested on installation to verify that the installed performance meets the design specifications. A report of the tested performance shall be provided to the building owner.~~

610.3 ~~Wind energy systems.~~ Alternative sources. ~~Wind energy systems shall be designed, constructed and sized to provide not less than 2 percent of the total estimated annual electric energy consumption of the building, or collective buildings on the building site in accordance with NFPA 70 and Section 610.1.1 or 610.1.2.~~

The following shall be considered as substitutes for any portion of the renewable energy requirement of Section 610.1:

1. Conserving additional non-renewable energy, where the conserved non-renewable energy equals twice the renewable energy credited.

2. *Renewable energy credits* (RECs) or local utility green power is purchased, where the purchased amount equals ten times the renewable energy credited. Documentation of the purchase shall be provided.

~~**610.3.1 Installation, location and structural requirements.** Wind energy systems shall be located on the building, adjacent to the building, or on the building site.~~

610.4 ~~Solar water heating equipment.~~ Prescriptive compliance. ~~Not less than 10 percent of the building's annual estimated hot water energy usage shall be supplied by onsite solar water heating equipment.~~

Buildings or their building sites that are designed and constructed with one or more *onsite renewable energy systems* that have the capacity to provide not less than 0.50 watt per square foot of *conditioned floor* area shall be considered to be in compliance with Section 610.

610.5 ~~Renewable energy system performance monitoring and metering.~~ System requirements. ~~Renewable energy systems shall be metered and monitored in accordance with Sections 610.5.1 and 610.5.2.~~

The installation, inspection, repair and replacement of onsite renewable energy systems shall comply with manufacturer's instructions, the *International Fire Code*, the *International Building Code* and NFPA 70.

~~**610.5.1 Metering.** Renewable energy systems shall be metered separately from the building's electrical and fossil fuel meters. Renewable energy systems shall be metered to measure the amount of renewable electric or thermal energy generated on the building site in accordance with Section 603.~~

~~**610.5.2 Monitoring.** Renewable energy systems shall be monitored to measure the peak electric or thermal energy generated by the renewable energy systems during the building's anticipated peak electric or fossil fuel consumption period in accordance with Section 603.~~

610.6 Performance verification. *Onsite renewable energy systems* shall be tested upon installation to verify that the installed performance meets the design specifications. Such testing shall be documented.

Revise as follows:

~~**A106.6 Renewable energy system project electives.** Buildings seeking a renewable energy system project elective or electives shall be equipped with one or more renewable energy systems in accordance with Section 610.1 that have the capacity to provide the percent of annual energy used within the building as selected in Table A106. Capacity shall be demonstrated in accordance with Sections 610.1.1 and 610.1.2.~~

TABLE A106
ENERGY CONSERVATION AND EFFICIENCY

SECTION	DESCRIPTION	MINIMUM NUMBER OF ELECTIVES REQUIRED AND ELECTIVES SELECTED
A102.2	The jurisdiction shall indicate a number between and including 0 and up to and including 10 to establish the minimum total number of project electives that must be satisfied.	—
A106.1	zEPI reduction project electives	☐ Yes ☐ No
A106.1	Project zEPI is at least 5 points lower than required by Table 302.1	☐ 1 elective
A106.1	Project zEPI is at least 10 points lower than required by Table 302.1	☐ 2 electives
A106.1	Project zEPI is at least 15 points lower than required by Table 302.1	☐ 3 electives
A106.1	Project zEPI is at least 20 points lower than required by Table 302.1	☐ 4 electives
A106.1	Project zEPI is at least 25 points lower than required by Table 302.1	☐ 5 electives
A106.1	Project zEPI is at least 30 points lower than required by Table 302.1	☐ 6 electives
A106.1	Project zEPI is at least 35 points lower than required by Table 302.1	☐ 7 electives
A106.1	Project zEPI is at least 40 points lower than required by Table 302.1	☐ 8 electives
A106.1	Project zEPI is at least 45 points lower than required by Table 302.1	☐ 9 electives
A106.1	Project zEPI is at least 51 points lower than required by Table 302.1	☐ 10 electives
A106.2	Mechanical systems project elective	☐ Yes ☐ No
A106.3	Service water heating	☐ Yes ☐ No
A106.4	Lighting systems	☐ Yes ☐ No
A106.5	Passive design	☐ Yes ☐ No
~~A106.6~~	~~Renewable energy systems—5 percent~~	~~☐ Yes~~ ~~☐ No~~
~~A106.6~~	~~Renewable energy systems—10 percent~~	~~☐ Yes~~ ~~☐ No~~
~~A106.6~~	~~Renewable energy systems—20 percent~~	~~☐ Yes~~ ~~☐ No~~

Reason: Electricity from renewable sources is usually environmentally preferable to electricity generated from conventional sources. This proposal simplifies the existing renewables section, which is overly complex and difficult to enforce. This also adds new options, as renewable systems are impractical for some buildings.

- --New 610.1 gives the basic requirement, 2% of the electricity is renewables, in a simple and clear manner.

- --New 610.2 makes it clear the requirement can be computed for either individual buildings or a group of buildings.

- --New 610.3 offers important alternatives. An onsite renewables requirement is not viable unless practical alternatives are included. For example many downtown buildings are nested between, and shaded by larger buildings. This proposal allows three options.

Item #1 allows twice as much non-renewable energy savings as an alternative to renewables.

Item #2 allows purchased Renewable Energy Credits (RECs) or electricity from a local green power program. Both the RECs and the green power options require the up front purchase of 10 years worth of the renewable electricity requirement for the building. Utility green power programs are available many places and local utility programs will often be the simplest. For example, over 150 utility green energy programs are listed in the US Department of Energy's web site at: http://apps3.eere.energy.gov/greenpower/markets/pricing.shtml?page=2

Consumers can also buy green power in the form of renewable energy certificates (RECs), which are usually available regardless of whether the local utility offers a green power product.

- --New 610.4 is a prescriptive alternative of 0.5 w/ft2 (existing Section 610.1.2) doesn't require estimating overall energy use and is useful for buildings that want PV.

- --New 610.5 references other standards already in the IGCC, with all references moved to this one section.

- --New 610.6 requires the renewable system to be tested.

- --Revised definitions for RECs, renewable energy systems, and onsite renewables energy systems are more concise. Commentary material is removed. The existing IGCC leaves out some types of renewables, but the use of these definitions includes them.

- --References to the old text are removed from the existing Appendix A.

Overall this revised renewable section is much more usable than the existing renewables section. The addition of multiple alternative is particularly important.

Cost Impact: Will not increase the cost of construction.

GEW 132-14: 610-KLEIN1216

GEW133-14

202, 610, 610.1, 610.1.1, 610.1.2, 610.2, 610.2.1, 610.2.2, 610.2.2.1, 610.3, 610.3.1, 610.4, 610.5, 610.5.1, 610.5.2

Proponent: Lorraine Ross, Intech Consulting, Inc, representing The Dow Chemical Company (Intech@tampabay.rr.com)

Revise definitions as follows:

<u>**ONSITE RENEWABLE ENERGY SYSTEM.** An energy generation system located on the building or building site that derives its energy from a renewable energy source.</u>

RENEWABLE ENERGY CREDIT (REC). An REC represents the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation. An REC, and its associated attributes and benefits, is sold separately from the underlying physical electricity associated with an onsite renewable energy source. ~~REC's allow organizations to support renewable energy development and protect the environment where renewable power products are not locally available. There are two approaches to verifying REC ownership and the right to make environmental claims: (1) REC contracts from a list of approved providers, including an audit of the chain of custody; and (2) REC tracking systems.~~

RENEWABLE ENERGY SOURCE~~, ONSITE~~. Energy derived from solar radiation, wind, waves, tides, biogas, biomass, or geothermal energy. ~~The energy system providing onsite renewable energy is located on or adjacent to the building site, and generate energy for use on the building site or to send back to the energy supply system.~~

Revise as follows:

610 ~~BUILDING~~ <u>ONSITE</u> RENEWABLE ENERGY SYSTEMS

610.1 Renewable energy systems requirements. ~~Buildings that consume energy shall comply with this section. Each building or surrounding lot or building site where there are multiple buildings on the building site shall be equipped with one or more renewable energy systems in accordance with this section.~~

~~Renewable energy systems shall comply with the requirements of Section 610.2 for solar photovoltaic systems, Section 610.3 for wind systems, or Section 610.4 for solar water heating systems, and Section 610.5 for performance monitoring and metering of these systems as approved by the code official. These systems shall be commissioned in accordance with the requirements of Section 611.~~

~~**Exception:** Renewable energy systems are not required for the following:~~

1. ~~Buildings or building sites where there are multiple buildings on the building site providing not less than 2 percent of the total estimated annual energy use of the building, or collective buildings on the site, with onsite renewable energy using a combination of renewable energy generation systems complying with the requirements of Section 610.2, 610.3, or 610.4.~~
2. ~~Where not less than 4 percent of the total annual building energy consumption from renewable generation takes the form of a 10-year commitment to renewable energy credit ownership, confirmed by the code official.~~
3. ~~Where the combined application of onsite generated renewable energy and a commitment to renewable energy credit ownership as confirmed by the code official, totals not less than 4 percent of the total annual building energy consumption from renewable generation.~~

Any combination of onsite renewable energy systems shall be provided for buildings or building sites in accordance with Section 610.2. Compliance shall be demonstrated in accordance with Section 610.1.1 or 610.1.2.

Exceptions:

1. Onsite renewable energy systems are not required where it is confirmed by the building official that compliance with Sections 610.1.1 or 610.1.2 cannot be provided by onsite renewable energy systems alone, and renewable energy credits are purchased to provide not less than 0.5 watt per square foot of conditioned floor area. Renewable energy credits shall be for a period of 10 years, shall be paid in full and non-refundable, and documentation of full payment shall be submitted to the building official prior to issuance of the building certificate of occupancy.
2. Onsite renewable energy systems are not required where it is confirmed by the building official that compliance with Sections 610.1.1 or 610.1.2 cannot be provided by onsite renewable energy systems alone, and any combination of onsite renewable energy systems and renewable energy credits provide a rating of not less than 0.5 watt per square foot of conditioned floor area. Renewable energy credits shall be for a period of 10 years, paid in full and non-refundable, and documentation of full payment shall be submitted to the building official prior to issuance of the building certificate of occupancy.
3. Onsite renewable energy systems are not required for the following building occupancies , where not less than 10 percent of the building's total annual estimated hot water demand is met onsite with geothermal or solar thermal systems designed, constructed and installed in accordance with manufacturer's instructions.

   3.1. Group A-2, restaurants and banquet halls
   3.2. Group F, laundries
   3.3. Group R-1, boarding houses (transient), hotels (transient), motels (transient)
   3.4. Group R-2 occupancies
   3.5. Group A-3, health clubs and spas
   3.6 Group I-2, hospitals, mental hospitals and nursing homes

4. Onsite renewable energy systems are not required for buildings where not less than 10 percent of the building's total annual estimated space heating or space cooling demand is met by onsite geothermal or solar thermal systems designed, constructed and installed in accordance with manufacturer's instructions.

610.1.1 Building performance-based compliance. ~~Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.1, performance-based compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than 2 percent of the total calculated annual energy use of the building, or collective buildings on the site.~~

Buildings or their building sites shall be equipped with one or more onsite renewable energy systems that have the capacity to provide not less than 2 percent of the total calculated annual electrical energy demand of the building, or collective buildings on the site.

610.1.2 Building prescriptive compliance. ~~Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.2, prescriptive compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than 2 percent of the total estimated annual energy use of the building, or collective buildings on the building site, with onsite renewable energy by calculation demonstrating that onsite renewable energy production has a rating of not less than 1.75 Btu/h (0.5 W) or not less than 0.50 watts per square foot of conditioned floor area, and using any single or combination of renewable energy generation systems meeting the requirements of Sections 610.2, 610.3, or 610.4.~~

Buildings or their building sites shall be equipped with one or more onsite renewable energy systems that have the capacity to provide not less than 0.50 watt per square foot of conditioned floor area of the building or collective buildings on the site.

610.2 ~~Solar photovoltaic systems~~ On-site renewable energy system requirements. ~~Solar photovoltaic systems shall be sized to provide not less than 2 percent of the total estimated annual electric energy consumption of the building, or collective buildings on the building site in accordance with Section 610.1.1 or 610.1.2.~~

Installation, inspection, maintenance, repair and replacement of onsite renewable energy systems shall comply with manufacturer's instructions, the International Fire Code, the International Building Code and NFPA 70.

610.2.1 ~~Limitation.~~ Onsite renewable energy system performance verification. ~~Solar photovoltaic systems shall not be used to comply with Section 610.1 where building sites have total global insolation levels lower than 2.00 kWh/m2/day as determined in accordance with NREL SERI TR-642-761.~~

Onsite renewable energy systems shall be tested upon installation to verify that the installed performance meets the design specifications. A report of the tested performance shall be provided to the building owner and the building official.

610.2.2 ~~Requirements~~ Onsite renewable energy system metering. ~~The installation, inspection, maintenance, repair and replacement of solar photovoltaic systems and system components shall comply with the manufacturer's instructions, Section 610.2.2.1, the International Fire Code, the International Building Code and NFPA 70.~~

Onsite renewable energy systems shall be individually metered in accordance with Section 603.3.7.

~~**610.2.2.1 Performance verification.** Solar photovoltaic systems shall be tested on installation to verify that the installed performance meets the design specifications. A report of the tested performance shall be provided to the building owner.~~

~~**610.3 Wind energy systems.** Wind energy systems shall be designed, constructed and sized to provide not less than 2 percent of the total estimated annual electric energy consumption of the building, or collective buildings on the building site in accordance with NFPA 70 and Section 610.1.1 or 610.1.2.~~

~~**610.3.1 Installation, location and structural requirements.** Wind energy systems shall be located on the building, adjacent to the building, or on the building site.~~

~~**610.4 Solar water heating equipment.** Not less than 10 percent of the building's annual estimated hot water energy usage shall be supplied by onsite solar water heating equipment.~~

~~**610.5 Renewable energy system performance monitoring and metering.** Renewable energy systems shall be metered and monitored in accordance with Sections 610.5.1 and 610.5.2.~~

~~**610.5.1 Metering.** Renewable energy systems shall be metered separately from the building's electrical and fossil fuel meters. Renewable energy systems shall be metered to measure the amount of renewable electric or thermal energy generated on the building site in accordance with Section 603.~~

~~**610.5.2 Monitoring.** Renewable energy systems shall be monitored to measure the peak electric or thermal energy generated by the renewable energy systems during the building's anticipated peak electric or fossil fuel consumption period in accordance with Section 603.~~

Reason: Renewable Energy Systems are crucial to goals for net zero energy buildings. This proposal reorganizes this section, and recognizes approved 2015 code change proposals for fire, building and electrical code compliance for a variety of renewable energy systems. Companion changes to this Section 610 rewrite are required for Chapter 2 Definitions. Most importantly, the credible use of Renewable Energy Credits is provided as an alternate method to meet the onsite renewable energy system requirement under certain conditions.

The following is a breakdown of the reasons for the reorganization of Section 610.

Section 610.1. The charging paragraph states that onsite renewable energy systems are required and identifies installation as well as compliance mechanisms. It is important to note that the renewable energy systems can be located on the buildings or on the building site. Existing language was removed that detailed requirements for various types of renewable energy systems. The detailed installation, fire, structural, electrical, and other requirements for these systems are now very clearly defined in the IBC, IFC, and NFPA and referenced in section 610.2.

Exceptions:

The existing exceptions where rewritten for clarity and to add new exceptions for systems that cannot be complied with in the same way as those that produce electricity.

Exception 1 recognizes that there are circumstances where the onsite renewable energy system alone cannot provide the minimum of 2% of the building's electrical energy use. When this condition is confirmed by the building official, the purchase of Renewable Energy Credits that provide 0.5 watts per square foot of conditioned floor area is permitted. Therefore, under this exception, the entire requirement may be met by RECs alone. Purchase of the required RECS must be for a ten year period, shall be paid in full and non-refundable, and documentation of full payment shall be submitted to the building official prior to issuance of the building certificate of occupancy.

Exception 2 recognizes that there are circumstances where the onsite renewable energy may provide a portion of the minimum of 2% of the building's electrical energy use. When this condition is confirmed by the building official, a combination of the onsite renewable energy system and the purchase of Renewable Energy Credits that provide a combined 0.5 watts per square foot of conditioned floor area is permitted. Purchase of the required RECS must be for a ten year period, shall be paid in full and non--and documentation of full payment shall be submitted to the building official prior to issuance of the building certificate of occupancy.

Exception 3 granted to certain occupancies where there is a high volume of hot water consumption. In these cases, if 10% of the hot water needs in these buildings is met by geothermal or solar thermal systems, then the 2% minimum for renewable energy is not required. For other occupancies where the hot water consumption is relatively low, it is more beneficial to provide 2% of their annual energy usage with other renewable energy systems or RECS.

Exception 4 granted to buildings where geothermal or solar thermal systems provide at least 10% of the buildings space heating or space cooling, then the 2% minimum for renewable energy is not required.

Section 610.1.1 and Section 610.1.2. These sections identify a performance based or prescriptive compliance path for the onsite renewable energy system requirement.

Section 610.2. This section refers the user to the appropriate codes and manufacturer's instructions for requirements related to installation, inspection, etc. of onsite renewable energy systems.

Existing sections 610.2, 610.3, 610.4 attempted to put system specific requirements in this code. In the 2015 IBC the system specific requirements were adequately added/addressed. There is no longer a need for this type of information in the IgCC so it is deleted.

Section 610.2.1. This existing section related to performance verification has been adapted to apply to all renewable energy systems.

Section 610.2.2. This existing section has been changed to reflect the fact that monitoring requirements did not make the cut and are not found in section 603. The appropriate reference is made to the metering section.

Chapter 2:

Definitions for Renewable Energy Credit (REC) and Renewable Energy Source, Onsiteave been modified. A new definition for Onsite Renewable Energy System has been added.

Renewable Energy Credit (REC), was modified to remove unnecessary language from the definition. The deleted language is more appropriate for a user guide.

Renewable Energy Source, Onsite was modified to Renewable Energy Source and to remove language that is related to systems. Onsite Renewable Energy System is a new added definition that defines systems using renewable energy sources as a means of generating energy for the building or building site. This term is widely used throughout section 610.

Cost Impact: Will not increase the cost of construction. This proposal simplifies this requirement and will ease compliance and enforcement of onsite renewable energy systems.

GEW133-14: 610-ROSS1103

GEW134-14
610.1, 610.1.1, 610.1.2, 610.4

Proponent: Charles Foster, Steffes Corporation, representing self (cfoster20187@yahoo.com)

Revise as follows:

610.1 Renewable energy systems requirements. Buildings that consume energy shall comply with this section. Each building or surrounding lot or building site where there are multiple buildings on the building site shall be equipped with one or more renewable energy systems in accordance with this section.

Renewable energy systems shall comply with the requirements of Section 610.2 for solar photovoltaic systems, Section 610.3 for wind systems, or Section 610.4 for solar water heating systems, and Section 610.5 for performance monitoring and metering of these systems as approved by the code official. These systems shall be commissioned in accordance with the requirements of Section 611.

Exception: Renewable energy systems are not required for the following:

1. Buildings or building sites where there are multiple buildings on the building site providing not less than ~~2~~ 3 percent of the total estimated annual energy use of the building, or collective buildings on the site, with onsite renewable energy using a combination of renewable energy generation systems complying with the requirements of Section 610.2, 610.3, or 610.4.
2. Where not less than 4 5 percent of the total annual building energy consumption from renewable generation takes the form of a 10-year commitment to renewable energy credit ownership, confirmed by the code official.
3. Where the combined application of onsite generated renewable energy and a commitment to renewable energy credit ownership as confirmed by the code official, totals not less than 4 5 percent of the total annual building energy consumption from renewable generation.

610.1.1 Building performance-based compliance. Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.1, performance- based compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than ~~2~~3 percent of the total estimated ~~calculated~~ annual energy use of the building, or collective buildings on the site.

610.1.2 Building prescriptive compliance. Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.2, prescriptive compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than ~~2~~ 3 percent of the total estimated annual energy use of the building, or collective buildings on the building site~~, with onsite renewable energy by calculation demonstrating that onsite renewable energy production has a rating of not less than 1.75 Btu/h (0.5 W) or not less than 0.50 watts per square foot of conditioned floor area, and using any single or combination of renewable energy generation systems meeting the requirements of Sections 610.2, 610.3, or 610.4~~.

610.4 Solar water heating equipment. Not less than ~~10~~ 20 percent of the building's annual estimated hot water energy usage shall be supplied by onsite solar water heating equipment.

Reason: This proposal does five primary things:

1. increases the onsite renewable requirement from 2% to 3%,
2. increases the REC purchase requirement from 4% to 5%,

3. reduces the RC commitment time from 10 to 5 years,
4. cleans up unintelligible language in Section 610.1.2., and
5. increases the solar water heating requirement from 10% to 20%.

The price of onsite solar is decreasing as the cost to produce solar photovoltaic panels falls. Moreover, the IgCC should aggrssively promote renewable energy. Moving from a 2% to 3% requirement is not unreasonable given the market and the goals of the IgCC.

The same argument holds for increasing REC purchase requirements from 4% to 5%. The 10 year REC purchase requirement that currently exists in the IgCC is too long as serves as a barrier to the efficient development of grid-scale renewable energy projects. This proposal suggests 5 years as an alternative.

