IgCC – ENERGY/WATER

2014 PUBLIC COMMENT AGENDA FOR THE PROPOSED CHANGES TO THE 2012 IgCC

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Chapter 6, 302.1.1, 302.1, 903.1, 904.3, 1007.3, 1007.3.1, 1007.3.2, 1007.3.3, 1007.3.3.1, 1007.3.3.2, 1007.3.3.3, A106

Proposed Change as Submitted

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_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:

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 construction 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~~	~~Subsequent to completion of all commissioning~~	~~None~~	~~611.1~~

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
~~owner~~				~~activities~~		
~~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~~

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANCY	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupancy	
~~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)

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. *Building thermal 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_2e emissions reporting.** Where the jurisdiction indicates in Table 302.1 that ongoing post certificate of occupancy zEPI, 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, energy demand, and CO_2e 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 CO_2e 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_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.~~

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The Committee was opposed to removal of Chapter 6 regulating energy conservation from the IgCC. Even if jurisdictions choose to not adopt one chapter or another, the IgCC needs to contain the full complement of topics. If the code doesn't contain a chapter on energy conservation, there is no chapter available for adopting jurisdictions to consider. The general