Next, some of the existing language in Section 610.1.2 is, at best, confusing. This proposal removes the confusing language.

Finally, the solar water heating requirement in Section 610.4 is very low. Solar thermal is a proven technology that can easily economically provide virtually all the domestic hot water for most commercial office buildings, much less a green building. The IgCC should increase the percentage from 10% to 20%.

Cost Impact: Will not increase the cost of construction.

GEW134-14: 610.1.1-FOSTER525

GEW135-14

610.2, 610.3, 610.5.1, 610.5.2

Proponent: Charles Foster, Steffes Corp., representing self (cfoster20187@yahoo.com)

Revise as follows:

610.2 Solar photovoltaic systems. Solar photovoltaic systems shall be sized to provide not less than 2 percent of the total estimated annual ~~electric~~ energy consumption of the building, or collective buildings on the building site in accordance with Section 610.1.1 or 610.1.2.

610.3 Wind energy systems. Wind energy systems shall be designed, constructed and sized to provide not less than 2 percent of the total estimated annual ~~electric~~ energy consumption of the building, or collective buildings on the building site in accordance with NFPA 70 and Section 610.1.1 or 610.1.2.

610.5.1 Metering. Renewable energy systems shall be metered separately from the building's electrical and fossil fuel meters and shall~~. Renewable energy systems shall be metered to~~ measure the amount of renewable electric or thermal energy generated on the building site in accordance with Section 603. Such metering shall include the renewable energy system output and time of production to facilitate the monitoring required by Section 610.5.2.

610.5.2 Monitoring. Renewable energy systems shall be monitored at least monthly to determine the coincidence between ~~measure~~ the peak electric or thermal energy generated by the renewable energy systems ~~during~~ and the building's ~~anticipated~~ peak electric or fossil fuel consumption period in accordance with Section 603.

Reason: This proposal addresses two issues:

1. a mismatch in scope between various sections on the amount of renewable energy required, and
2. cleans up awkward language on metering and monitoring.

1. Sections 610.1.1 and 610.1.2 establish minimum size requirements for on-site renewable energy facilities. Both of these sections require "2 percent of the total calculated annual energy use of the building" to be provided by on-site renewable energy systems. This would include the use of all energy sources including electricity, gas, propane, oil and any other fuel source. Sections 610.2 and 610.3, however, change the language to speak only to "2 percent of the total estimated ***electric*** energy consumption," not the broader scope of "total calculated annual energy consumption" as required in Sections 610.1 and 610.2. (emphasis added)

Even if a reading of these various sections could be tortured into making some sense, the incentive would be in direct conflict with green building goals as it would tend to encourage the use of on site fossil fuels in lieu of investing in on-site renewables.

Making these changes would also reconcile Sections 610.2 and 3 with Section 610.4 that requires 10 percent of the "building's annual estimated hot water energy usage," thus broadly addressing all fuels and not just electricity.

2. Sections 610.5.1 and 610.5.2 address metering and monitoring of renewable energy systems. The proposed change to Section 610.5.1 attempts to streamline the section and to add some specificity as to the metering output requirements. Currently, Section 610.5.2 requires "monitoring" but it does not provide any guidance; continuous monitoring? quarterly? The proposal simply attempts to require periodic and systematic monitoring.

Cost Impact: Will not increase the cost of construction.

GEW135-14: 610.2-FOSTER507

GEW136-14

610.1, 610.1.2, 610.5 (New), 610.5.1 (New), 610.5.2 (New), 610.5.3 (New), 610.6 (New), 610.6.1 (New), 610.6.2 (New), 610.6.3 (New)

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

610.1 Renewable energy systems requirements. Buildings that consume energy shall comply with this section. Each building or surrounding lot or building site where there are multiple buildings on the building site shall be equipped with one or more renewable energy systems in accordance with this section.

Renewable energy systems shall comply with the requirements of Section 610.2 for solar photovoltaic systems, Section 610.3 for wind systems, ~~or~~ Section 610.4 for solar water heating systems, Section 610.5 for biogas systems, or Section 610.6 for biomass systems, and shall comply with Section ~~610.5~~ 610.7 for performance monitoring and metering of these systems as *approved* by the *code official*. These systems shall be commissioned in accordance with the requirements of Section 611.

Exception: Renewable energy systems are not required for the following:

1. Buildings or building sites where there are multiple buildings on the building site providing not less than 2 percent of the total estimated annual energy use of the building, or collective buildings on the site, with onsite renewable energy using a combination of renewable energy generation systems complying with the requirements of Section 610.2, 610.3, ~~or~~ 610.4, 610.5, or 610.6.
2. Where not less than 4 percent of the total annual building energy consumption from renewable generation takes the form of a 10-year commitment to *renewable energy credit* ownership, confirmed by the *code official*.
3. Where the combined application of onsite generated renewable energy and a commitment to *renewable energy credit* ownership as confirmed by the *code official*, totals not less than 4 percent of the total annual building energy consumption from renewable generation.

610.1.2 Building prescriptive compliance. Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.2, prescriptive compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than 2 percent of the total estimated annual energy use of the building, or collective buildings on the building site, with onsite renewable energy by calculation demonstrating that onsite renewable energy production has a rating of not less than 1.75 Btu/h (0.5 W) or not less than 0.50 watts per square foot of conditioned floor area, and using any single or combination of renewable energy generation systems meeting the requirements of Sections 610.2, 610.3, ~~or~~ 610.4, 610.5, or 610.6.

610.5 Biogas energy systems. Biogas energy systems shall be designed, constructed, and sized to provide not less than 2 percent of the total estimated annual energy consumption of the building, or collective buildings on the building site in accordance with Section 610.1.1 or 610.1.2.

610.5.1 Installation, location, and structural requirements. Biogas energy systems shall be located in the building, on the building, adjacent to the building, or on the building site.

610.5.2 On-site waste materials. Only waste materials that are produced at the building or building site shall be allowed to be used in the biogas system. Transportation of waste materials to the building or building site is prohibited.

610.5.3 Gas mixing. Biogas shall not be mixed with other fuel gases at the building or building site, except where the on-site appliances using the fuel gases are in compliance with the applicable mechanical and safety code requirements relative to the mixing of different types of fuel gases.

610.6 Biomass energy systems. Biomass energy systems shall be designed, constructed, and sized to provide not less than 2 percent of the total estimated annual energy consumption of the building, or collective buildings on the building site in accordance with Section 610.1.1 or 610.1.2.

610.6.1 Installation, location, and structural requirements. Biomass energy systems shall be located in the building, on the building, adjacent to the building, or on the building site.

610.6.2 On-site biomass materials. Only those biomass materials that are produced at the building or building site shall be used in the biomass system. Transportation of biomass materials produced at the building or building site to another building or building site is prohibited.

610.6.3 Biomass co-firing. Biomass shall not be mixed with other types of fuel at the building or building site, except where the on-site appliances using the fuel are in compliance with the applicable mechanical and safety code requirements relative to the use and mixing of biomass with other types of fuel.

Reason: Biogas and biomass are listed as renewable energy sources in the IgCC, but there is no language in Section 610 that would allow such systems to meet the renewable energy requirements of Section 610.

This code change will allow biogas and biomass systems to meet the renewable energy requirements of the code. This will allow building owners more flexibility and more options to meet the requirements, especially in areas that have poor solar and/or wind resources.

The new text provides language for on-site renewable biogas biomass systems that is consistent with the requirements for on-site renewable electric systems.

In addition, as an alternative and to be consistent with requirements shown in Section 610.4, the value could be increased to 10%, since biogas and biomass energy systems are likely to have smaller footprints (in terms of area or volume of space needed for similar energy outputs) and a higher "energy density" than other on-site renewable energy systems.

Other changes are editorial and provided to show the changes to the Section numbering.

Cost Impact: Will not increase the cost of construction. This will provide more options for building owners, and is likely to reduce the cost of meeting the renewable energy requirements of the IgCC.

GEW136-14: 610.1-ROSENSTOCK508

GEW137-14
610.1.1 (New)

Proponent: Jim Edelson, New Buildings Institute, representing NBI (edelson8@gmail.com)

Add new text as follows:

<u>**610.1.1 Renewable energy credit (REC).** A renewable energy credit (REC) shall comply with all of the following:</u>

1. <u>Be from a renewable electricity generation facility that began operation or was repowered not earlier than 15 years prior to the date of the purchase, and represent the renewable and environmental attributes of electricity generated at that facility,</u>
2. <u>Not be derived from a renewable electricity generation facility that has been mandated by a local, state or federal government agency or was required under any legal requirement.</u>
3. <u>Not be simultaneously used to meet a local, state or federal energy mandate or other legal requirement.</u>
4. <u>Not represent renewable energy, renewable attributes or environmental attributes that can be legitimately claimed by another party.</u>

Reason: The IgCC's use of Renewable Energy Credit (REC) needs additional specification. The proposed specifications for RECs reflects language that many states and regions have used to prevent double counting of RECs and "aged-out" systems producing RECs. These minimum requirements are also included in other national certifications, such as Green- E. This set of minimum quality requirements for RECs serves as a means to ensure RECs are of sufficient quality to achieve their intended objective as a trade-off for on-site renewable systems. Specifically, these quality minimums lead to additional investments in installed renewable energy generating facilities. For the instances where the model code is being adopted in jurisdictions that already have similar requirements for REC quality, such as Green-E, this proposed IgCC language is consistent with those requirements.

Cost Impact: Will not increase the cost of construction.

GEW137-14: 610.1.1 (NEW)-EDELSON788

GEW138-14
610.2.3 (New)

Proponent: Edward Golden, Ascend Restoration Services, Inc., representing Ascend Restoration Services, Inc. (ed.golden@ascendrestoration.com)

Add new text as follows:

610.2.3 Roof mounted and elevated solar photovoltaic systems. The installation of roof mounted and elevated solar photovoltaic system components shall comply with Section 1013.6 of the *International Building Code,* Section 1013.7 of the *International Fire Code* and Section 304.11 of the *International Mechanical Code.*

Reason: To coordinate with the recent changes in the IBC, IFC and IMC which passed in code group A as E108-12.

There is an expanding list of equipment, assemblies, systems, devices and items that are now commonly being placed on rooftops and elevated walking surfaces that require routine maintenance. The current provisions of these sections require guards to be constructed as a method of fall protection provided for service and installation workers. This code change proposal is needed so there is correlation between IgCC, IBC, IFC and the IMC. This expands the fall protection, life safety provisions to a growing number of trades and service workers that are working on elevated walking surfaces. The proposal also provides an alternate method of compliance with the inclusion of exceptions which allow for the installation of fall arrest/restraint anchorage connector devices meeting ANSI Z359.1 which is the nationally recognized consensus general industry standard used nationally. The proposed exception is a choice made by the designer and building owner that provides design flexibility and the opportunity to lower construction cost associated with building guards. The proposal will increase the uniform application of this section of the code. The Bureau of Labor Statistics, US Department of Labor reports the fatalities due to falls for the years from 1998 to 2010 are second only to highway incidents, with an average of 743 fatalities each year over this 12 year period. Of the 635 fatal falls in 2010 one third are from falls from ladders or roofs. In 2010 the construction industry had the highest number of fatal occupational injuries. In 2010 for non fatal falls the median number of days away from work due to falls to a lower level was 14 days. Clearly the code needs to be improved to provide fall protection where mechanical equipment, appliances, fans, roof hatch openings, solar arrays,solar water heaters, photovoltaic panels, skylights, chimneys, gutters, attic vents, and ventilators, satellites dishes, antennas, television/radio/internet and other communication equipment and all other machinery and other components that require service are located on elevated surfaces more than 30 inches above lower level.

Cost Impact: Will not increase the cost of construction. The code change proposal will not increase the cost of construction because, the inclusion of exception into the IBC, IFC, and IMC provide a choice to lower the cost of construction.

GEW138-14: 610.2.3 (NEW)-GOLDEN435

GEW139-14
610.4, Chapter 12

Proponent: Jim Huggins, Solar Rating & Certification Corp., representing Solar Rating & Certification Corp.

Revise as follows:

610.4 Solar water heating equipment. Not less than 10 percent of the building's annual estimated hot water energy usage shall be supplied by onsite solar water heating equipment.

<u>The solar water heating equipment shall comply with SRCC 300. The annual estimated output of the solar water heating equipment shall be determined by an approved certification body or by using an approved, publicly available calculation program using solar collector performance information published by an approved certification body.</u>

Add new standard as follows:

<u>**SRCC**</u>
<u>Solar Rating & Certification Corp.,</u>
<u>400 High Point Drive, Suite 400,</u>
<u>Cocoa, FL 32926</u>

<u>SRCC 300-2013-09 Minimum Standards for Solar Water Heating Systems</u>

Reason: This section requires that 10% of the building's hot water energy usage be supplied by a solar system, but does not explain how to determine the energy contribution of the solar equipment. This proposal adds a requirement to comply with the nationally recognized standard for solar thermal systems. This requirement is in the IRC, but not in the IMC or the IECC, so it is needed here to cover non-residential systems.

Certification by an approved Certification Body will provide to the design professional the information needed determine the annual estimated contribution of the solar thermal system to the building's hot water energy usage. The alternate method allows the design professional to determine the solar system's contribution using an approved calculation method.

Cost Impact: Will not increase the cost of construction. Certification of solar thermal systems is already required by incentive programs, utilities, and many states so most solar thermal systems are already certified. For those cases where the system is not certified, the alternate method provides the design professional a means to calcuate the solar system output. Rather than increasing the cost of construction, this modification should lower it by make it easier for the design professional to determine compliance with the 10% requirement.

Analysis: A review of the standard proposed for inclusion in the code, SRCC 300-2013-09 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2014.

GEW139-14: 610.4-HUGGINS629

GEW140-14
610.4.1 (New)

Proponent: Edward Golden, Ascend Restoration Services, Inc, representing Ascend Restoration Services, Inc. (ed.golden@ascendrestoration.com)

Add new text as follows:

610.4.1 Roof mounted and elevated solar water heating equipment. The installation of roof mounted and elevated solar water heating system components shall comply with Section 1013.6 of the *International Building Code*, Section 1013.7 of the *International Fire Code* and Section 304.11 of the *International Mechanical Code.*

Reason: To coordinate with the recent changes in the IBC, IFC and IMC which passed in code group A as E108-12.

There is an expanding list of equipment, assemblies, systems, devices and items that are now commonly being placed on rooftops and elevated walking surfaces that require routine maintenance. The current provisions of these sections require guards to be constructed as a method of fall protection provided for service and installation workers. This code change proposal is needed so there is correlation between IGCC, IBC, IFC and the IMC. This expands the fall protection, life safety provisions to a growing number of trades and service workers that are working on elevated walking surfaces. The proposal also provides an alternate method of compliance with the inclusion of exceptions which allow for the installation of fall arrest/restraint anchorage connector devices meeting ANSI Z359.1 which is the nationally recognized consensus general industry standard used nationally. The proposed exception is a choice made by the designer and building owner that provides design flexibility and the opportunity to lower construction cost associated with building guards. The proposal will increase the uniform application of this section of the code. The Bureau of Labor Statistics, US Department of Labor reports the fatalities due to falls for the years from 1998 to 2010 are second only to highway incidents, with an average of 743 fatalities each year over this 12 year period. Of the 635 fatal falls in 2010 one third are from falls from ladders or roofs. In 2010 the construction industry had the highest number of fatal occupational injuries. In 2010 for non fatal falls the median number of days away from work due to falls to a lower level was 14 days. Clearly the code needs to be improved to provide fall protection where mechanical equipment, appliances, fans, roof hatch openings, solar arrays,solar water heaters, photovoltaic panels, skylights, chimneys, gutters, attic vents, and ventilators, satellites dishes, antennas, television/radio/internet and other communication equipment and all other machinery and other components that require service are located on elevated surfaces more than 30 inches above lower level.

Cost Impact: Will not increase the cost of construction. The code change proposal will not increase the cost of construction because, the inclusion of exception into the IBC, IFC and IMC provide a choice to lower the cost of construction.

GEW140-14: 610.4.1 (NEW)-GOLDEN440

GEW 141-14
611

Proponent: Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com); Craig Conner, representing self (craig.conner@mac.com)

Delete without substitution:

~~611 ENERGY SYSTEMS COMMISSIONING AND COMPLETION~~

Reason: The proposal is delete all of Section 611. Most of this section is covered by provisions in the IECC.

Cost Impact: Will not increase the cost of construction. The proposal removes provisions.

GEW 141-14: 611-KLEIN1218

GEW142-14

611.1 611.1.1, 611.1.2, 611.1.2.1, 611.1.2.2, 611.1.3, 611.1.3.1, 611.1.3.2, 611.1.3.3, 611.1.4, 611.1.4.1, 611.1.4.2, 611.1.4.3, 611.1.5, 611.1.5.1, 611.1.5.2, 611.1.5.3, 611.1.5.4, 611.1.5.5, 611.2, 611.3, 611.3.1, 611.3.2, 611.3.3, 611.3.3.1, 611.3.3.2, 611.3.3.3, 611.3.3.4, 611.3.4, 611.3.5, 611.4, 611.4.1, 611.4.2, 611.4.3 (New), 611.4.5 (New), 611.5 (New), 611.6 (New), 611.7 (New), 611.7.1 (New), 611.7.2 (New), 611.7.3 (New), 611.8 (New), 611.8.1 (New), 611.9 (New), 611.9.1 (New), 611.9.2 (New), 611.9.2.1 (New), 611.9.2.2 (New), 611.9.2.3 (New), 611.9.2.4 (New), 611.9.2.5 (New), 611.10 (New), 611.10.1 (New), 611.10.2 (New), 611.10.3 (New)

THIS CODE CHANGE PROPOSAL IS ON THE AGENDA OF THE IgCC GENERAL CODE DEVELOPMENT COMMITTEE. SEE THE HEARING ORDER FOR THE IgCC GENERAL CODE DEVELOMPENT COMMITTEE.

Proponent: Brenda Thompson, Chair, representing Sustainability, Energy, High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Revise as follows:

611.1 ~~Mechanical~~ Systems commissioning and completion requirements. ~~Within 60 days from approval conducting the final mechanical inspection,the *registered design* professional~~ Prior to passing the final inspection, the *registered design professional* or *approved agency* shall provide to the code official evidence of ~~mechanical~~ systems commissioning and completion of the ~~mechanical system~~ commissioned building systems installation ~~to the *code official*~~, in accordance with the *International Energy Conservation Code* *and provisions of this code*. A Final Commissioning Report and Systems Manual shall be provided before project completion. ~~Drawing notes~~ Construction documents shall clearly indicate provisions for commissioning and completion requirements in accordance with this section and Section 903, and are permitted to refer to specifications for further requirements. Construction documents shall list equipment and systems to be commissioned and include the location of, and performance data pertaining to, each piece of equipment and system. The construction documents shall specify that the documents prescribed in this section and Section 903 be provided to the building owner before project completion. Copies of ~~all~~ the documentation shall be ~~given to the owner and~~ made available to the *code official* upon request.

~~**611.1.1 Commissioning plan.** A commissioning plan shall be developed by a registered design professional or approved agency and include as a minimum all of the following items:~~

1. ~~A narrative describing the activities that will be accomplished during each phase of commissioning, including guidance on who accomplishes the activities and how they are completed.~~
2. ~~Equipment and systems to be tested including, but not limited to, the specific equipment, appliances or systems to be tested and the number and extent of tests.~~
3. ~~Functions to be tested including, but not limited to, calibrations and economizer controls.~~
4. ~~Conditions under which the test shall be performed including, but not limited to, affirmation of winter and summer design conditions and full outside air.~~
5. ~~Measurable criteria for performance.~~

~~**611.1.2 Systems adjusting and balancing.** HVAC systems shall be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the product specifications. Test and balance activities shall include, at a minimum, the provisions of Sections 611.1.2.1 and 611.1.2.2.~~

~~**611.1.2.1 Air systems balancing.** Each supply air outlet and zone terminal device shall be equipped with a means for air balancing in accordance with the *International Mechanical Code*. Discharge dampers are prohibited on constant volume fans and variable volume fans with motors of 10 hp (7.35 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (735 W), fan speed shall be adjusted to meet design flow conditions.~~

~~**Exception:** Fans with fan motor horsepower of 1 hp (735 W) or less.~~

~~**611.1.2.2 Hydronic systems balancing.** Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the capability to measure pressure across the pump, or shall have test ports at each side of each pump.~~

~~**Exceptions:**~~

1. ~~Pumps with pump motors of 5 hp (3677 W) or less.~~
2. ~~Where throttling results in not greater than 5 percent of the nameplate horsepower draw above that required if the impeller were trimmed.~~

~~**611.1.3 Functional performance testing.** Functional performance testing shall be in accordance with the requirements of Sections 611.1.3.1, 611.1.3.2 and 611.1.3.3.3~~

~~**611.1.3.1 Equipment.** Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with *approved* plans and specifications so that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all specified modes of control and sequence of operation, including under full-load, part-load and all of the following emergency conditions:~~

1. ~~Each mode as described in the sequence of operation.~~
2. ~~Redundant or automatic backup mode.~~
3. ~~Performance of alarms.~~
4. ~~Mode of operation upon a loss of power and restoration of power.~~

~~**611.1.3.2 Controls.** HVAC control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operated in accordance with the *approved* plans and specifications. Sequences of operation shall be functionally tested to document that they operate in accordance with the *approved* plans and specifications.~~

~~**611.1.3.3 Economizers.** Air economizers shall undergo a functional test to determine that they operate in accordance with the manufacturer's specifications.~~

~~**611.1.4 Preliminary commissioning report.** A preliminary report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or approved agency and provided to the building owner. The report shall be identified as "Preliminary Commissioning Report" and shall identify all of the following:~~

1. ~~Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.~~
2. ~~Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.~~
3. ~~Climatic conditions required for performance of the deferred tests.~~

~~**611.1.4.1 Acceptance.** Buildings, or portions thereof, shall not pass the final mechanical inspection until such time as the *code official* has received a letter of transmittal from the building owner acknowledging that the building owner has received the Preliminary Commissioning Report.~~

~~**611.1.4.2 Copy.** At the request of the *code official*, a copy of the Preliminary Commissioning Report shall be made available for review.~~

~~**611.1.4.3 Certification.** A certification, signed and sealed by the *registered design professional*, documenting that the mechanical and service water heating systems comply with Sections C403 and C404 of the *International Energy Conservation Code*, shall be provided to the *code official*.~~

~~**611.1.5 Completion requirements** The construction documents shall specify that the requirements described in this section be provided to the building owner within 90 days of the date of receipt of the certificate of occupancy.~~

~~**611.1.5.1 Drawings.** Construction documents shall include the location of and performance data pertaining to each piece of equipment.~~

~~**611.1.5.2 Manuals.** An operating and maintenance manual in accordance with industry-accepted standards shall be provided and shall include all of the following:~~

1. ~~Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.~~
2. ~~Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the building project. Required routine maintenance shall be clearly identified.~~
3. ~~Names and addresses of not less than one service agency.~~

~~A systems manual shall be provided and shall include all of the following:~~

1. ~~HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in programming comments.~~
2. ~~A complete narrative of how each system is intended to operate, including recommended setpoints, seasonal changeover information and emergency shutdown operation.~~
3. ~~Control sequence descriptions for lighting, domestic hot water heating and all renewable energy systems complete with a description of how these systems connect to, and are controlled in conjunction with, the overall building system.~~

~~**611.1.5.3 System balancing report.** A written report describing the activities and measurements completed in accordance with Section 611.1.2 shall be provided.~~

~~**611.1.5.4 Final commissioning report.** A complete report of test procedures and results identified as "Final Commissioning Report" shall be completed and provided to the building owner. The report shall include all of the following:~~

1. ~~Results of all functional performance tests.~~
2. ~~Disposition of all deficiencies found during testing, including details of corrective measures used or proposed.~~
3. ~~All functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.~~

~~**Exception:** Deferred tests that were not performed at the time of report preparation because of climatic conditions.~~

~~**611.1.5.5 Post-occupancy recommissioning.** The commissioning activities specified in Sections 611.1.2 through 611.1.5 shall be repeated 18 to 24 months after certificate of occupancy. Systems and control devices that are not functioning properly shall be repaired or replaced. Adjustments to calibration settings shall be documented. This documentation shall be provided to the building owner.~~

611.2 ~~Sequence of operation~~ Commissioning plan. ~~A sequence of operation shall be developed and finalized upon commissioning, when the operational details are initialized and validated. A sequence of operation shall be the final record of system operation, and shall be included on the control diagram "as" or as part of the education and operation and maintenance document that is provided to the owner.~~

A commissioning plan shall be developed for the systems specified in the construction documents to be commissioned by a registered design professional or approved agency and shall be assembled in accordance with Section 903.3.

611.3 ~~Lighting and electrical systems commissioning and completion requirements.~~ Functional and performance testing. ~~Prior to issuance of a certificate of occupancy, the *registered design professional* shall provide evidence of lighting and electrical systems commissioning and completion in accordance with the *International Energy Conservation Code* and the provisions of this section.~~

~~Drawing notes shall specify the provisions for commissioning and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections 611.2.4 and 611.2.5~~

Functional and performance testing shall be performed in accordance with the requirements of Sections 611.3.1, 611.3.2 and 611.3.3.

611.3.1 ~~Preconstruction documentation, lighting.~~ Equipment. ~~Construction and owner education documents shall include floor plans, diagrams and notations of sufficient clarity describing the types of, location and operational requirements of all lighting controls including a sequence of operation and preliminary intended setpoints for all dimming systems and automatic *daylight controls*, demonstrating conformance to the provisions of this code, relevant laws, ordinances, rules and regulations, as *approved* by the *code official*.~~

Equipment functional and performance testing shall demonstrate that the installation and operation of components, systems, and system-to-system interfacing relationships is in accordance with *approved* plans and specifications so that operation, function, performance and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all specified modes of control and sequence of operation, including under full-load, part-load and all of the following emergency conditions:

1. Each mode as described in the sequence of operation.
2. Redundant or automatic backup mode.
3. Performance of alarms.
4. Mode of operation upon a loss of power and restoration of power.

611.3.2 ~~Verification.~~ Controls. ~~The approved agency conducting commissioning shall verify that controls have been installed in accordance with the *approved* construction documents. Any discrepancies shall be reviewed for compliance with Section 608 and the requirements of Section C405.2 of the *International Energy Conservation Code*.~~

Control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operated in accordance with the *approved* plans and specifications.

611.3.3 ~~Commissioning.~~ Sequence of operation. ~~Lighting controls shall be commissioned in accordance with this section.~~ The sequence of operation shall be verified to document that the sequence operates in accordance with the *approved* plans and specifications. This verified sequence of operation shall be the final record of system operation, and shall be included on the control "record documents," and as part of the education and Systems Manual operation and maintenance document that is provided to the owner.

611.3.3.1 Occupant sensors. It shall be verified that the functional testing in accordance with Section C405.2 of the *International Energy Conservation Code* has been performed.

611.3.3.2 Automatic daylight controls. Automatic *daylight controls* shall be commissioned in accordance with all of the following:

1. It shall be verified that the placement and orientation of each sensor is consistent with the manufacturer's instructions. If not, the sensor shall be relocated or replaced.
2. Control systems shall be initially calibrated to meet settings and design intent established in the construction documents.
3. Prior to calibration of systems controlling dimmable luminaires, all lamps shall be seasoned in accordance with the recommendations of the lamp manufacturer.
4. Where located inside buildings, calibration of open-loop *daylight controls*, which receive illumination from natural light only, shall not occur until fenestration shading devices such as blinds or shades have been installed and commissioned.
5. Calibration of closed-loop *daylight controls*, that receive illumination from both natural and artificial light, shall not occur until furniture systems and interior finishes have been installed, and any fenestration shading devices such as blinds or shades have been installed and commissioned.
6. Calibration procedures shall be in accordance with the manufacturer's instructions.

611.3.3.3 Time switch and programmable schedule controls. Lighting controls installed in accordance with Section 608 shall be programmed. Scheduling shall incorporate weekday, weekend and holiday operating times, including leap year and daylight savings time corrections. It shall be verified that system overrides work and are located in compliance with Section C405.2 of the *International Energy Conservation Code*.

611.3.3.4 Dimming systems with preset scenes. For programmable dimming systems, it shall be verified that automatic shutoff and manual overrides are working and that programming is complete. Prior to programming, the lamps shall be seasoned in accordance with NEMA LSD 23.

611.3.4 Post-commissioning documentation. The following documentation shall be provided to the building owner in accordance with Section 903.

1. Settings determined during commissioning activities outlined in Section 611.3.3.
2. A narrative describing the intent and functionality of all controls including any capability for users to override a schedule or master command.
3. Specification sheets for all lighting equipment and controls.
4. Operation manuals for each lighting control device. Required maintenance and maintenance schedules shall be clearly identified. Documentation and instructions necessary for building maintenance personnel to maintain and recalibrate lighting systems and controls.
5. An annual inspection schedule for lighting controls.
6. Troubleshooting information for fluorescent dimming systems and the remediation of switching issues such as false-ons and false-offs.

~~**611.3.5 Post-occupancy recommissioning.** The commissioning activities in Section 611.3.3 shall be repeated 18 to 24 months after issuance of the certificate of occupancy. Control devices that are not functioning properly shall be repaired or replaced. Adjustments to calibration settings shall be documented. This documentation shall be provided to the building owner.~~

611.4 Building envelope systems commissioning and completion requirements. Pre-certificate of occupancy commissioning report. ~~Prior to issuance of a certificate of occupancy, the *registered design professional* shall provide evidence of *building thermal envelope* systems commissioning and completion to the building owner in accordance with the *International Energy Conservation Code* and the provisions of this section.~~

~~Construction documents shall specify the provisions for commissioning and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the building owner and made available to the *code official* upon request in accordance with Sections 611.4.1 and 611.4.2.~~

A pre-certificate of occupancy report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or approved agency and shall be provided to the building owner prior to final inspection. The report shall be identified as "Pre-Certificate of Occupancy Commissioning Report" and shall be assembled in accordance with Section 903.4.1

611.4.1 ~~Preconstruction documentation, building thermal envelope.~~ Acceptance. ~~Construction and owner education documents shall indicate the location, nature and extent of the work proposed and show the functional requirements and operation of all *building thermal envelope* systems demonstrating conformance to the provisions of this code, relevant laws, ordinances, rules and regulations, as *approved* by the *code official*.~~

Buildings, or portions thereof, shall not pass the final mechanical inspection until such time as the *code official* has received a letter of transmittal from the building owner acknowledging that the building owner has received the Pre-Certificate of Occupancy Commissioning Report.

611.4.2 ~~Verification~~ Copy available for review. ~~The approved agency conducting commissioning shall verify that *building thermal envelope* systems have been installed in accordance with the *approved* construction documents. Any discrepancies shall be reviewed for compliance with requirements of the *International Energy Conservation Code* and this code.~~

At the request of the *code official*, a copy of the Pre-Certificate of Occupancy Commissioning Report shall be made available for review.

611.4.3 Verification. The approved agency conducting commissioning shall verify that *commissioned* systems have been installed and perform in accordance with the *approved* construction documents. Any discrepancies shall be reviewed for compliance with requirements of the *International Energy Conservation Code* and this code.

611.4.5 Manuals A Systems Manual assembled in accordance with industry-accepted standards and Section 903.6.1 shall be provided to the owner before project completion.

611.5 Final Commissioning Report. A complete report of accomplishment of the commissioning plan including test procedures and results identified as "Final Commissioning Report" shall be completed in accordance with Section 903.5.1 before project completion and shall be provided to the building owner.

611.6 Commissioning completion. The commissioning activities specified in the commissioning plan including delayed testing shall be completed and documented before project completion. Equipment and systems repaired or replaced and adjustments to set-points and calibration settings shall be documented in the record sequence of operation and in Systems Manual updates. These documentations shall be provided to the building owner.

611.7 HVAC commissioning. HVAC equipment and systems shall be commissioned in accordance with the IECC and this section using recognized commissioning standards, as approved.

611.7.1 Mechanical systems adjusting and balancing. HVAC systems shall be tested, adjusted and balanced in accordance with generally accepted standards, as approved. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the construction documents. Test and balance activities shall include the provisions of Section C408.2.2 of the *International Energy Conservation Code* except that the exceptions to Section C408.2.2 shall not apply. A written report describing the test and balance activities and measurements completed shall be provided with the final Systems Manual.

611.7.2 HVAC system operations. HVAC equipment and systems commissioning shall include testing and balancing verification including adjustment of temperatures, flows, and sequence of operation.

611.7.3 HVAC economizers. Air and water economizers shall undergo a functional test to determine that they operate in accordance with the manufacturer's specifications and perform to project requirements.

611.8 Domestic hot water system commissioning. Domestic hot water equipment and systems shall be commissioned in accordance with this section and the construction documents.

611.8.1 Domestic hot water system operations. Domestic hot water equipment and systems commissioning shall include verification and adjustment of temperatures, flows, and sequence of operation.

611.9 Lighting and electrical systems commissioning. Lighting, lighting controls, plug load controls and electrical systems commissioning shall be completed in accordance with the *International Energy Conservation Code* and the provisions of this section.

611.9.1 Preconstruction documentation, lighting. Construction and owner education documents shall include floor plans, diagrams and notations of sufficient clarity describing the types of, and location and operational requirements of the lighting controls including a sequence of operation, schedules and preliminary intended set-points for area controls, dimming systems and automatic daylight controls, demonstrating conformance to the provisions of the construction documents and this code, as approved by the code official.

611.9.2 Lighting controls commissioning. Lighting controls shall be commissioned in accordance with this section.

611.9.2.1 Occupant sensors. It shall be verified that the functional testing in accordance with Section C405.2 of the *International Energy Conservation Code* has been performed.

611.9.2.2 Automatic daylight controls. Automatic daylight controls shall be commissioned in accordance with all of the following:

1. It shall be verified that the placement and orientation of each sensor is consistent with the manufacturer's and designer's instructions. If not, the sensor shall be relocated or replaced.
2. Control systems shall be initially calibrated to meet settings and design intent established in the construction documents.
3. Prior to calibration of systems controlling dimmable luminaires, the lamps shall be seasoned in accordance with the recommendations of the lamp manufacturer in accordance with NEMA LSD 23.
4. Where located inside buildings, calibration of open-loop daylight controls, that receive illumination from natural light only, shall not occur until fenestration shading devices such as blinds or shades have been installed and commissioned.

5. Calibration of closed-loop daylight controls, that receive illumination from both natural and artificial light, shall not occur until furniture systems and interior finishes have been installed, and any fenestration shading devices such as blinds or shades have been installed and commissioned.
6. Calibration procedures shall be in accordance with the manufacturer's instructions.

611.9.2.3 Time switch and programmable schedule controls. Lighting controls installed in accordance with Section 608 shall be programmed and commissioned. Scheduling shall incorporate weekday, weekend and holiday operating times, including leap year and daylight savings time corrections. It shall be verified that system overrides work and are located in compliance with Section C405.2 of the *International Energy Conservation Code*.

611.9.2.4 Dimming systems with preset scenes. For programmable dimming systems, it shall be verified that automatic shutoff and manual overrides are working and that programming is complete. Prior to programming, the lamps shall be seasoned in accordance with NEMA LSD 23.

611.9.2.5 Lighting documentation. The following documentation for lights, systems and control devices shall be provided to the building owner:

1. Settings determined during commissioning activities outlined in Section 611.9.2
2. A narrative describing the intent and functionality of all controls including any capability for users to override a schedule or master command.
3. Specification sheets for all lighting equipment and controls.
4. Operation manuals for each lighting control device. Required maintenance and maintenance schedules shall be clearly identified. Documentation and instructions necessary for building maintenance personnel to maintain and recalibrate lighting systems and controls.
5. An annual inspection schedule for lighting controls.
6. Troubleshooting information for dimming systems and the remediation of switching issues such as false-ons and false-offs.

611.10 Building envelope systems commissioning, Building thermal envelope, dynamic glazing and shading device systems shall be commissioned and completion documentation shall be provided to the building owner in accordance with the *International Energy Conservation Code* and the provisions of this section.

611.10.1 Preconstruction documentation, building thermal envelope. Construction and owner education documents shall indicate the location, nature and extent of the work proposed and show the functional requirements and operation of the building thermal envelope, dynamic glazing and shading device systems demonstrating conformance to the provisions of this code.

611.10.2 Continuous air barrier commissioning. Prior to final inspection, the *registered design professional* or approved agency shall provide evidence of *continuous air barrier commissioning* that shall include:

1. Clear identification of the *continuous air barrier* components specified for the project and identified on approved construction documents
2. Review of planned construction details to ensure continuity of the air barrier over the entire *building thermal envelope*.
3. A field inspection checklist clearly showing the requirements necessary for proper installation of the *continuous air barrier*.
4. Witnessing and reporting on any *continuous air barrier* testing specified by the owner.
5. Periodic field inspections over the course of project construction to ensure compliance with the *continuous air barrier* requirements including but not limited to proper material handling and storage, use of approved materials and approved substitutes, proper material and surface preparation, air barrier continuity at all *building thermal envelope* penetrations and other

requirements as necessary for achieving the performance objective of the continuous air barrier.

6. A final commissioning report provided to the building owner and *code official* demonstrating compliance with the *continuous air barrier* requirements.

611.10.3 Continuous air barrier commissioning report. A final commissioning report shall be delivered to the building owner, and shall include:

1. A field inspection checklist showing the requirements necessary for proper installation of the continuous air barrier.
2. The results of any building air leakage testing
3. Reports from field inspections during project construction showing compliance with continuous air barrier requirements including but not limited to proper material handling and storage, use of approved materials and approved substitutes, proper material and surface preparation and air barrier continuity at building thermal envelope penetrations.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal is the first part of a two part proposal to separate the process of commissioning from the systems and building elements which must be observed, reviewed and found in compliance during the commissioning process. This change removes the process elements of commissioning, the second change – or Part II of this proposal will be to add a comprehensive process to Chapter 9 of this code. Thus, this proposal specifies the systems and building elements which need to be commissioned and the key things to be reviewed, the functions to be observed to verify that the installed systems are in compliance with the code. Chapter 9 will address the process of doing the commissioning including the specific reporting requirements.

Cost Impact: Will increase the cost of construction. While the vast majority of this proposal is editorial. New provisions for air barrier commissioning will add to the overall cost of the commissioning process.

GEW142-14: 611.1-THOMPSON1022

GEW143-14
611.1

Proponent: Maureen Traxler, City of Seattle, WA, representing Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

Revise as follows:

611.1 Mechanical systems commissioning and completion requirements. Within 60 days from approval ~~conducting~~ of the final mechanical inspection, the *registered design professional* shall provide evidence to the *code official* that installation and commissioning of mechanical systems has been completed ~~commissioning and completion of the mechanical system installation to the *code official*,~~ in accordance with the *International Energy Conservation Code*.

Drawing notes shall clearly indicate provisions for commissioning and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request.

Reason: This is an editorial proposal to simplify and improve the readability of this section.

Cost Impact: Will not increase the cost of construction.

GEW143-14: 611.1-TRAXLER620

GEW144-14
611.1.4.1

Proponent: Kathleen Petrie, City of Seattle, WA, representing City of Seattle, Department of Planning and Development (kathleen.petrie@seattle.gov)

Delete without substitution:

~~**611.1.4.1 Acceptance.** Buildings, or portions thereof, shall not pass the final mechanical inspection until such time as the *code official* has received a letter of transmittal from the building owner acknowledging that the building owner has received the Preliminary Commissioning Report.~~

Reason: As written, Section 611.1.4.1 does not add value to the enforcement process. Section 611.1.4 requires the preliminary commissioning report to be given to the owner and Section 611.1.4.2 states that a copy of the report be made available to the code official upon request, so Section 611.1.4.1 creates a layer of redundancy in the process. If the purpose of this section is to delay the final inspection in order to ensure that the contractor has dealt with any system deficiencies, then that is a contract negotiation between the owner and contractor.

Cost Impact: Will not increase the cost of construction.

GEW144-14: 611.1.4.1-PETRIE474

GEW145-14
611.1.5.5

Proponent: Barry Greive, Target Corporation, representing Target Corporation (barry.greive@target.com)

Revise as follows:

611.1.5.5 Post-occupancy recommissioning. <u>Where there is not an actively monitored and managed *energy management and control* system</u>, the commissioning activities specified in Sections 611.1.2 through 611.1.5 shall be repeated 18 to 24 months after issuance of the certificate of occupancy. Systems and control devices that are not functioning properly shall be repaired or replaced. Adjustments to calibration settings shall be documented. This documentation shall be provided to the building owner.

Reason: Systems with an EMCS are continuously monitored and essentially commissioning is done 24/7, reports stating how the system is functioning can be given to the Building Official if requested. Requiring post commissioning on EMCS structures is redundant and a miss use of resources.

Cost Impact: Will not increase the cost of construction.

GEW145-14: 611.1.5.5-GREIVE1012

GEW146-14

601.3, 601.3.3 (New), 612 (New), 612.1 (New), 612.2 (New), 612.2.1 (New), 612.2.2 (New), 612.2.3 (New), 612.2.4 (New), 612.3 (New), 612.3.1 (New), 612.3.2 (New), 612.3.3 (New), 612.3.4 (New), 612.3.5 (New)

Proponent: Duane Jonlin, City of Seattle, WA, representing Seattle Department of Planning and Development (duane.jonlin@seattle.gov)

Revise as follows:

601.3 Application. Buildings and their associated building sites shall comply with Section 601.3.1, ~~or~~ Section 601.3.2 or Section 601.3.3.

601.3.3 Operational energy use confirmation. Buildings shall comply with Sections 603, 610, 611, 612 and the total building performance compliance path in Section C407 of the *International Energy Conservation Code*.

612 OPERATIONAL ENERGY USE CONFIRMATION

612.1 Operational energy use limit. Buildings shall be designed according to total building performance criteria of Section C407 of the *International Energy Conservation Code*. The annual energy cost calculated for the *proposed design* shall be less than 85 percent of annual energy cost calculated for the *standard reference design*.

612.2 Demonstration period for operating energy use. The actual energy cost of the occupied building shall be less than 85 percent of annual energy cost calculated for the *standard reference design* for at least one 12-month recording period concluding within three years of the date of issuance of the Certificate of Occupancy.

The building shall be at least 75 percent occupied during the recording period. The energy cost for the *standard reference design* shall be adjusted according to Section 612.3. The owner shall notify the *code official* when this 12-month recording period has been successfully completed. The owner shall submit to the code official either certified copies of the utility bills for the recording period or a Portfolio Manager Energy Performance Report. The documentation shall indicate the occupancy type for each building tenant, the amount of conditioned floor area occupied by that tenant and the calendar time period during which that area of the building was occupied.

612.2.1 Issuance of temporary certificate of occupancy. Upon the satisfaction of the code official of compliance with all code provisions other than Section 612, the code official shall issue a *Temporary Certificate of Occupancy* according to Section 111.3 of the *International Building Code*.

612.2.2 Certificate of occupancy. Upon compliance with the provisions of Section 612.2, the *building* shall be issued a *Certificate of Occupancy.*

612.2.3 Non-compliance. Where the building fails to comply with Section 612.2, a notice of violation shall be issued.

612.2.4. Extension of demonstration period. For good cause, including conditions where less than 75 percent of the building is occupied, the *code official* is authorized to extend the demonstration period for one additional year. If the building is not at least 75 percent occupied after three additional one-year periods, the *code official* shall evaluate compliance with Section 612.2 based on the most recent one-year period and adjusted for the actual occupancy rate during that period.

612.3 Modifications for actual operating conditions. Where the operating conditions of the occupied building differ from those used for Total Building Performance calculations during the recording period, the *standard reference design* shall be modified according to the applicable provisions of Sections 612.3.1 through 612.3.5 and compliance shall be based upon the revised *standard reference design*.

612.3.1 Adjustment for change in use or occupancy. Where the use or occupancy of the building or a portion of the building changes from that identified in the permit submittal, the assigned energy performance target shall be adjusted to reflect the new occupancy.

612.3.2 Optional adjustment for change in occupancy characteristics. Where the actual occupant density, plug load density, operating hours or other occupancy characteristics are substantially different from those assumed in the *standard reference design*, the *standard reference design* is permitted to be revised to reflect those actual occupancy characteristics, subject to approval of the code official.

612.3.3 Optional adjustment for change in process loads. Where actual process loads are substantially different from those assumed in the *standard reference design*, the *standard reference design* is permitted to be revised to reflect the actual process loads, subject to approval of the code official.

612.3.4 Adjustment for partial occupancy. Where a portion of the floor area of the building is unoccupied during the demonstration period, the *standard reference design* shall be revised to reflect a weighted monthly average of the actual percentage of floor area occupied.

612.3.5 Adjustment for utility cost changes. Where the unit energy costs differ from the costs used in the *standard reference design*, the *standard reference design* shall be revised accordingly.

Reason: This proposal provides an optional compliance pathway ensuring that the building functions optimally when it is fully occupied and operating, essentially extending the concept of “commissioning” into that time period.

Using this pathway, a motivated building owner will be provided with a straightforward means to focus the whole project development team on the actual energy use, rather than just the energy model. It can be difficult and time-consuming to determine the cause of sub-par performance, in which case the issue is often simply dropped. Such performance problems might be due to design errors, construction defects, malfunctioning equipment or controls, incorrect system settings, operator errors, or occupant use of the space, but with traditional code compliance methods no one has responsibility to go looking for the cause, or even to know that the building is performing poorly.

The energy use limits in this pathway are determined using the IECC “Total Building Performance” modeling protocol, which limits modeled energy use to 85 percent of the “standard reference design.” The building must operate within its calculated energy limit for a 12-month period sometime during the first three years after construction. Buildings following this protocol are likely to perform significantly better than comparable buildings that simply begin operations without any further tracking or evaluation.

By using standardized IECC energy modeling protocol, rather than CBECS-based targets, this proposal provides a more nuanced standard, specific to the building and local climate. It is “energy cost” based, which allows use of the same energy model as the IECC, and greatly simplifies compliance verification for code officials – the code official simply looks at the certified utility bills.

A building that “really” performs at high level is far more important than an energy model or code compliance pathway that “theoretically” performs at a high level. Attaining such performance is important to society, and important to the owner who paid for that performance.

Cost Impact: Will not increase the cost of construction. Because it is an optional compliance path, this proposal does not increase the cost of construction.

GEW146-14: 612 (NEW)-JONLIN992

GEW147-14

601.3, 601.3.3 (New), 603.2.2 (New), 610.1.1, 612 (New), 612.1 (New), 612.1.1 (New), 612.1.2 (New), 612.1.2.1(New), 612.1.3 (New), 612.2 (New), 612.2.1 (New), 612.3(New), 612.3.1 (New), 612.3.2 (New), 612.3.3 (New), 612.3.4 (New)

Proponent: Ryan Colker, National Institute of Building Sciences, representing National Institute of Building Sciences (rcolker@nibs.org)

Revise as follows:

601.3 Application. Buildings and their associated building sites shall comply with Section 601.3.1, Section 601.3.2 or 601.3.3.

601.3.3 Outcome-based compliance. Buildings designed on an outcome basis shall comply with Sections 612, 603, 610, and 611 and the *International Energy Conservation Code*.

603.2.2 Onsite nonrenewable energy. For the purpose of determining compliance with the provisions of Section 603.2, the CO_2e emissions associated with onsite non-renewable energy use shall be calculated in accordance with Section 602.2.2.

610.1.1 Building performance-based and outcome-based compliance. Buildings and surrounding property or building sites where there are multiple buildings on the building site, that are designed and constructed in accordance with Section 601.3.1, performance-based compliance or Section 612.3 Outcome-based compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than 2 percent of the total calculated annual energy use of the building, or collective buildings on the site.

612 OUTCOME-BASED PATHWAY REQUIREMENTS.

612.1 Outcome-based requirements. Compliance for buildings and their sites to be designed on an outcome basis shall be determined by actual measurement of all the energy being used once the building and the energy using elements associated with the building site are in full operation in accordance with Equation 6-3. Where a building has multiple occupancy types, the maximum allowable energy use shall be based on total gross floor area of each occupancy type in relation to the total gross floor area of all occupancy types within the building. Buildings and building sites complying with this section shall also comply with the *International Energy Conservation Code*. Compliance shall be based on a determination of actual energy use in accordance with this section.

> **Exception:** Buildings having one or more uses or occupancies not listed in Table 612.1 or where a mixed use building in accordance with the *International Building Code* includes any occupancies not shown in Table 612.1, shall not be eligible to demonstrate compliance with this code in accordance with Section 612.

TABLE 612.1
REFERENCE ANNUAL ENERGY USE INDEX (EUIr)

Climate zone [a]	1A	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	6A	6B	7	8
Use and Occupancy[b]	Reference EUIr skBtu/sf/yr														
Business (B)															
Office	154	159	154	151	140	137	167	144	152	179	155	190	176	208	282
Bank	154	159	154	151	140	137	167	144	152	179	155	190	176	208	282
Medical office (non-	115	118	115	113	104	102	125	108	114	134	116	148	131	156	210

Climate zone [a]	1A	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	6A	6B	7	8
diagnostic)															
Storage (S-2)															
Distribution/ Shipping Center	105	67	69	66	64	55	75	70	66	87	81	104	95	119	186
Mercantile (M)															
Grocery/ Food Store	448	476	452	484	450	473	522	479	514	554	511	592	561	633	758
Assembly (A)															
Library (A-3)	234	232	224	230	217	209	254	228	235	275	246	304	277	327	434
Educational (E)															
Elementary/ Middle School	140	139	134	134	128	124	149	132	132	160	141	182	161	193	274
Institutional (I-2)															
Hospital/ Inpatient health	417	422	397	408	388	407	425	366	398	425	374	439	394	446	532

a Climate zones as determined in accordance with by Section C301 of the *International Energy Conservation Code.*
b. Use and occupancy as determined by Chapter 3 of the *International Building Code.*

612.1.1 zEPI. All outcome-based designs shall demonstrate a zEPI of not more than 51 as determined in accordance with Equation 6-3.

zEPI = 100 (EUI_a / EUI_r) **(Equation 6-3)**

Where:

EUI_a = the Actual Annual Energy Use Index for the *building* and *building site* expressed in accordance with Section 612.1.2 and Equation 6-4.
EUI_r = the Reference Annual Energy Use Index for the *building* use and occupancy in Table 612.1 as adjusted by Section 612.1.3 where applicable

612.1.2 Actual energy use intensity (EUIa). The actual energy use intensity (EUIa) of the *building* and *building site* shall be expressed in accordance with this section. On-site renewable energy generation in excess of the generation requirements of Section 610 shall be included in the calculation of the EUIa.

The EUI_a shall be determined in accordance with Equation 6-4 and Sections 612.1.2.1.

EUI_a = ($AEU_{consumption}$ – $AEU_{renewable}$)/TCFA **(Equation 6-4)**

Where:

EUI_a = the energy use intensity of the *building* and *building site*

$AEU_{consumption}$ = the annual energy consumed by the building and building site from all forms of energy specified in Sections 603.3.1 through 603.3.6 and converted to source Btus in accordance with Sections 602.1.2.2 and 602.1.2.3.

$AEU_{renewable}$ = the annual energy produced by *onsite renewable energy systems* in excess of the production required by Section 610 and converted to source Btus by multiplying onsite Btu production by a factor of 1.

TCFA = the total *conditioned floor area* of the building

612.1.2.1 Measurement of AEUs. The AEUs shall be determined from metering, utility billing or other form of measurement in accordance with Section 603.

612.1.3 Reference energy use intensity (EUIr). The reference energy use intensity shall be determined utilizing Table 612.1. The EUIr value from Table 603.1 shall be adjusted based on the monthly weighted average percentage of occupied floor area during the 12- month compliance period as documented in accordance with 612.3.2. For buildings with multiple use or occupancy designations in Table 612.1, the EUIr shall be adjusted based on the weighted area average of the use or occupancy.

612.2 Annual direct and indirect $C0_2e$ emissions. The emissions associated with the EUIa shall be less than or equal to the CO_2e emissions associated with the CO_2e emissions in accordance with the EUIr determined in Section 612.1.3. The CO_2e emissions calculations for the building and building site shall be determined in accordance with Sections 612.2.1 and 612.2.2 and Equation 6-5.

$CO_2ea \leq (CO_2er \times zEPI) / 100$ **(Equation 6-5)**

where:

zEPI = the minimum score as prescribed by Section 612.1.1

CO_2ea = emissions associated with the EUIa of the building as determined in accordance with Section 612.1.2

CO_2er = emissions associated with the EUIr as determined in accordance with Section 612.1.3

612.2.1 Onsite electricity. For the purpose of determining compliance with the provisions of Section 612.2, the CO_2e emissions associated with onsite electricity use shall be calculated in accordance with Section 602.2.1.

612.3 Compliance. Compliance with Section 612 shall be determined in accordance with Sections 612.3.1 through 612.3.4

612.3.1 Issuance of temporary certificate of occupancy. Where the code official determines a building and its site are in compliance with this code other than Section 612, the code official shall issue a Temporary Certificate of Occupancy as authorized in Section 111.3 of the *International Building Code*.

612.3.2 Reporting of energy use and CO_2e emissions. Within 36 months of issuance of the temporary certificate of occupancy, the building owner shall provide the *code official* with documentation, in a form acceptable to the code official and certified by a *registered design professional*, of a continuous 12-month period where the building complies with Sections 612.1 and 612.2. The occupancy or use type for the occupied period utilized in Section 612.1.3 shall be indicated in the documentation and include the time periods and square footage of the building occupied by all building tenants.

612.3.3 Certificate of occupancy. Upon compliance with Section 612.3.2, the building shall be issued a Certificate of Occupancy.

612.3.4 Non-compliance. Should the building owner fail to comply with Section 612.3.2, the owner shall be deemed non-compliant and be issued a violation.

Reason: This proposal for the establishment of an outcome-based approach to compliance with energy requirements is intended to address numerous issues impacting code departments, designers, building owners and energy efficiency advocates. To address these diverse needs, stakeholders representing these segments of the industry have come together to begin addressing these issues. While discussed in greater depth below, the following list represents some of the challenges addressed by this proposal:

Code departments have limited resources available to enforce building codes—particularly energy codes.

Energy use is highly measurable yet current code pathways anticipate results from designs, not actual building performance.

Designers often do not have the flexibility to use the latest technologies in achieving energy efficiency requirements.

Effectively capture all energy saving strategies including those not currently covered under the IECC including building orientation.

Reducing energy use at the systems level is required but this approach has not been handled effectively in the IECC.

Energy uses not covered within the existing code framework (i.e., plug loads) are a growing percentage of energy use associated with buildings.

For 35 years, since the first energy codes, there has been no consideration in the codes for how buildings actually perform – only criteria prescribing how they are to be designed and constructed. The provisions in virtually all energy codes and standards are based on a number of prescribed criteria that must be satisfied by specific products, materials and components of a building. The closest these documents come to actual performance of a building is a simulation of how a building as designed is expected to perform compared to the same identical building but assumed to just meet the provisions in the code. In effect, this creates a custom energy budget for each and every building based on a prescriptive foundation.

Unfortunately, many of those criteria do not allow for application of new technologies such as innovative window materials or creative design approaches such as passive solar, building form and shape, and orientation. In order to establish an actual EUI (EUIa) for a building the code must provide a methodology for measuring and expressing the energy use of a building and subsequently be able to compare it to the target reference EUI (EUIr) as part of the compliance verification process.

The purpose of this section is to allow the design team in conjunction with the owner/developer the freedom to achieve a common and uniform objective that applies equally, without exception, to all buildings of the same type and in the same climate zone – something not included in current energy codes and standards. The significance of actual validation of achieving that objective is through measurement of actual building operation as it is intended to be occupied. Energy simulation is part of the current models, but such modeling is not known as a good predictor of actual energy performance. It is an appropriate comparison of the merits of different design considerations.

This proposed outcome procedure is unique and offers communities the option to gain valuable experience and knowledge with a method and accurate results far beyond the traditional procedures of design for energy conservation. An analogy can be made between the outcome based requirements for a building to the purchase and use of an automobile. When purchasing a vehicle you are given information about the vehicle's performance in its specifications and the mileage that is anticipated for its operation. However, your personal performance and mileage may be quite different. Only by checking the actual mileage can you know whether what was stated is being achieved.

Similarly, under traditional energy codes and standards, when the building is completed and is occupied there is no way to know whether the decisions for a specific design or material or orientation resulted in actual energy savings. This proposed outcome approach provides a real target, allows design options and flexibility and then provides real answers as to whether what was planned has been achieved in a way that has never been done before.

An outcome-based framework accommodates actual conditions in existing buildings better than prescriptive or modeled-performance approaches. Owners of existing buildings are allowed to invest in a strategy that achieves performance improvements without specifically having to meet code minimums which may not reflect how the building was originally constructed. Outcome-based pathways allow for designs to incorporate operations and management or tenant behavior.

In addition to the National Institute of Building Sciences, this proposal is supported by:

- New Buildings Institute
- Institute for Market Transformation
- Colorado Chapter, International Code Council

SECTION-BY-SECTION ANALYSIS FOR OUTCOME-BASED PATHWAY PROPOSAL TO INTERNATIONAL GREEN CONSTRUCTION CODE

Edits in Existing Sections:

601.3 Establishes the outcome-based pathway as an acceptable method for compliance with the *Energy Conservation, Efficiency and CO2e Emission Reduction* chapter of the IgCC.

601.3.3 Defines the provisions to be applied when pursuing the Outcome-based pathway, including setting the International Energy Conservation Code as a minimum requirement.

610.1.1 Like in the performance-based pathway, the outcome-based pathway requires a building to have renewable energy systems onsite that can produce at least 2 percent of the annual building energy use.

New Section 612 Establishing Outcome-Based Pathway Requirements

612.1 Establishes the outcome-based pathway as an actual measurement of energy use once in full operation. For buildings with multiple occupancy types, the gross floor area of each type is used to determine compliance. If an occupancy type is not included in the table then this pathway cannot be used.

612.1.1 Establishes the equation to be used in determining the target energy use. The target is based on the ratio of a building's actual energy use to a reference value provided in Table 60X.1. The actual use should be 51 percent or better than the values in the table. The table is based on data from the 2003 Commercial Buildings Energy Consumption Survey conducted by the U.S. Department of Energy's Energy Information Administration. The equation is based on source Btus.

612.1.2 The building's actual energy use in equation 6-3 is calculated based on non- renewable source energy used onsite on a square foot basis. Renewable energy above the Section 610 requirement is not included in the calculation.

612.1.2.1 The actual energy use shall be determined by methodologies expressed in Section 603.

612.1.3 The reference energy use is determined by using Table 60X.1 for the building occupancy type and climate zone. The reference is adjusted to account for actual occupied floor area.

612.2 In addition to compliance with energy use requirements, the IgCC requires compliance with greenhouse gas emission requirements. The actual and reference energy use determined in 60X.1 is used to calculate greenhouse gas emissions in relation to the zEPI.

612.2.1 The greenhouse gas emissions for onsite electricity use is determined using the same calculations as in the performance-based pathway (602.2.1)

612.2.2 The greenhouse gas emissions for onsite, non-renewable energy use is determined using the same calculations as in the performance-based pathway (602.2.2)

612.3 Compliance is to be determined post-occupancy

612.3.1 Upon the satisfaction of the code official that all other code requirements are met, a temporary certificate of occupancy is issued.

612.3.2 The energy use and CO2e calculations determined under this pathway are to be determined and reported to the code official in an acceptable format. The compliant report covers 12 months that meet the target requirements within the 36 month period. The results are to be certified by a registered design professional.

612.3.3 The building is considered compliant and the owner is issued a final certificate of occupancy if they provide an affirmative report as required in section 60X.3.2.

612.3.4 If the building owner is unable to produce the results required within three years of issuance of the temporary certificate of occupancy, the building is in violation of this section of the code.

Cost Impact: Will not increase the cost of construction.

GEW147-14: 601.3-COLKER434

GEW148-14
701.1

Proponent: Dru Meadows, The Green Team, Inc., representing Walmart (dmeadows@thegreenteaminc.com)

Revise as follows:

701.1 Scope. The provisions of this chapter shall establish the means of conserving water~~, providing for safe water~~ ~~consumption~~ and protecting the quality of water resources.

Reason: It is not possible to ensure safe water "consumption" since anything may happen to the water after it is supplied.

If the intent is to clarify that nothing in Chapter 7 should result in provision of unsafe water, then the clause should be deleted. Section 102 covers this point. It states that the provisions of the IgCC shall not be deemed to nullify any provisions of law, and that the IgCC is an overlay code to the I- codes. Health and safety are a given. The IgCC is addressing conservation and quality of our water resources.

If there is a different intent, then the clause should be revised appropriately.

Cost Impact: Will not increase the cost of construction.

GEW148-14: 701.1-MEADOWS676

GEW149-14
702.1

Proponent: Karen Hobbs, representing Natural Resources Defense Council (khobbs@nrdc.org)

Revise as follows:

702.1 Fitting and fixture consumption. Fixtures shall comply with Table 702.1 and the following:

1. For dwelling unit and guestroom shower compartments with a floor area of not greater than 2600 in^2 (1.7 m^2), the combined flow rate from shower water outlets that are capable of operating simultaneously including rain systems, waterfalls, body sprays and jets shall not exceed 2.0 gallons per minute (gpm) (7.6 L/min). Where the floor area of such shower compartments is greater than 2600 in^2 (1.7 m^2), the combined flow rate from simultaneously operating shower water outlets shall not exceed 2.0 gpm (7.6 L/min) for each additional 2600 in^2 (1.7 m^2) of floor area or portion thereof.
2. In gang shower rooms, the combined flow rate from shower water outlets that are capable of operating simultaneously including rain systems, waterfalls, body sprays and jets shall not exceed 2.0 gpm (7.6 L/min) for every 1600 in^2 (1.01 m^2) or portion thereof of room floor area.
3. In shower compartments required to comply with the requirements of Chapter 11 of the *International Building Code*, the combined flow rate from shower water outlets that are capable of operating simultaneously including rain systems, waterfalls, body sprays and jets shall not exceed 4.0 gpm (15.1 L/min) for every 2600 in^2 (1.7 m^2) or portion thereof of room floor area.
4. <u>Showers and tub-shower combinations shall be provided with individual control valves of the pressure balance, thermostatic, or combination pressure balance/thermostatic mixing valve type that provide scald and thermal shock protection for the rated flow rate of the installed showerhead or a flow rate of 1.5 gpm ± 0.1 gpm (5.75 L/m ± 0.35 L/m), whichever is less. Handle position stops shall be provided on such valves and shall be adjusted in accordance with the manufacturer's instructions to deliver a mixed water temperature of not greater than 120°F (49°C). Water heater thermostats shall not be utilized as a substitute for handle position stops.</u>
5. <u>Control valves for showers and tub-shower combinations shall be factory marked with the manufacturer's minimum rated flow and such marking shall be visible at final inspection.</u>

Reason: The thermal protection afforded by shower valves can be compromised if the flow rate of the showerhead is less than the flow rate for which the protective components of the valve have been designed. As noted by Martin and Johnson (2008) (as cited in codes and Standards Enhancement Initiative (CASE), "Multi-Head Showers and Lower-Flow Shower Heads." 2013 California Building Energy Efficiency Standards, California Utilities Statewide Codes and Standards Team. September 2011), combinations of valves and shower heads were tested to determine whether pressure-compensating valves and thermostatic valves rated for 2.5 gpm would perform adequately at lower flow rates. The tests included 22 shower valves from six manufacturers, and the valves were assessed on their ability to maintain water temperature within certain bounds for a given time after a change in pressure event as described by the ASSE 1016-2005 standard for shower valves. The results indicated that a significant share of shower valves rated for 2.5 gpm failed to provide the thermal protection specified by ASSE 1016 when tested at lower flow rates, As summarized in the CASE report (p. 15): "These results indicate that shower valve temperature maintenance is strongly affected by flow rate, and that new showers with lower-flow shower heads would have to be installed with valves that are designed for 2.0 and lower flow rates."

The IgCC requires a maximum flow rate of 2.0 gpm. This code change proposal will help ensure that new buildings built to this code can safely accommodate showerheads with this flow rate. Note that this language does not require that the showerhead itself have a flow rate of 1.5 gpm, but simply that the shower valve provide the thermal protection called for under the recognized standard when tested at a flow rate as low as 1.5 gpm. The marking requirement is necessary to facilitate inspection and compliance. To the extent that the mark is permanent, it will provide a point of reference for building occupants to consider when changing showerheads in future years

Cost Impact: Will not increase the cost of construction.

GEW149-14: 702.1-HOBBS1032

GEW150-14
702.1, Table 702.1, 702.2

Proponent: Kathleen Petrie, City of Seattle, Department of Planning and Development, representing Regional Code Collaboration (kathleen.petrie@seattle.gov)

Revise as follows:

702.1 Fitting and fixture consumption. Fixtures shall comply with Table 702.1 and the following:

1. For dwelling unit and guestroom shower ~~compartments with a floor area of not greater than 2600 in^2 (1.7 m^2)~~, the combined flow rate from shower water outlets that are capable of operating simultaneously including rain systems, waterfalls, body sprays and jets shall not exceed 2.0 gallons per minute (gpm) (7.6 L/min). ~~Where the floor area of such shower compartments is greater than 2600 in^2 (1.7 m^2), the combined flow rate from simultaneously operating shower water outlets shall not exceed 2.0 gpm (7.6 L/min) for each additional 2600 in^2 (1.7 m^2) of floor area or portion thereof.~~
2. In gang shower rooms, the combined flow rate from shower water outlets that are capable of operating simultaneously including rain systems, waterfalls, body sprays and jets shall not exceed 2.0 gpm (7.6 L/min) for every 1600 in^2 (1.01 m^2) or portion thereof of room floor area.
3. In shower compartments required to comply with the requirements of Chapter 11 of the *International Building Code*, the combined flow rate from shower water outlets that are capable of operating simultaneously including rain systems, waterfalls, body sprays and jets shall not exceed 4.0 gpm (15.1 L/min) for every 2600 in^2 (1.7 m^2) or portion thereof of room floor area.

TABLE 702.1
MAXIMUM FIXTURE AND FITTING FLOW RATES FOR REDUCED WATER CONSUMPTION

FIXTURE OR FIXTURE FITTING TYPE	MAXIMUM FLOW RATE
Showerhead[a]	~~2.0~~ <u>1.75</u> gpm and WaterSense labeled
Lavatory faucet ~~and bar sink—~~ private	~~1.5~~ <u>1.0</u> gpm
Lavatory faucet—public (metered)	0.25 gpc[b]
Lavatory faucet—public (nonmetered)	0.5 gpm
Kitchen faucet <u>and bar sink</u> — private	~~2.2~~ <u>2.0</u> gpm
~~Kitchen and bar sink faucets in other than dwelling units and guestrooms~~	~~2.2 gpm~~
Urinal	~~0.5~~ <u>0.125</u> gpf and WaterSense labeled or nonwater urinal
Water closet—public and remote[c]	1.6 gpf
Water closet—public and nonremote	1.28 gpf average[d, e]
Water closet-tank type, private	1.28 gpf and WaterSense labeled[d]

FIXTURE OR FIXTURE FITTING TYPE	MAXIMUM FLOW RATE
Water closet—flushometer type, private	1.28 gpf[e]
Prerinse spray valves	~~1.3~~ 1.28 gpm and Watersense labeled
Drinking fountains (manual)	0.7 gpm
Drinking fountains (metered)	0.25 gpc[b]

For SI: 1 foot = 304.8 mm, 1 gallon per cycle (gpc) = 3.8 Lpc, 1 gallon per flush (gpf) = 3.8 Lpf, 1 gallon per minute (gpm) = 3.8 Lpm

a. Includes hand showers, body sprays, rainfall panels and jets. Showerheads shall be supplied by automatic compensating valves that comply with ASSE 1016 or ASME A112.18.1/CSA B125.1 and that are specifically designed to function at the flow rate of the showerheads being used.

b. Gallons per cycle of water volume discharged from each activation of a metered faucet.

c. A remote water closet is a water closet located not less than 30 feet upstream of other drain line connections or fixtures and is located where less than 1.5 drainage fixture units are upstream of the drain line connection.

d. The effective flush volume for a dual-flush water closet is defined as the composite, average flush volume of two reduced flushes and one full flush.

e. In public settings, the maximum water use of a dual flush water closet is based solely on its full flush operation; not an average of full and reduced volume flushes.

~~**702.2 Combination tub and shower valves.** Tub spout leakage from combination tub and shower valves that occurs when the outlet flow is diverted to the shower shall not exceed 0.1 gpm, measured in accordance with the requirements of ASME A112.18.1/CSA B125.1.~~

Reason: When the 2012 IgCC was published, jurisdictions from around the Puget Sound Region banned together to see if we could reduce fixture flow requirements from current code. We started to share Table 702.1 with our builders, owners and industry professionals and the feedback we received is that we could reduce the flow of some fixtures even further, as is demonstrated in the proposal. With further research, we found that there were several product options to choose from at these levels and pricing was quite competitive.

Depending on location, this proposal may minimally increase the cost of construction.

Cost Impact: Will increase the cost of construction.

GEW150-14: 702.1-PETRIE1139

GEW151-14
Table 702.1

Proponent: Shawn Strausbaugh, representing Arlington County, VA (sstrausbaugh@arlingtonva.us)

Revise as follows:

TABLE 702.1
MAXIMUM FIXTURE AND FITTING FLOW RATES AND QUANTITIES
FOR REDUCED WATER CONSUMPTION[f,g]

FIXTURE OR FIXTURE FITTING TYPE	MAXIMUM FLOW RATE
Showerhead[a]	2.0 gpm at 80 psi and WaterSense labeled
Lavatory faucet and bar sink—private	1.5 gpm at 60 psi
Lavatory faucet—public (metered)	0.25 gpc[b]
Lavatory faucet—public (nonmetered)	0.5 gpm
Kitchen faucet—private	2.2 gpm 1.8 gpm at 60 psi
Kitchen and bar sink faucets in other than dwelling units and guestrooms	~~2.2 gpm~~ at 60 psi
Urinal	0.5 gpf and WaterSense labeled or nonwater urinal
Water closet—public and remote[c]	1.6 gpf
Water closet—public and nonremote	1.28 gpf average[d, e]
Water closet-tank type, private	1.28 gpf and WaterSense labeled[d]
Water closet—flushometer type, private	1.28 gpf[e]
Prerinse spray valves	1.3 gpm and Watersense labeled
Drinking fountains (manual)	0.7 gpm
Drinking fountains (metered)	0.25 gpc[b]

For SI: 1 foot = 304.8 mm, 1 gallon per cycle (gpc) = 3.8 Lpc, 1 gallon per flush (gpf) = 3.8 Lpf, 1 gallon per minute (gpm) = 3.8 Lpm, 1 pound per square inch = 6.895 kPa..

a. Includes hand showers, body sprays, rainfall panels and jets. Showerheads shall be supplied by automatic compensating valves that comply with ASSE 1016 or ASME A112.18.1/CSA B125.1 and that are specifically designed to function at the flow rate of the showerheads being used.

b. Gallons per cycle of water volume discharged from each activation of a metered faucet.

c. A remote water closet is a water closet located not less than 30 feet upstream of other drain line connections or fixtures and is located where less than 1.5 drainage fixture units are upstream of the drain line connection.

d. The effective flush volume for a dual-flush water closet is defined as the composite, average flush volume of two reduced flushes and one full flush.

e. In public settings, the maximum water use of a dual flush water closet is based solely on its full flush operation; not an average of full and reduced volume flushes.

f. Bottle filling stations associated with drinking fountains shall not have limitations for flow rate.

g. Where a faucet has a pot filler mode, the flow shall not exceed 22 gpm at 60 psi. Such faucets shall automatically return to the flow rate indicated in table when the pot filler mode activation mechanism is released or when the faucet flow is turned off.

Reason: New footnote f: Bottle fillers were added to the IPC as an option for use with drinking fountains. If they are used exclusively to fill bottles, limitations on their flowrate will not save water.

New footnote g and tabel change: Kitchen faucet provisions have been modified in CalGreen and ASHRAE 189.1 to make 1.8 the maximum flowrate, but to allow for a “pot-filler mode” at a higher flowrate. This portion of the change is submitted for consistency.

EPA WaterSense program has finalized a product specification for Pre-Rinse Spray Valves that requires both water savings and basic levels of performance. With

As seen in the revised table pressures have been added under the applicable fixtures flow rate: Flow is a function of pressure, so pressure must be added to properly identify flowrate. This approach aligns it with the IPC, Table 604.4

“Or Quantity” has been added to reflect the fact that some are not flowrates, such as metered faucets, toilets or urinals. This wording matches IPC Table 604.4 nomenclature.

Cost Impact: Will not increase the cost of construction.

GEW151-14: TABLE702.1-STRAUSBAUGH706

GEW152-14
702.4.1 (New)

Proponent: Jonah Cecil Scheib, Urban Green Council, representing Urban Green Council (cs@urbangreencouncil.org)

Add new text as follows:

702.4.1 Drinking fountain faucets. Drinking fountains shall be equipped with a bubbler for drinking and a separate faucet designed for filling containers that are up to 10 inches in height.

Reason: Drinking fountains should permit people to easily fill their water bottles, in order to encourage people to drink water rather than sugary drinks and to use reusable bottles. This proposal would require water fountains to include a fixture that makes it convenient to fill a bottle.

New York City established a similar regulation in 2012.

Bibliography:
NYC Green Codes Task Force, Health and Toxicity Proposal 20 (Proposal) NYC Local Law 55 of 2010 (Law; Legislative Summary)

NYC Plumbing Code Section 410 (Code reference)

Cost Impact: Will not increase the cost of construction.

GEW152-14: 702.4.1 (NEW)-SCHEIB1131

GEW153-14
702.21 (New)

Proponent: Jonah Cecil Scheib, Urban Green Council, representing Urban Green Council (cs@urbangreencouncil.org)

Add new text as follows:

702.21 Emergency Drinking Water Supply. Buildings of Group R or Group I occupancy that have potable water distributions systems that are dependent on the pumping of water supplied from a public water main to any location in the building, shall be designed with emergency potable water supply fixtures. Such fixtures shall be located within the building where the pressure from the public water main will provide for the required flow and pressure in accordance with the *International Plumbing Code*. The fixtures shall be located in an accessible common area of the building. The number and type of emergency potable water supply fixtures chosen shall provide for the filling of portable containers by the building's occupants for obtaining drinking water and water closet flushing water. The number and type of emergency potable water supply fixtures shall be approved.

> **Exception:** Buildings with potable water distribution pumps powered by an emergency or standby power system that is powered by either a renewable or non- renewable energy source, shall not be required to have emergency potable water supply fixtures.

Reason: This proposal would allow people to have better access to drinking water during blackouts. During a power failure, buildings that use electric pumps lose their water supply. Pressure from the public water main may be sufficient to reach the lower stories of the building, but even that may remain unavailable if a non-operating pump blocks the water supply. This proposal would require residential buildings, as well as hotels, dormitories and residential care facilities, to provide drinking water to a common area, supplied directly through pressure in the public water main, for use in a power outage.

Per the 2012 IgCC Preface, the code is "founded on principles intended to establish provisions consistent with the scope of a green construction code that adequately protects public health, safety and welfare".

New York City established a similar regulation in 2013.

Bibliography:
NYC Building Resilience Task Force, Proposal 23 (Proposal)
NYC Local Law 110 of 2013 (Law; Legislative Summary) NYC Plumbing Code Section 614 and Table 403

Cost Impact: Will not increase the cost of construction.

GEW153-14: 702.22 (NEW)-SCHEIB1141

GEW154-14

202, 702.5 (New)

Proponent: John Watson, representing Elkay (john.watson@elkay.com)

Add new text as follows:

702.5 Bottle filling stations. Bottle filling stations shall be integral to, or used as a substitute for, not less than 50 percent of the required number of drinking fountains.

Add new definition as follows:

BOTTLE FILLING STATION. A plumbing fixture connected to the potable water distribution system and sanitary drainage system that is designed and intended for filling personal use drinking water bottles or containers up to 10 inches (254 mm) in height. Such fixtures can be separate from or integral to a drinking fountain and can incorporate a water filter and a cooling system for chilling the drinking water.

Reason: 1. Less water is wasted during the drinking process as virtually no water is lost down the drain unlike traditional drinking fountains which generate up to 50% wastewater into the drainage system. This 50% waste in traditional fountains has been documented in calculations in the outdated ARI 1010 standard (which used 60% for pre-chilling calculations) and confirmed in product testing.
2. Bottle filling stations will reduce the amount of waste generated from plastic bottles that are used to provide drinking water.

Cost Impact: Will not increase the cost of construction.

GEW154-14: 702.5 (NEW)-WATSON965

GEW155-14
702.5

Proponent: Jay Peters, Codes and Standards International, representing Falcon Waterfree (peters.jay@me.com)

Delete without substitution:

~~**702.5 Nonwater urinal connection.** The fixture drain for nonwater urinals shall connect to a branch drain that serves one or more lavatories, water closets or water-using urinals that discharge upstream of such urinals.~~

Reason: This provision is in conflict with every current model plumbing code in the country, including the most widely adopted IPC. The experts on the 2015 International Plumbing Code Committee, those charged with the minimum health and safety provisions of the plumbing system, along with industry and ICC members addressed this provision during the recent code cycle and disapproved it based on lack of data to prove it is an issue. (See committee reasoning below P62-12. *underline emphasis added*)

`When nonwater urinals are maintained properly per manufacturer installation instructions and the fixture listing requirements, water is periodically flushed through the fixture and into the fixture drain. This serves the purpose of dissolving and removing any potential urine salts in the drainage system.

This provision has potential to have a counter effect on water efficiency efforts. In many cases, It adds additional expense to the initial design and installation of nonwater supplied urinals, deterring efforts to utilize water saving fixtures. Moreover, building owners desiring to be environmentally friendly by conserving thousands, and possibly millions, of gallons of water, by directly replacing existing high volume urinals with new nonwater urinals will oftentimes find it cost prohibitive to re-design and reconfigure a public or commercial bathroom drainage, vent and water supply system located behind the walls of the structure to accommodate this provision.

This provision singles-out nonwater urinals yet does not address issues associated with low flow urinals (1 pint typ.) with minimally diluted urine/water mixtures that tend to trickle through the drainage piping, allowing lime and calcium deposits to accumulate and harden, potentially causing damage to the plumbing drainage system.

Ironically, if this provision remains, the IPC has the potential to save millions more gallons of potable water than the IgCC. Logically, the IgCC should mesh with the IPC by removing this provision and revisiting it when the IPC reconsiders and more date is provided to support claims of drainage issues, which have such a negative effect on water conservation.

As mentioned above, the current section is in conflict with the IPC. The following is the most recent committee action and comment pertaining to the 2015 IPC Proposal.

IPC Technical Committee (2015) reasoning:

P62-12 Committee Action: Disapproved

Committee Reason: The opposition testimony was compelling in stating that there is not any data to support that nonwater urinals are causing widespread problems. To write code language to be mandatory to fix a product that is not performing, is not an acceptable way to solve the problem. If the product does not perform properly then other action should be taken.

Cost Impact: Will not increase the cost of construction. The original provision increases cost of construction whereas removing this provision could potentially reduce costs and make saving a substantial amount of potable water more realistic and less expensive.

GEW155-14: 702.5-PETERS876

GEW156-14

702.6.4 (New), 702.6.5 (New)

Proponent: Julius Ballanco, JB Engineering, Inc.,representing InSinkErator (JBENGINEER@aol.com)

Add new text as follows:

702.6.4 Food waste disposer. The water use for a food waste disposer shall not exceed 8 gpm under full load condition and 1 gpm under no-load condition. Food waste disposers shall be equipped with run-cycle time limiting means that requires manual activation for restarting. The maximum allowable run time cycle shall be 10 minutes.

702.6.5 Pulpers and mechanical strainers. The water use for pulpers and mechanical strainers shall not exceed 2 gpm. Pulpers and mechanical strainers shall be equipped with run-cycle time limiting means that requires manual activation for restarting. The maximum allowable run time cycle shall be 10 minutes.

Reason: The addition of these two section will add energy and water conservation requirements for commercial food handling establishment appliances. A standard food waste disposer can be run continuously in a food handling establishment, even though there is nothing discharging down the drain. This is a waste of energy and water. There are green controls available for food waste disposers that result in water and energy savings. This adds a green component to use of a food waste disposer.

Pulpers and mechanical strainers can also waste a tremendous amount of water and energy. Similarly, there are green units available that use a minimal amount of water and shut down after a 10 minute cycle. This adds a green feature to these units.

If a food handling establishment is going to be green they must use energy and water conserving food waste disposers, pulpers, or mechanical strainers.

The section is being renumbered to place the new section between the current sections 702.6.3 and 702.6.4. This would result in this section and table becoming 702.6.6.

Cost Impact: Will increase the cost of construction.

GEW 156-14: 702.6-BALLANCO157

GEW157-14
702.6.1

Proponent: Shawn Strausbaugh, representing Arlington County, VA (sstrausbaugh@arlingtonva.us)

Revise as follows:

702.6.1 Clothes washers. Clothes washers of the type in the ENERGY STAR program as defined in "ENERGY STAR® Program Requirements, Product Specification for Clothes Washers, Eligibility Criteria," shall have a water factor (WF) not exceeding ~~6.0~~ 5.4 and a *modified energy factor* (MEF) of not less than 2.0.

Reason: This change is to cordinate this specific IgCC section with ASHRAE 189.1 -2011. The reduction from a 6.0 water factor to a 5.4 water factor is 10% below the Energy Star requirements.

Cost Impact: Will not increase the cost of construction.

GEW157-14: 702.6.1-STRAUSBAUGH708

GEW158-14
702.7

Proponent: Dru Meadows, The Green Team, Inc., representing Walmart (dmeadows@thegreenteaminc.com)

Revise as follows:

~~702.7~~ 709.11 Municipal reclaimed water. Where required by Table 302.1 and where municipal reclaimed water is accessible and allowed for such use by the laws, rules and ordinances applicable in the jurisdiction, it shall be supplied to water closets, water-supplied urinals, water-supplied trap primers and applicable industrial uses. A municipal reclaimed water supply shall be deemed accessible where the supply is not greater that 150 percent of the distance that the potable water supply is from the lot boundary or the supply is within 100 feet (30.5 m) of a potable water supply that serves the lot.

Reason: This proposal relocates Section 702.7 (Municipal reclaimed water) from Section 702 (Fixtures, fittings, equipment and appliances) to Section 709 (Reclaimed water systems). It does not revise any of the language.

This proposal is intended to improve the organization and use of this chapter. Users are not likely to look for reclaim water requirements in Section 702; they will look in Section 709.

Cost Impact: Will not increase the cost of construction.

GEW158-14: 702.7-MEADOWS681

GEW159-14
702.8, 702.8.1, 702.8.2, Table 7022.8.2, 702.8.2.1

Proponent: Gary Klein, representing self (gary@aim4sustainability.com)

Delete and substitute as follows:

~~**702.8 Efficient hot and tempered water distribution.** Hot and tempered water distribution shall comply with either the maximum pipe length or maximum pipe volume limits in this section. Hot and tempered water shall be delivered to the outlets of individual showers, combination tub-showers, sinks, lavatories, dishwashers, washing machines and hot water hose bibbs in accordance with Section 702.8.1 or Section 702.8.2. For purposes of this section, references to pipe shall include tubing. For purposes of this section, the source of hot or tempered water shall be considered to be a water heater, boiler, circulation loop piping or electrically heat-traced piping.~~

702.8 Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section 702.8.1 or Section 702.8.2. The flow rate through 1/4 inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

Revise as follows:

702.8.1 Maximum allowable pipe length method. For fixtures other than public lavatory faucets, ~~the~~ maximum allowable ~~pipe~~ piping length from the nearest circulation loop pipe or an electrically heat-traced pipe source of ~~hot or tempered water~~ to the termination of the fixture supply pipe shall be in accordance with the maximum pipe length column~~s~~ in Table 702.8.2. Where the length contains more than one size of pipe, the largest size shall be used for determining the maximum allowable length of the pipe in Table 702.8.2.

702.8.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section 702.8.2.1. For fixtures other than public lavatory faucets, the maximum volume of heated water in the piping from the nearest ~~hot or tempered water in the piping to public lavatory faucets, metering or nonmetering, shall be 2 ounces (0.06 L). For fixtures other than public lavatory faucets, the maximum volume shall be 64 ounces (1.89 L) for hot or tempered water from a water heater or boiler; and 24 ounces (0.7 L) for hot or tempered water from a~~ circulation loop pipe or an electrically heat-traced pipe shall be 24 ounces (0.7 L).

TABLE 702.8.2
PIPE VOLUME AND MAXIMUM PIPING LENGTH ~~OF PIPE OR TUBE~~

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM ~~PIPE OR TUBE~~ PIPING LENGTH (feet)		
		~~System without a circulation loop or heat-traced line (feet)~~	~~System with a circulation loop or heat-traced line (feet)~~	~~Lavatory faucets – public (metering and nonmetering) (feet)~~
1/4[a]	0.33	~~50~~	16	~~6~~
5/16[a]	0.5	~~50~~	16	~~4~~
3/8[a]	0.75	~~50~~	16	~~3~~
½	1.5	~~43~~	16	~~2~~
5/8	2	~~32~~	12	~~1~~

¾	3	~~21~~	8	~~0.5~~
7/8	4	~~16~~	6	~~0.5~~
1	5	~~13~~	5	~~0.5~~
1 ¼	8	~~8~~	3	~~0.5~~
1 ½	11	~~6~~	2	~~0.5~~
2 or larger	18	4	1	~~0.5~~

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml.

a. The flow rate for $^1/_4$ -inch size pipe or tube is limited to 0.5 gallons per minute; for 5/16-inch size, it is limited to 1 gpm; for 3/8-inch size, it is limited to 1.5 gpm.

702.8.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the circulation loop pipe or an electrically heat-traced pipe source of ~~hot water~~ and the termination of the fixture supply pipe. The volume shall be determined from the liquid ounces per foot column of Table 702.8.2. The volume contained within fixture shutoff valves, flexible water supply connectors to a fixture fitting, or within a fixture fitting shall not be included in the water volume determination. ~~Where hot or tempered water is supplied by a circulation loop pipe or an electrically heat-traced pipe, the~~ The volume shall include the portion of the fitting on the branch ~~source~~ pipe that supplies water to the fixture.

Reason: The reason for this proposal is to correlate the provisions with what was approved for inclusion in the 2015 IECC-CE. CE 274 and CE 275 were approved. The effect of this is to remove two columns from the table, and the associated text from the section.

What remains are the provisions that limit the volume to 24 ounces from a circulation loop pipe or a heat traced pipe to plumbing fixtures or appliances. This will result in reduced hot water delivery times, less wasted water and less wasted energy. We have not done anything to change the volume requirements from water heaters (or boilers) that have been approved for use in the 2015 IECC.

Cost Impact: Will not increase the cost of construction. These provisions were already in the IgCC. The proposal correlates them with the 2015 IECC.

GEW159-14: 702.8-KLEIN959

GEW160-14

702.8.1, 702.8.2, Table 802.8.2, Tables 802.8.2 (2) through 802.8.2 (10) (New), 702.8.2.1

Proponent: Michael Cudahy, representing Plastic Pipe and Fittings Association (mikec@cmservices.com)

Revise as follows:

702.8.1 Maximum allowable pipe length method. The maximum allowable pipe length from the source of hot or tempered water to the termination of the fixture supply pipe shall be in accordance with the maximum pipe length columns in Tables 702.8.2 (2) through 702.8.2 (10), as appropriate for type of the pipe to be installed. Where the type of pipe to be installed is unknown or the type of pipe is not covered by Tables 702.8.2 (2) through 702.8.2 (10), Table 702.8.2 (1) shall be used for design purposes. Where the length contains more than one size of pipe, the largest size shall be used for determining the maximum allowable length of the pipe in the tables ~~702.8.2~~.

702.8.2 Maximum allowable pipe volume method. ~~The water volume in the piping shall be calculated in accordance with Section 702.8.2.1.~~ The maximum volume of hot or tempered water in the piping to public lavatory faucets, metering or nonmetering, shall be 2 ounces (0.06 L). For fixtures other than public lavatory faucets, the maximum volume shall be 64 ounces (1.89 L) for hot or tempered water from a water heater or boiler; and 24 ounces (0.7 L) for hot or tempered water from a circulation loop pipe or an electrically heat-traced pipe. The water volume in the piping shall be calculated in accordance with Section 702.8.2.1.

TABLE 702.8.2 (1)
VOLUME AND MAXIMUM LENGTH OF PIPE OR TUBE OF A TYPE UNKNOWN OR NOT COVERED[b]

For SI: 1 inch = 25.4 mm, 1 foot = 304.8mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml

a. The flow rate for 1/4 -inch size pipe or tube is limited to 0.5 gallons per minute; for 5/16 – inch size, it is limited to 1 gpm; for 3/8 –inch size, it is limited to 1.5 gpm.

b. Not covered means pipe or tube types not covered by Table 702.8.2(2) through 702.8.2(10).

(Portions of table not shown remain unchanged.)

TABLE 702.8.2(2)
VOLUME AND MAXIMUM LENGTH OF TYPE K COPPER TUBING

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube Length		
		System without a Circulation Loop or Heat Traced Line (feet)	System with a Heat Traced Line (feet)	Lavatory Faucets - Public (metering and non-metering) (feet)
3/8[a]	0.84	44.6	14.3	2.7
1/2	1.45	44.5	16.6	2.1
3/4	2.90	21.7	8.3	0.5
1	5.17	12.6	4.8	0.5
1 1/4	8.09	7.9	3.0	0.5
1 1/2	11.45	5.8	1.9	0.5
2 or larger	20.04	3.6	0.9	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL

a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(3)
VOLUME AND MAXIMUM LENGTH OF TYPE L COPPER TUBING

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube Length		
		System without a Circulation Loop or Heat Traced Line (feet)	System with a Circulation Loop or Heat Traced Line (feet)	Lavatory Faucets - Public (metering and non-metering) (feet)
3/8[a]	0.97	38.7	12.4	2.3
1/2	1.55	41.6	15.5	1.9
3/4	3.22	19.6	7.5	0.5
1	5.49	11.8	4.6	0.5
1 1/4	8.38	7.6	2.9	0.5
1 1/2	11.83	5.6	1.9	0.5
2 or larger	20.58	3.5	0.9	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL
a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(4)
VOLUME AND MAXIMUM LENGTH OF TYPE M COPPER TUBING

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube Length		
		System without a Circulation Loop or Heat Traced Line (feet)	System with a Circulation Loop or Heat Traced Line (feet)	Lavatory Faucets - Public (metering and non-metering) (feet)
3/8[a]	1.06	35.4	11.3	2.1
1/2	1.69	38.2	14.2	1.8
3/4	3.43	18.4	7.0	0.4
1	5.81	11.2	4.3	0.4
1 1/4	8.70	7.4	2.8	0.5
1 1/2	12.18	5.4	1.8	0.5
2 or larger	21.08	3.4	0.9	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL
a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(5)
VOLUME AND MAXIMUM LENGTH OF CPVC TUBING, CTS[a]

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube Length		
		System without a Circulation Loop or Heat Traced Line (feet)	System with a Circulation Loop or Heat Traced Line (feet)	Lavatory Faucets - Public (metering and non-metering) (feet)
1/2	1.25	51.6	19.2	2.4
3/4	2.67	23.6	9.0	0.6
1	4.43	14.7	5.6	0.6
1 1/4	6.61	9.7	3.6	0.6
1 1/2	9.22	7.2	2.4	0.6
2 or larger	15.79	4.6	1.1	0.6

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 ounce = 29.6 mL
a. Copper tube size outside diameter dimension and SDR 11

TABLE 702.8.2(6)
VOLUME AND MAXIMUM LENGTH OF CPVC PIPE, SCHEDULE 40

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Pipe Length		
		System without a Circulation Loop or Heat Traced Line (feet)	System with a Circulation Loop or Heat Traced Line (feet)	Lavatory Faucets - Public (metering and non-metering) (feet)
3/8[a]	1.17	32.1	10.3	1.9
1/2	1.89	34.1	12.7	1.6
3/4	3.58	17.6	6.7	0.4
1	5.53	11.8	4.5	0.5
1 1/4	9.66	6.6	2.5	0.4
1 1/2	13.20	5.0	1.7	0.4
2 or larger	21.88	3.3	0.8	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL
a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(7)
VOLUME AND MAXIMUM LENGTH OF CPVC PIPE, SCHEDULE 80

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Pipe Length		
		System without a Circulation Loop or Heat Traced Line (feet)	System with a Circulation Loop or Heat Traced Line (feet)	Lavatory Faucets - Public (metering and non-metering) (feet)
3/8[a]	0.86	43.6	14.0	2.6
1/2	1.46	44.2	16.4	2.1
3/4	2.74	23.0	8.8	0.5
1	4.56	14.3	5.5	0.5
1 1/4	8.24	7.8	2.9	0.5
1 1/2	11.38	5.8	1.9	0.5
2 or larger	19.11	3.8	0.9	0.5

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL
a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(8)
VOLUME AND MAXIMUM LENGTH OF PE-AL-PE TUBING

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube Length		
		System without a Circulation Loop or Heat Traced Line (feet)	System with a Circulation Loop or Heat Traced Line (feet)	Lavatory Faucets - Public (metering and non-metering) (feet)
3/8[a]	0.63	59.5	19.0	3.6
1/2	1.31	49.2	18.3	2.3
3/4	3.39	18.6	7.1	0.4
1	5.56	11.7	4.5	0.4
1 1/4	8.49	7.5	2.8	0.5
1 1/2	13.88	4.8	1.6	0.4
2 or larger	21.48	3.4	0.8	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL
a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(9)
VOLUME AND MAXIMUM LENGTH OF PEX AND PE-RT TUBING, CTS[b]

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube Length		
		System without a Circulation Loop or Heat Traced Line (feet)	System with a Circulation Loop or Heat Traced Line (feet)	Lavatory Faucets - Public (metering and non-metering) (feet)
3/8[a]	0.6	58.6	18.8	3.5
1/2	1.18	54.7	20.3	2.5
3/4	2.35	26.8	10.2	0.6
1	3.91	16.6	6.4	0.6
1 1/4	5.81	11.0	4.1	0.7
1 1/2	8.09	8.2	2.7	0.7
2	13.86	5.2	1.3	0.6

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL
a. The flow rate for 3/8 inch size is limited to 1.5 gpm
b. Copper tube size outside diameter dimension and SDR 9, for both PEX and PE-RT types of tubing

TABLE 702.8.2(10)
VOLUME AND MAXIMUM LENGTH OF PEX-AL-PEX TUBING

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube Length		
		System without a Circulation Loop or Heat Traced Line (feet)	System with a Circulation Loop or Heat Traced Line (feet)	Lavatory Faucets - Public (metering and non-metering) (feet)
3/8[a]	0.63	59.5	19.0	3.6
1/2	1.31	49.2	18.3	2.3
3/4	3.39	18.6	7.1	0.4
1	5.56	11.7	4.5	0.4
1 1/4	8.49	7.5	2.8	0.5
1 1/2	13.88	4.8	1.6	0.4
2 or larger	21.48	3.4	0.8	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL
a. The flow rate for 3/8 inch size is limited to 1.5 gpm.

702.8.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the source of hot water and the termination of the fixture supply pipe. The volume shall be determined from the liquid ounces per foot column of Tables 702.8.2 (2) through 702.8.2 (10) as appropriate for the type of pipe. Where the type of pipe is unknown or the type of pipe is not covered by Tables 702.8.2 (2) through 702.8.2 (10), Table 702.8.2 (1) shall be used to determine the volume. The volume contained within fixture shutoff valves, flexible water supply connectors to a fixture fitting, or within a fixture fitting shall not be included in the water volume determination. Where hot or tempered water is supplied by a circulation loop pipe or an electrically heat-traced pipe, the volume shall include the portion of the fitting on the source pipe that supplies water to the fixture.

Reason: This proposal improves upon the method of calculating hot water volume in plumbing systems by adding additional tables to the language, as an option, if the piping material of the system is known.

There is a significant difference between tubing materials in regards to volume per unit length as volume of tubing materials for the same application can vary sometimes by as much as 30-40%. This proposal modification is the most accurate as it generates lengths that contain the same volume and will not result in significant differences in buildings when constructed to it.

Also, selecting the proper tables will be necessary if the building is being designed using BIM programs that calculate actual volumes of piping systems, or multiple green building ratings are sought after. One could imagine the challenges that could later occur if a building was designed in a way that did not deliver the hot water as calculated.

Cost Impact: Will not increase the cost of construction.

GEW160-14: 702.8.1-CUDAHY839

GEW161-14
702.10, Chapter 12

Proponent: Jeffrey Waterman, representing Liberty Pumps, Inc.
(jwater@libertypumps.com)

Revise as follows:

702.10 Water-powered <u>sump</u> pumps. Water-powered pumps shall not be used as the primary means of removing ground water from sumps. Where used as an emergency backup pump for the primary pump, the primary pump shall be an electrically powered pump and the water-powered pump shall be equipped with an auditory alarm that indicates when the water-powered pump is operating. The alarm shall have a minimum sound pressure level rating of 85 dB measured at a distance of 10 feet (3048 mm). Where water-powered pumps are used, they shall have a water-efficiency factor of pumping not less than ~~2 gallons (7.6 L)~~<u>1.4</u> <u>gallons (5.3 L)</u> of water to a height of ~~8 feet (2438 mm)~~<u>10 feet (3048 mm)</u> for every 1 gallon (3.8 L) of water used to operate the pump, measured at a water pressure of 60 psi (413.7 kPa). Pumps shall be clearly marked as to the gallons (liters) of water pumped per gallon (liters) of potable water consumed. <u>Water-powered sump pumps shall comply with</u> <u>IAPMO PS 119.</u>

Add new standard as follows:

IAPMO Group
4755 E. Philadelphia
Ontario, CA 91761

<u>IAPMO PS 119-2012ae1 Water-Powered Sump Pumps</u>

Reason: Section 702.10 was rewritten during the last IGCC code cycle, and the changes included allowing water-powered sump pumps if the following criteria was followed: the WPP could only be an emergency pump for use when the primary electrically powered pump fails; they must have an alarm to warn of usage; they need to have a water efficiency factor of pumping not less than 2 gallons (7.6 L) of water to a height of 8 feet (2438 mm) for every 1 gallon (3.8 L) of water used to operate the pump, measured at a water pressure of 60 psi (413.7 kPa); and the efficiency factor needs to be marked on the product. The efficiency factor established at that time was just a guess driven primarily from advertising by non-third party listed products.

Shortly after this verbiage was set to be adopted by the IGCC, the topic of water powered pumps was also reviewed by the Plumbing Water Efficiency Task Group for the
2012 code cycle of the IAPMO Green Plumbing and Mechanical Code Supplement (GPMCS), and it was debated whether or not the same criteria should be added to that code. The efficiency ratio adopted by the IgCC was discussed, and there were two issues brought up.

Firstly, the efficiency ratio seemed to be set rather high, and secondly there was no means of insuring whether or not the efficiency factor as marked on the product was truthfulIt was suggested that the efficiency ratio could be added to the applicable product standard for these pumps, IAPMO PS 119-2006, “Material and Property Standard for Water Energized Sump Pump." It seemed reasonable since both major plumbing codes -- IAPMO’s Uniform Plumbing Code and ICC’s International Plumbing Code -- were either written or being revised to make it clear that all plumbing products and materials must be third party listed and must comply with the approved applicable standard (ref. IAPMO 2012 Uniform Plumbing Code, clause 301.1; and ICC 2012

International Plumbing Code, Section 303.4. Several members of the IAPMO GPMCS Water Efficiency Task Group then set out to work with the IAPMO Standards group to set up a separate task group to review and update IAPMO PS 119-2006. The PS 119 task group also included representatives of the three manufacturers of IAPMO/UPC listed water powered sump pumps – Liberty Pumps, Inc., A.Y. McDonald Mfg. Co., and the Zoeller Pump Company. Representative examples of their products were exchanged between the three companies so they could compare results from their respective WPP test cells for the purpose of determining the best construction of a laboratory test cell and establishment of a testing procedure, and the determination of an appropriate minimum efficiency ratio. A test cell design and procedure was approved, and efficiency ratios were reviewed. It appeared that the IGCC 2:1 @ 8 feet ratio was beyond the current state of the art of WPP design. While a product could be designed to meet this specific set of parameters, the real world usage of these pumps requires them to be effective under a multitude of inlet pressures and discharge heads. Also it also was felt that an efficiency ratio at 10 feet as opposed to 8 feet would be more meaningful since it probably was closer to the average elevation from the bottom of a sump pit to its discharge point.The result of the task group was creation of the revised product standard
IAPMO PS 119-2012a(e1), “Water Powered Sump Pumps”.

This revised standard established the performance requirement as follows: “The pump efficiency ratio at 415 ± 1.4 kPa (60 ± 0.2 psi) and at a head of 3.0 ± 0.06 m (10 ± 0.2 ft), calculated in accordance with Section 5.3.2(h), shall be at least 1.4." Subsequent to the revision of IAPMO PS 119, the 2012 IAPMO Green Plumbing and Mechanical Code

Supplement adopted this efficiency ratio. The IAPMO 2012 GPMCS clause reads as follows:

412.0 Water-Powered Sump Pumps. Sump pumps powered by potable or reclaimed (recycled) water pressure shall only be used as an emergency backup pump. The water-powered pump shall be equipped with a battery powered alarm having a minimum rating of 85 dBa at 10 feet (3048 mm). Water-powered pumps shall have a water efficiency factor of pumping at least 1.4 gallons (5.3 L) of water to a height of 10 feet (3048 mm) for every gallon of water used to operate the pump, measured at a water pressure of 60 psi (414 kPa). Pumps shall be clearly labeled as to the gallons of water pumped per gallon of potable water consumed. Water- powered stormwater sump pumps shall be equipped with a reduced pressure principle backflow prevention assembly.

The proposed change to IgCC Section 702.10 will harmonize the green construction codes, permit usage of water powered pumps with efficiency factors at the current state of the art in performance, and with the acceptance of IAPMO PS 119-2012a(e1) into IGCC Chapter 12 ("Referenced Standards") there is a means for third party certification which includes a validation of the required efficiency factor labeling

Bibliography:

2012 Green Plumbing & Mechanical Code Supplement, Clause 412.0, pub. The International Association of Plumbing and Mechanical Officials, 2012, Page 14

Cost Impact: Will not increase the cost of construction. No impact.

Analysis: A review of the standard proposed for inclusion in the code, IAPMO PS 119-2012ae1 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2014.

GEW161-14: 702.10-WATERMAN1020

GEW162-14
702.18, 702.18.1

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org)

Delete without substitution:

~~**702.18 Autoclaves and sterilizers.** Autoclaves and sterilizers requiring condensate tempering systems shall be of the type that does not require potable water to be blended with the discharge water to reduce the temperature of discharge.~~

~~**702.18.1 Vacuum autoclaves and sterilizers.** Vacuum sterilizers shall be prohibited from utilizing venturi-type vacuum mechanisms using water.~~

Reason: There are problems with the code text requirements and the types of sterilizers currently on the market. In Section 702.18.1, there is only one manufacturer that provides this type of device.
For Section 702.18

Options with Pros and Cons

Chilled Water Recirculation Loop for Medium & Large Size Sterilizers – Reduces total water consumption per sterilization cycle to 1-1.5 gallons.

Pros:

- Sterilizers are tied into the facility's chilled water recirculation loop when systems have excess capacity to supply and cool steam sterilizer units. This recirculation loop prevents the majority of the water used in the steam sterilizers to be flushed down the facility drain
- Only 1-1.5 gallons of water are consumed per cycle

Cons

- Added product acquisition costs ($ 5,000 to $ 10,000) per sterilizer + any associated installation costs to connect to the facility chilled water system
- Added cost for hospital to install Chilled Water Loop piping infrastructure to the SPD department. Might require larger chiller system to feed multiple steam sterilizers in SPD. (additional cost)
- Some competitors require additional sq/ft to install chilled water recirculation system (lost space to the facility)
- This option may not be viable to facilities that are replacing old sterilizers with new ones. (infrastructure, footprint, cost, etc.)
- Currently not available on small sterilizers (3-5 year development project). Vendor cost would increase
- Many hospitals do not have excess chilled water capacity for the SPD
- Chilled water supply all year round, for all seasons in the northern US might not be feasible.
- Some facilities don't rely on a central steam boiler system for the steam sterilizers. These Customers use electric steam generators to supply their steam sterilizers. Stand alone or integral steam generators must have potable water for steam generation, discharge of sterilizer, and discharge of generator. There is no manufacturing chilled water solution for stand alone or integral steam generators. No current solution

Non Potable Water Options (Grey Water or Rain Water)

Pros

- Utilize untreated water and save potable water consumption

Cons

- Today, manufactures have designed steam sterilizers to accept only one feed water source, potable water. To change this design to accept grey water & potable water for the steam sterilizer, there would be an increase the total acquisition cost of the sterilizer unit.
- Steam sterilizers have specific water quality requirements to ensure proper performance. There are no current water quality standards established for the use of grey water in steam sterilizer systems. Facilities will still need to meet manufacturing water quality requirements even with grey water. Obviously there is more variability and unknown elements in grey water that exponentially increase water quality variability. New project development required (3-5 years) by manufacturers. Added cost of equipment ($ 1,000 - $ 2,000) per unit depending sterilizer model.

- Grey Water must be collected and treated by hospital. Cost to the facility to implement Non-Potable Water could be significant. (reclamation, collection, treatment, filtration, and delivery to the SPD)
- Hospital infection control concerns with Non-Potable Water in clean (sterile processing) environments, creation of aerosols, potential bacteria introduced from these systems, cross contamination, backflow issues, etc. are all concerns.

Alternate Non-Potable Water Reclamation/Recirculation Systems

Pros

- Utilize water loops for discharge to recirculate and only add fresh water when needed. System could be consolidated for several units (mini water treatment system in each facility) or stand alone for each sterilizer.

Cons

- Effectively requires a mini water treatment unit inside each facility. Additional cost and maintenance would be the responsibility of the facility. (water must be decontaminated & treated)
- Nothing commercially available at this time from any of the major sterilization equipment manufacturer.
- Multiple systems would be required for multiple sized units or entire departments, adds significant cost and requires additional space for processing water recirculation by hospital.
- Hospital infection control concerns with Non-Potable Water in clean (sterile processing) environments, creation of aerosols, potential bacteria introduced from these systems, cross contamination, backflow issues, etc. are all concerns.

Steam Condensate Return Lines

Pros

- Steam condensate is returned to the boiler, which is the largest reason for water consumption in a sterilizer cycle. Water consumption significantly reduced.
- Know technology, but not available for steam sterilizers

Cons

- Additional cost for return piping infrastructure by hospital
- Hospital infection control concerns to return steam that was used for sterilization purposes into the main hospital steam boiler system
- Potable water still needed for 50% of the units sold with a built in steam generator
- No current commercialized solution available on the market for steam sterilizers

SUMMARY

All of these options will require additional equipment, cost, square footage, and infrastructure changes by the facility. Many of these options may not be available in facilities such as small hospitals, surgery centers, or converted/renovated hospital space. Additional product development, FDA Submission, or additional equipment from manufacturers could take 3-5 years to comply with these codes.

For Section 702.18.1:

Select small & medium sized steam sterilizers currently use Venturi-type vacuum mechanisms. Venturi systems do have a positive role for certain applications. Small steam sterilizers are infrequently used near the OR. These small sterilizers have low usage and lower water consumption vs. larger units. Venturi systems cost much less than vacuum pump systems. If vacuum pumps are the only solution, small steam sterilizer costs will increase. The footprint of the sterilizer might also increase, making it difficult to replace older units that were smaller in design.

We agree that medium to large steam sterilizers should only use vacuum pump systems due to their larger water volume demand per cycle.

Pros

- Vacuum Pump Systems (vs. Venturi systems) could reduce water consumption by 40-50%

Cons

- Vacuum systems are not available currently for the small sterilizers from largest market share manufacturer in US at this time. To our knowledge, only one manufacturer uses vacuum pumps in small sterilizers which would create a monopoly with new code language
- Hospitals would be required to run additional electric (208 or 480 service) to ALL locations requiring small sterilizers. Currently only 50% of the small sterilizers sold require the installation of the high voltage, 3 phases lines. Additional costs would be incurred to provide electrical lines or force hospital to purchase larger sterilizers with built in vacuum pump.
- Vacuum pumps use additional electric consumption as a trade off for the water saving.

- Vacuum pumps still require water for the seal. Facilities would still have to incur the costs of providing water lines to the units.

Pump noise levels may not be acceptable in clinical spaces adjacent to operating rooms

Small sterilizers with electric steam generators, water recirculation, and vacuum pumps may expand the footprint of the sterilizers beyond what is acceptable in small areas provided in the OR space, requiring additional sq/ft costs by the facility

Not commercially available (3-5 year development process)

Added cost could be 10-15% above current costs (Average unit costs $35-45k for surgery applications today)

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx

Chilled Water Recirculation Loop for Medium & Large Size Sterilizers – Reduces total water consumption per sterilization cycle to 1-1.5 gallons.

Cost Impact: Will not increase the cost of construction.

GEW162-14: 702.18-PAARLBERG656

GEW163-14
703.3

Proponent: Jonah Cecil Scheib, Urban Green Council, representing Urban Green Council (cs@urbangreencouncil.org)

Delete and substitute as follows:

~~**703.3 Condensate coolers and tempering.** Potable water shall not be used as tempering water for sanitary discharge where the tempering water volume requirement for the application exceeds 200 gallons per day (757 liters per day). Where the tempering water volume required for the application is 200 gallons per day (757 liters per day) or less and potable water is used for tempering, water flow control devices shall be installed. Such control devices shall limit the flow rate of tempering water to that which is necessary to limit the temperature of the waste discharge to a maximum of 140°F (60°C). Such devices shall have a maximum flow rate of 200 gallons per day (757 liters per day).~~

<u>**703.3 Potable and nonpotable water prohibited for tempering.** Neither potable water nor nonpotable water shall be used for tempering condensate and other waste water before discharging it to the sanitary drainage system.</u>

Reason: Tempering water is used to cool condensate (for instance, from a steam heat system), which is then drained into the sewer. The current limit of 200 gallons per day would still allow 73,000 gallons per year of water to be delivered to the sanitary sewer, after serving no other use that briefly absorbing some heat. Even nonpotable water that has been treated sufficiently to permit its use inside buildings can be used for a higher purpose than as a heat sink. No other building systems waste water in this manner, and the green code should prohibit new installations from using tempering water (either potable or nonpotable) for condensate.

Bibliography:

NYC Green Codes Task Force, Proposal Water Efficiency 6 (Proposal) NYC Local Law 54 of 2010 (Law; Legislative Summary)
NYC Plumbing Code Section 202 and 428 (Code reference)

Cost Impact: Will not increase the cost of construction.

GEW163-14: 703.3-SCHEIB1159

GEW164-14
703.7.3, 703.8

Proponent: Dru Meadows, The Green Team, Inc., representing Walmart (dmeadows@thegreenteaminc.com)

Delete without substitution:

~~**703.7.3 Metering.** The metering of mechanical systems, system components, equipment and appliances shall be conducted in accordance with Section 705.1.~~

Revise as follows:

703.8 Wet-hood exhaust scrubber systems. Where wet-hood exhaust scrubber systems are used, they shall incorporate a water recirculation system. ~~The makeup water supplies for such systems shall be metered in accordance with Section 705.1.~~

Reason: Metering requirements are in Section 705 (Metering). The language in 703.7.3 and 703.8 does not add any further requirements. There are no similar cross references for other systems or equipment (e.g. irrigation or nonpotable systems).

Removing the cross references will simplify the code language without diminishing the requirements or application.

Cost Impact: Will not increase the cost of construction.

GEW164-14: 703.7.3-MEADOWS683

GEW165-14
705.1

Proponent: Anthony Apfelbeck, City of Altamonte Springs, FL, representing City of Altamonte Springs (ACApfelbeck@altamonte.org)

Revise as follows:

705.1 Metering. Water consumed from any source associated with the building or building site shall be metered. Each potable and reclaimed source of water, and each onsite nonpotable water source, shall be metered separately. Meters shall be installed in accordance with the requirements of the *International Plumbing Code*. For the purposes of Section 705.1.1, each meter identified in Table 705.1.1 shall be capable of communicating water consumption data remotely and at a minimum, be capable of providing daily data with electronic data storage and reporting capability that can produce reports that show daily, monthly, and annual water consumption.

> **Exception:** Fire sprinkler systems installed in accordance with Section 903.3 of the *International Fire Code* shall not be required to be metered.

Reason: The metering of fire sprinkler systems is an unnecessary cost as these systems only flow water in an emergency. Water is not "consumed" by the fire sprinkler system as a normal course of operations and, therefore, a straight reading of 705.1 would not require metering under the core code provision. In fact, metering of these systems can significantly impact the water supply available for the sprinkler system and create further cost impacts as a result of the need to increase pipe sizes due to the unnecessary meter loss. This language clarifies that there is no need to meter these systems.

Cost Impact: Will not increase the cost of construction.

GEW 165-14: 705.1-APFELBECK262

GEW166-14
705.1, 705.1.1, Table 705.1.1

Proponent: Dru Meadows, TheGreen Team, Inc., representing Walmart (dmeadows@thegreenteaminc.com)

Revise as follows:

~~705.1~~ 701.2 ~~Metering~~ Water usage metering required. Water consumed from any source associated with the building or building site shall be metered. Each potable and reclaimed source of water, and each onsite nonpotable water source, shall be metered separately. Meters shall be installed in accordance with the requirements of the *International Plumbing Code*. For the purposes of Section ~~705.1.1~~701.2.1, each meter identified in Table ~~705.1.1~~ 701.2.1 shall be capable of communicating water consumption data remotely and at a minimum, be capable of providing daily data with electronic data storage and reporting capability that can produce reports that show daily, monthly, and annual water consumption.

~~705.1~~ 701.2.1 ~~Metering~~ Individual metering required. All potable and nonpotable water supplied to the applications listed in Table ~~705.1.1~~701.2.1 shall be individually metered in accordance with the requirements indicated in Table ~~705.1.1~~701.2.1. Similar appliances and equipment shall be permitted to be grouped and supplied from piping connected to a single meter.

TABLE ~~705.1.1~~ 701.2.1
METERING REQUIREMENTS

(portions of table not shown remain unchanged)

Reason: This proposal only relocates metering requirements (Section 705) to the general requirements (Section 701). It doesn't delete or change any language.

This proposal is intended to improve the overall logic and consistency of the chapter.
The metering requirements are general requirements applicable to all buildings. Similar general requirements in other chapters are located in the first sections of those chapters (e.g. the site inventory requirements in Chapter 4 and the IAQ management plan requirements in Chapter 8). Other sections are applicable only to the extent that such systems or equiment is incorporated into the building. You are not required to have rainwater collection systems - but, if you do, you need to comply with the rainwater requirments. You must comply with the metering requirements.

Cost Impact: Will not increase the cost of construction.

GEW166-14: 705.1-MEADOWS675

GEW167-14
706.1, Chapter 12

Proponent: Lisa Reiheld, Canadian Standards Association, representing CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

706.1 Scope. The provisions of this section shall govern the use of nonpotable water and the construction, installation, and design of systems utilizing nonpotable water. The use and application of nonpotable water shall comply with laws, rules and ordinances applicable in the jurisdiction. <u>Where the jurisdiction does not have an applicable ordinance for the use and application of nonpotable water, the use and application of nonpotable water shall comply with CSA B128.3.</u>

Add a new standard as follows:

CSA

<u>B128.3-12 Performance of non-potable water reuse systems</u>

Reason: The addition of the alternative option to follow CSA B128.3 "Performance of non-potable water reuse systems" gives criteria for jurisdictions that do not have their own ordinances currently in place while still allowing the jurisdiction to have priority over the standard if they already have a policy in place.

Cost Impact: Will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CSA B128.2-12, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2014.

GEW167-14: 706.1-REIHELD1067

GEW168-14
706.3, Chapter 12

Proponent: Lisa Reiheld, Canadian Standards Association, representing CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

706.3 Water quality. Nonpotable water for each end use application shall meet the minimum water quality requirements as established for the application by the laws, rules and ordinances applicable in the jurisdiction. <u>Where the jurisdiction does not have an applicable ordinance for nonpotable water quality, the water shall meet the mininum water quality requirements of CSA B128.3.</u>

Add new standard as follows:

CSA

<u>B128.3-12 Performance of non-potable water reuse systems</u>

Reason: The addition of the alternative option to follow CSA B128.3 "Performance of non-potable water reuse systems" gives criteria for jurisdictions that do not have their own ordinances currently in place.

Cost Impact: Will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CSA B128.3-12, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2014.

GEW168-14: 706.3-REIHELD1057

GEW169-14
707.1, Chapter 12

Proponent: Lisa Reiheld, Canadian Standards Association, representing CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

707.1 Scope. The provisions of this section or the provisions of CSA B128.1/CSA B128.2 shall govern the construction, installation, alteration, and repair of rainwater collection and conveyance systems.

Add new standard as follows:

CSA

CSA B128.1-06/CSA B128.2-06 Design and Installation of Non-Potable Water Systems/Maintenance and Field Testing of Non-Potable Water Systems

Reason: The addition of the option to follow CSA B128.1/CSA B128.2 "Design and installation of non-potable water systems/Maintenance and field testing of non-potable water systems" gives an alternative reference standard that is equivalent to the IGC provisions included in this section.

Cost Impact: Will not increase the cost of construction

Analysis: A review of the standards proposed for inclusion in the code, CSA B128.1-06/CSA B128.2-06, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2014.

GEW169-14: 707.1-REIHELD1059

GEW170-14
708.12

Proponent: Dru Meadows, The Green Team, Inc., representing Walmart (dmeadows@thegreenteaminc.com)

Revise as follows:

708.12 ~~Gray~~ Specific gray water system design. The design of the gray water system shall conform to ~~accepted engineering practice~~the requirements of Section 708.

Reason: The term "accepted engineering practice" is subjective and difficult to enforce.

Cost Impact: Will not increase the cost of construction.

GEW 170-14: 708.12-MEADOWS241

GEW171-14
709.6

Proponent: Lisa Reiheld, Canadian Standards Association, representing CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

709.6 Approved components and materials. Piping, plumbing components, and material used in the reclaimed water systems shall be manufactured of material *approved* for the intended application as specified in the *International Plumbing Code*.

Reason: Adding reference to components and materials as those specified in IPC makes this section consistent with other sections refering to IPC requirements.

Cost Impact: Will not increase the cost of construction.

GEW171-14: 709.6-REIHELD1186

GEW172-14
709.9

Proponent: Dru Meadows, The Green Team, Inc., representing Walmart (dmeadows@thegreenteaminc.com)

Revise as follows:

709.9 Reclaimed water systems. The design of the reclaimed water systems shall conform to ASTM E 2635 and ~~accepted engineering practice~~ <u>the requirements of Section 709.</u>

Reason: The term "accepted engineering practice" is subjective and difficult to enforce.

Cost Impact: Will not increase the cost of construction.

GEW172-14: 709.9-MEADOWS680

GEW173-14
703.7.6, 703.7.6.1 (New)

Proponent: Daryn Cline, EVAPCO, Inc., representing EVAPCO (dcline@evapco.com)

Delete and substitute as follows:

~~**703.7.6 Water** Where nonpotable water is used within cooling towers, evaporative condensers and fluid coolers, it shall conform to the water quality and treatment requirements of the jurisdiction having authority and the water chemistry guidelines recommended by the equipment manufacturers.~~

703.7.6 Potable and nonpotable make-up water quality. Where potable and nonpotable make-up water is used within cooling towers, evaporative condensers and fluid coolers, such water shall conform to the water quality and treatment requirements of a water treatment plan developed in accordance with Section 703.7.6.1.

Add new text as follows:

703.7.6.1 Water Treatment Plan. The water treatment plan shall be based on the water chemistry guidelines recommended by the equipment manufacturers, the authority having jurisdiction and a make-up water analysis of the following parameters:

1. Conductivity in µS/ml
2. pH
3. Total Hardness in ppm as CaCO3
4. Ca Hardness in ppm as CaCO3
5. Mg Hardness in ppm as CaCO3
6. Alkalinity in ppm as CaCO3
7. Silica in ppm
8. Chlorides in ppm
9. Sulfate in ppm
10. Iron in ppm

The plan shall:

1. the control of microbiological activity, scale and corrosion.
2. specify the equipment and products used for treating the water of an open recirculating loop.
3. maximize cycles of concentration as required by Section 703.7.7.
4. address equipment and product compatibility with equipment materials of construction and system metallurgy.
5. include a schedule for the required inspection, maintenance and monitoring of the system and shall include a corrective actions log.
6. include owner's training and commissioning documents.
7. identify the persons responsible for providing and maintaining the system water treatment.

Reason: This section is revised and expanded to include a complete water analysis requirement, not just for non-potable, but for potable water used as make up for cooling towers, evaporative condensers and fluid coolers. This complete water analysis is required and to be used to determine the maximum allowable parameters for the recirculating water loop previously submitted by EVAPCO to accurately determine cycles of concentration levels as defined in Section 703.7.7 Discharge based on water chemistry.

This expanded code section also recommends adding the requirement of a documented water treatment plan, based on the make-up water chemistry (potable or non-potable) documented in Section 703.7.6. and 1. A water treatment plan that considers the HVAC system, water temperature and component metallurgy is utilized to further extend the life of the cooling system and to provide an efficient heat transfer system with minimal biological fouling and scaling, providing an energy saving design for the life of the system.

Cost Impact: Will not increase the cost of construction.

GEW173-14: 703.7.6 #2-CLINE1056

GEW174-14
703.7.7, Table 703.7.7

Proponent: Daryn Cline, EVAPCO Inc, representing EVAPCO (dcline@evapco.com)

Revise as follows:

~~**703.7.7 Discharge.** The discharge water from cooling towers used for air-conditioning systems shall be in compliance with Table 703.7.7. Where the discharge water is not captured for reuse, it shall be discharged and treated in accordance with jurisdictional requirements, if applicable.~~

~~**Exception:** Discharge water with total dissolved solids in excess of 1,500 ppm (1,500 mg/L), or silica in excess of 120 ppm (120 mg/L) measured as silicon dioxide shall not be required to meet the minimum parameters specified in Table 703.7.7.~~

703.7.7 Discharge water. The parameters of the discharge water from cooling towers used for air conditioning systems shall not exceed the values indicated in Table 703.7.7. The maximum cycles of concentration for a cooling tower shall be where any one of the following conditions occur:

1. Any value indicated in Table 703.7.7 is achieved.
2. Ten cycles of concentration have occurred.
3. The operation of the condenser water system is affected.

Cooling tower discharge water that is not captured for reuse shall be discharged and treated in accordance with the requirements of the jurisdiction, where applicable.

TABLE 703.7.7
~~MINIMUMCYCLES OF CONCENTRATION DISCHARGE WATER~~
MAXIMUM PARAMETER VALUES FOR WATER IN COOLINGTOWER CONDENSER LOOP[a]

~~MAKEUP WATER TOTAL HARDNESS (mg/L)~~[a] PARAMETER	~~MINIMUM CYCLES OF CONCENTRATION~~ MAXIMUM VALUE
~~< 200~~ Langelier Stability Index	~~5~~ 2.8
~~≥ 200~~ Ca (as CAO3)	~~3.5~~ 800 ppm
Total (M) Alkality	500 ppm
SiO2	150 ppm
Cl	300 ppm
Sulfates	250 ppm
Conductivity	4000µS/ml

a. ~~Total hardness concentration expressed as calcium carbonate~~. Values based upon a galvanized steel cooling tower operating at a maximum temperature of 110°F (43.3°C).

Reason: The requirements in the current code are a function of the hardness expressed as calcium carbonate in the makeup water itself, which varies by location, source and time of the year. Please note that a complete water analysis would allow more precision in the selection of the appropriate cycles of concentration.

A suggested analysis based on the new Table 703.7.7 with maximum water chemistry limits is recommended for the next version of the code. These new suggested guidelines in the suggested Table 703.7.7 begin with a LSI (Langelier Stability Index) requirement. The maximum LSI of 2.8 is called out to avoid potential deposition problems, but there is also a limit on the system temperature and cooling tower materials of construction at 110°F and galvanized steel respectively.

A general requirement for cycles as proposed in the current Table 703.7.7 without specifying a particular make-up water quality could lead to unforeseen water quality issues. The limits in Table 703.7.7, will cover many installations, but not all. There are other minerals and combinations of minerals that will prevent a particular make-up water from being cycled as high as the current version requires.

Cost Impact: Will not increase the cost of construction.

GEW174-14: 703.7.7-CLINE1018

GEW175-14
703.9.1.1 (New)

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org); Brenda Thompson representing ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC@iccsafe.org)

Add new text as follows:

703.9.1.1 Group I-2, Condition 2, occupancies overflow alarm supervision. Group I-2, Condition 2, occupancies shall have overflow alarms connected to a direct digital control system or other approved supervisory and monitoring system.

Reason: Overflow alarms are a very wise idea, and hospitals can accommodate this requirement. However, this chapter is written considering a local audible alarm. This proposal seeks to include such an alarm in a hospital's direct digital control system, which exists in the hospital to monitor other considerations such as airflow, fire alarms, and other required aspects of the patient care environment which they are required to monitor. These systems are monitored by hospital staff 24/7/365, either by on-site staff or remote alters (pager, text) which can mobilize personnel quickly in the event of an active alarm. A local audible alarm would likely go unheard if in the mechanical rooms, especially on second or third shift when staff is more minimal, and rounding the areas do not occur as frequently. Including in the direct digital control system would ensure the alarm receives more prompt attention.

This proposal is cosponsored by the ICC Ad Hoc Committee for Healthcare (AHC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC).

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort
between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at:http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at:http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW175-14: 703.9.1.1(NEW)-PAARLBERG657

GEW176-14
703.10 (New)

Proponent: Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Add new text as follows:

703.10 HVAC system water usage for performance-based compliance. This section shall apply only where a performance-based compliance path for the building and its site is used. Water usage of HVAC systems in the *proposed design* shall be equal to or less than the water usage of HVAC systems in the *standard reference design*.

> **Exception:** Water usage of HVAC systems in the *proposed design* shall not be required to be equal or less than in the *standard reference design* provided that the site energy usage of HVAC systems in the *proposed design* is at least 20 percent less than the site energy usage of the HVAC system in the *standard reference design*.

Reason: This edit will ensure that proposed HVAC systems are as efficient in their use of water as in the standard reference design HVAC system. This edit also allows flexibility, as there will be options that will increase HVAC energy efficiency but also increase the amount of water that is being used at the building site. In many cases, systems that are more efficient in their use of water will also be more efficient in their use of energy.

Example: A two-stage gas-fired absorption 500 ton chiller will use about 6-7 gallons/ton-hour of make-up water in the cooling tower system, and have a rated full load efficiency of 1.0 COP. A 500 ton electric chiller rated at 0.56 kW/ton at full load will use about 3.5-4 gallons/ton-hour of make-up water in the cooling tower system (33- 50% reduction in water use) and have a full load efficiency of 6.28 COP. The more water efficient system will use much less energy.

Cost Impact: Will not increase the cost of construction.

GEW176-14: 703.10 (NEW)-ROSENSTOCK511

GEW177-14
704.1.2

Proponent: Ed Osann, representing Natural Resources defense Council (eosann@nrdc.org)

Revise as follows:

704.1.2 Water consumption. Water softeners shall have a maximum water consumption during regeneration of ~~5~~ 4 gallons (~~18.9~~ 15.1 L) per 1000 grains (17.1 g/L) of hardness removed as measured in accordance with NSF 44.

Reason: The current specification for water consumption is the minimum voluntary performance specification contained in NSF 44, which more than 60% of residential demand-initiated regeneration (DIR) models meet. Furthermore, at least half the residential DIR systems on the market use 4.0 gallons of water or less per 1000 grains of hardness removed. Thus, the IgCC has ample room to specify a water consumption specification that is substantially more resource-efficient than the minimum in NSF 44.

Bibliography:

Notification of Intent to Develop Draft Efficiency and Performance Specifications for Cation Exchange Water Softeners, US Environmental protection Agency, November 18, 2010.

Cost Impact: Will not increase the cost of construction. Many models are on the market today that would meet the specification proposed here for 2015. Cost impact is negligible.

GEW177-14: 704.1.2-OSANN1158

GEW178-14
705.1.1

Proponent: John Williams, CBO, Chair, representing ICC Adhoc Health Care Committee (AHC@iccsafe.org)

Revise as follows:

705.1.1 Metering. All potable and nonpotable water supplied to the applications listed in Table 705.1.1 shall be individually metered in accordance with the requirements indicated in Table 705.1.1. Similar appliances and equipment shall be permitted to be grouped and supplied from piping connected to a single meter.

> **Exception:** In Group I-2, Condition 2 occupancies and ambulatory care facilities, water used for patient treatment or to support patient care shall not be required to be individually metered.

Reason: Water systems are directly tied to the environment of care. The complexity of healthcare systems is such that individual metering of the listed systems is impractical. Although there is a focus to replace equipment with more efficient components and controls, existing healthcare facilities have older systems that would be impractical to install meters on the individual components. The cost to install separate meters will have minimal effect on the required environmental aspects, especially regarding temperature and humidity, which are required by ASHRAE 170 and drive the majority of the hospital's water consumption. Other systems, such as water features and therapy pools that are used for patient treatment, make only a small fraction of the overall water consumption. For this reason, the metering that leads to water savings solutions is minimized making the metering impractical.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 11 open meetings and over 162 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx

Cost Impact: Will not increase the cost of construction. This change has significant first-cost impact, with minimal life cycle costs benefits.

GEW178-14: 705.1.1-PAARLBERG658

GEW179-14
Table 705.1.1

Proponent: Daryn Cline, representing EVAPCO, Incorporated (dcline@evapco.com)

Revise as follows:

TABLE 705.1.1
METERING REQUIREMENTS

APPLICATION	REQUIREMENTS
Open & Closed Circuit Cooling towers	Cooling towers ~~of 100 tons capacity or greater or groups of towers~~ with a flow through tower greater than 500 gpm (30 L/s) shall be required to utilize a meter on makeup water and blow-down water supply lines.

(Portions of table not shown remain unchanged.)

Reason: Reason for editing the Cooling Tower section:

1) Clarify that this applies to open and closed circuit cooling towers (not just open towers)

2) This suggested edit of switching "to greater than 500 gpm, in lieu of 100 tons or greater" matches ASHRAE 189.1, and eliminates the tonnage requirements.

3) Removes "Groups of towers" wording which seemed vague and out of place.

Bibliography:

ASHRAE Standard 189.1-2011 Standard for the Design of High-Performance Green Buildings Page 21, Table 6.3.3B Subsystem Water Measurement Thresholds.

Cost Impact: Will not increase the cost of construction. This proposed change will result in a cost savings to the owner, as metering will not be required for small 100 ton cooling towers.

GEW179-14: TABLE 705.1.1-CLINE917

GEW180-14
Table 705.1.1

Proponent: Ed Osann, representing Natural Resources Defense Council (eosann@nrdc.org)

Revise as follows:

TABLE 705.1.1
METERING REQUIREMENTS

APPLICATION	REQUIREMENTS
Irrigation	In-ground irrigation systems for outdoor landscaping ~~Irrigation systems that are automatically controlled~~ shall be metered.
Non-residential tenant ~~Tenant~~ spaces	~~Tenant~~ Non-residential tenant spaces such as for medical offices, dental offices, dine-in restaurants, cafeterias, laundries and any other occupancy that is estimated to consume over 1000 gallons of water per day shall be metered individually.
Residential tenant spaces	Residential tenant spaces shall be metered individually.

(Portions of table not shown remain unchanged.)

Reason: This proposal establishes separate metering requirements for residential and non- residential tenant space. Specified occupancies that are characterized by significant levels of water consumption are listed and required to be separately metered, together with any other occupancies that are estimated to use over 1,000 gallons per day as in the present language. This approach removes the need for an estimate of future water use for the most common high- water-use occupancies.

This proposal also requires the installation of water sub-meters for individual units in newly constructed apartment buildings. Public water suppliers typically do not install meters of their own on water supply piping to individual units, and occupants typically pay for water and sewer service as part of their rent or condominium fee. Sub-metering in new multi-family buildings, when used for allocating the cost of water and wastewater service to individual dwelling units, ensures that water users receive an appropriate signal regarding the volume and cost of their water use, and thus incentivizes residents to undertake responsible water use and prompt reporting of fixtures in need of repair.

Sub-metering is also useful in identifying leakage or unintended use in unoccupied dwelling units within multifamily buildings. The National Multiple Family Sub-metering and Allocation Study (2004), sponsored by the US EPA and thirteen public water suppliers in different parts of the country, demonstrated that sub-metering reduces indoor water consumption substantially, by about 16% or 7,960 gallons per household unit per year, as a mid-range estimate. Nationwide, an estimated 5.9 million additional households will be living in multifamily housing by 2030 compared with 2015 (US Energy Information Agency, *Annual Energy Outlook 2011*, Residential Sector Key Indicators and Consumption, Reference Case). If beginning in 2016 all new multifamily housing is equipped with sub-meters used for billing allocation, even a conservative savings estimate of 3,110 gallons per unit per year (the value at the lower bound of the confidence band of the 2004 National Study estimate) yields water savings of 388 million gallons per day by 2030. Additionally, the measurement of water used for landscape purposes and for outdoor water features, such as swimming pools, ornamental ponds, and fountains, is essential to the effective management and avoidance of waste in large multi-family properties This proposal also makes clarifying changes in the language requiring metering for landscape irrigation. The landscape metering requirement should not be determined by whether a system has automatic controls or not, but rather whether the irrigation system is in-ground, and thus susceptible to hidden leaks and the malfunctioning of permanently installed equipment.

Bibliography:

National Multiple Family Sub-metering and Allocation Study (2004), sponsored by the US EPA.

Cost Impact: Will increase the cost of construction. The estimated cost to install a sub-meter in new construction is $175. The National Multiple Family Sub-metering and Allocation Study cites $150 per meter. Additionally, according to Northland Investment Corp, water sub-meters can be installed for $125 to $175 per meter (see http://www.allbusiness.com/real-estate-rental-leasing/real-activities-related-to-real/680669-1.html) and as per the City of San Diego, it costs $150 - $300 per unit to install sub-meters in new construction (See http://www.sdnn.com/sandiego/2010-04-02/politics-city-county-government/city-council-to-consider-new-water-meter-rules#ixzz0jyvjUjrD).

However, installation of sub-meters to allocate the cost of the building's water and wastewater service to individual occupants removes these utility costs from the owner's income statement and effectively increases the net cash flow and capitalized value of each rental unit.

GEW180-14: TABLE 705.1.1-OSANN1170

GEW181-14
707.11.1.1

Proponent: Lisa Reiheld, Canadian Standards Association, representing CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

707.11.1.1 Potable water applications. Where collected water is to be treated to potable water standards, wood or cedar shake roofing materials, roofing materials treated with biocides, and lead flashing are prohibited on collection surfaces. Painted surfaces are acceptable only where paint has been certified to ensure that the toxicity level of the paint is acceptable for drinking water contact. Lead, chromium or zinc-based paints are not permitted on rainwater collection surfaces. ~~Flat~~ Roofing products shall be certified to NSF P151. Rainwater shall not be collected from vegetated roof systems.

Reason: Not all Rainwater Catchment and Collection Systems are on flat roofs and NSF P151 "Health Effects from Rainwater Catchment System Components" is not limited in scope to flat roofs but is limited in scope to those components used in rainwater collection. Therefore the term "flat" is not required.

Cost Impact: Will not increase the cost of construction.

GEW181-14: 707.11.1.1-REIHELD1074

GEW182-14
707.11.2, 707.11.9, 707.12.7

Proponent: Benjamin Sojka (bsojka@rainwatermanagement.com)

Revise as follows:

707.11.2 Debris excluders. Downspouts and leaders shall be connected to a ~~roof washer~~ pre-tank filtration device and shall be equipped with a debris excluder or equivalent device to prevent the contamination of collected rainwater with leaves, sticks, pine needles and similar material. Debris excluders and equivalent devices shall be self-cleaning and shall not allow debris larger than 400 micron to pass through.

707.11.9 ~~Roof washer.~~ Pre-tank filtration device. A sufficient amount of rainwater shall be diverted at the beginning of each rain event, and not allowed to enter the storage tank, to wash accumulated debris from the collection surface. The amount of rainfall to be diverted shall be ~~field adjustable as necessary~~sufficient to minimize storage tank water contamination. The ~~roof washer~~ pre- tank filtration device shall not rely on manually operated valves or devices, and shall operate automatically. Diverted rainwater shall not be drained to the roof surface, and shall be discharged in a manner consistent with the storm water runoff requirements of the jurisdiction. ~~Roof washers~~ Pre-tank filtration devices shall be accessible for maintenance and service.

707.12.7 ~~Roofwasher~~ Pre-tank filtration device test. ~~Roofwashers~~ Pre-tank filtration devices shall be tested by introducing water into the gutters. Proper diversion of the first quantity of water in accordance with the requirements of Section 707.11.9 shall be verified. Proper filtration of the water entering the storage tank shall be verified in accordance with Section 707.11.2.

Reason: Modern pre-tank filtration devices are a portion of an overall rainwater harvesting system. They aid in insuring a high oxygen level is maintained in the water storage tank and help to insure that the tank will rarely, if ever, require cleaning. For example, vertical, vortex type pre-tank rainwater harvesting filters have all but replaced roof washers in the rainwater harvesting industry. Roofwashers often retain moisture and material with a high organic content collects on the filter insert which results in an excellent media for bacteria growth. Vertical, vortex filters utilize surface tension (adhesion) in conjunction with a fine stainless steel filter mesh which excludes unwelcome debris. By this process about 90% of the rainwater is captured, filtered and diverted into a storage tank, while the remaining water carrying leaves and other debris is redirected to an appropriate stormwater catchment device/area. Further, with the unit having a vertical filter element, moisture and debris build up is all bu elimanated making the unit virtually maintenance free. These vertical, vortex type filters are sized for specific roof capacities and as a result, do not require field adjustment which reduces potential installation errors. Good quality harvested rainwater stored in a tank is the goal, so water quality, which can be determined by particulate size entering the tank, is what should be measured during the testing phase. Simply measuring the amount of water divereted from a roof washer, which is only one type of pre-tank filtration device, limits the ability of manufacturers and installers to improve upon existing designs. Vertical, vortex style units require less maintenance and reduce the life cycle cost of the overall rainwater harvesting system because this type of pre-tank filter requires negligable maintenance and the tank may never need to be cleaned.

Vortex style units conform to European DIN 1986 standard for rainwater harvesting.

Bibliography:

Virginia Rainwater Harvesting Manual, Lawson, et all, 2009, pages 36-37.

Cost Impact: Will not increase the cost of construction. The use of modern rainwater harvesting pre-tank filtration devices, such as the vertical, vortex filter will drastically reduce the cost of a rainwater harvesting system over its life span. The initial filtration device is comparable in cost to roof washer boxes and requires no replacement filter elements and sets in place a situation where tank maintenance is minimal and may never require cleaning the interior of the tank.

GEW182-14: 707.11.2-SOJKA1035

GEW183-14
707.11.4

Proponent: Lisa Reiheld, Canadian Standards Association, representing CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

707.11.4 Collection pipe materials. ~~In buildings where rainwater collection and conveyance systems are installed, drainage piping *approved* for use within plumbing drainage systems shall be utilized to collect rainwater and convey it to the storage tank. Vent piping *approved* for use within plumbing venting systems shall be utilized for all vents within the rainwater system. Drains to a storm water discharge shall use *approved* waste piping.~~ Piping for conveying rainwater to a rainwater storage tank and from a rainwater storage tank overflow and drain to a point of discharge, shall be in accordance with Chapter 11 of the *International Plumbing Code*. Piping for venting rainwater storage tanks shall be in accordance with Section 702.1 of the *International Plumbing Code*. Rainwater conveyance systems, other than piping, shall be approved.

Reason: Adding the reference to those materials specified in the *International Plumbing Code* keeps this section consistent with all other sections that refer to approved products as those allowed by the IPC.

Cost Impact: Will not increase the cost of construction.

GEW183-14: 707.11.4-REIHELD1177

GEW184-14
707.11.7, Chapter 12

Proponent: Lisa Reiheld, Canadian Standards Association, representing CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

707.11.7 Storage tank. The design of the storage tank shall be in accordance with <u>CSA B126 or</u> Sections 707.11.7.1 through 707.11.7.10.

Add new standard as follows:

CSA

<u>B126-13 Water Cisterns</u>

Reason: Adding CSA B126 as a reference standard offers an alternative to complying with Sections 707.11.7.1 thru 707.11.7.10 and is equivalent in content.

Cost Impact: Will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CSA B126-13 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2014.

GEW184-14: 707.11.7-REIHELD1178

GEW185-14
707.12.10, Chapter 12

Proponent: Lisa Reiheld, Canadian Standards Association, representing CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

707.12.10 Water quality test. The quality of the water for the intended application shall be verified at the point of use in accordance with the requirements of the jurisdiction <u>or, where the jurisdiction does not have an applicable ordinance, in accordance with CSA B128.3.</u> Except where site conditions as specified in ASTM E 2727 affect the rainwater, collected rainwater shall be considered to have the parameters indicated in Table 707.12.10.

Add new standard as follows:

CSA

<u>B128.3-12 Performance of non-potable water reuse systems</u>

Reason: Adding reference to compliance with CSA B128.3 "Performance of non-potable water reuse systems" offers an alternative for jurisdictions that do not have an ordinance in place and includes methods for testing water quality.

Cost Impact: Will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, C SA B128.3-12 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2014.

GEW185-14: 707.12.10-REIHELD1180

GEW186-14
708.12.1.1

Proponent: Dru Meadows, The Green Team, Inc., representing Walmart (dmeadows@thegreenteaminc.com)

Revise as follows:

708.12.1.1 Prohibited gray water sources. Waste water containing urine or fecal matter shall not be diverted to gray water systems and shall discharge to the sanitary drainage system of the building or premises in accordance with the *International Plumbing Code*. ~~Water from reverse osmosis system reject water, water softener discharge water,~~ Kitchen sink waste water, dishwasher waste water, and waste water discharged from wet-hood scrubbers shall not be collected for reuse within a gray water system. Reverse osmosis system reject water and water softener system backwash waste water that does not comply with Section 710.1, shall not be collected for reuse within a gray water system.

Reason: As currently written, Section 708.12.1.1 is in conflict with Section 710. Section 708.12.1.1 prohibits the use of alternate onsite sources of nonpotable water such as reverse osmosis reject water. Section 710 permits it.

This proposed new text will remove the conflict and provide consistency between the two sections.

Cost Impact: Will not increase the cost of construction.

GEW186-14: 708.12.1.1-MEADOWS682

GEW187-14
708.13.6, Chapter 12

Proponent: Lisa Reiheld, Canadian Standards Association, representing CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

708.13.6 Storage tank tests. Storage tanks shall be tested in accordance with CSA B126 or all of the following:

1. Storage tanks shall be filled with water to the overflow line prior to and during inspection. All seams and joints shall be left exposed and the tank shall remain water tight without leakage for a period of 24 hours.
2. After 24 hours, supplemental water shall be introduced for a period of 15 minutes to verify proper drainage of the overflow system and verify that there are no leaks.
3. Following the successful test of the overflow, the water level in the tank shall be reduced to a point that is 2 inches (51 mm) below the makeup water trigger point using the tank drain. The tank drain shall be observed for proper operation. The makeup water system shall be observed to verify proper operation, and successful automatic shutoff of the system at the refill threshold. Water shall not be drained from the overflow at any time during the refill test.

Add new standard as follows:

CSA

B126-13 Water Cisterns

Reason: Adding CSA B126 as a reference standard for compliance offers an alternative to complying with requirements in Section 708.13.6 and is equivalent in content.

Cost Impact: Will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CSA B126-13 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2014.

GEW187-14: 708.13.6-REIHELD1182

GEW188-14

706, 707, 708, 709, 710, Table 903.1, A107.3.1, A107.4.3, A107.6.2, A107.7.1, A107.8, A107.9

Proponents: Brenda Thompson, representing SEHPCAC (SEHPCAC@iccsafe.org), Craig Conner, Self, representing self (craig.conner@mac.com), Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com)

Delete without substitution:

~~Section 706 NONPOTABLE WATER REQUIREMENTS~~

~~Section 707 RAINWATER COLLECTION AND DISTRIBUTION SYSTEMS~~

~~Section 708 GRAY WATER SYSTEMS~~

~~Section 709 RECLAIMED WATER SYSTEMS~~

~~Section 710 ALTERNATE ONSITE NONPOTABLE WATER SOURCES~~

Revise as follows:

TABLE 903.1
COMMISSIONING PLAN

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
Chapter 7: Water Resource Conservation, Quality and Efficiency						
Appliances	X	None	—	—	—	702.6
Hot water distribution	X	None	—	—	—	702.8
Cooling tower performance	—	X	—	—	—	703.7.7
Metering	X	None	—	—	—	705.1.1
Rainwater system water quality	None	X	Field testing and verification	None	~~707.15.1~~ <u>IPC Chapter 13</u>	~~707.15.1~~
Gray water system water quality	None	X	Field testing and verification	None	~~708.13.8~~ <u>IPC Chapter 13</u>	~~708.13.8~~
Soil percolation test	X	None	Field inspection and report	Prior to installation of gray water irrigation system	None	~~708.14.2~~ <u>IPC Chapter 14</u>

(Portions of table not shown remain unchanged)

Revise as follows:

A107.3.1 Signage. Each outlet shall be provided with signage in accordance with Section ~~706.2~~ <u>1301.3 of the *International Plumbing Code*</u>.

A107.4.3 Signage. The entries to rooms having water closets or urinals that are supplied with nonpotable water shall be provided with signage in accordance with Section ~~706.2~~ <u>1301.3 of the *International Plumbing Code*</u>.

A107.6.2 Signage. Fire pumps connected to a nonpotable water supply shall have signage in accordance with Section ~~706.2~~ 1301.3 of the *International Plumbing Code*provided at the building's fire command center and at each fire pump.

A107.7.1 Signage. Rooms containing process equipment supplied with nonpotable water shall be provided with signage in accordance with Section ~~706.2~~ 1301.3 of the *International Plumbing Code*.

A107.8 Alternate onsite nonpotable water for cooling tower makeup water project elective. Where projects are intended to qualify for an *alternate onsite nonpotable water* for cooling tower makeup water project elective in accordance with Section ~~A107.7~~ A107.8, nonpotable water shall be utilized for cooling tower makeup water ~~in accordance with the requirements of Section 706.3~~. Such water shall meet the minumum water quality requirements as established for the application by the laws, rules and ordinances applicable in the jurisdiction.

A107.9 Gray water collection project elective. Where projects are intended to qualify for a gray water collection project elective in accordance with Section ~~A107.8~~ A107.9, waste water from lavatories, showers, bathtubs, clothes washers, and laundry trays shall be collected for reuse onsite in accordance with the gray water requirements of ~~Section 708~~ the *International Plumbing Code*.

Reason: These sections are no longer needed in the IgCC because the requirements were approved for inclusion in the 2015 IPC. These sections are the "how to" for installing plumbing systems for graywater, reclaimed water, rainwater and other onsite sources of nonpotable water. These requirements are more appropriately located in the plumbing code.

This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. In 2012 and 2013, the SEHPCAC has held six two-day open meetings and 50 workgroup calls, which included members of the SEHPCAC as well as any interested parties, to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction.

GEW188-14: 706-THOMPSON1109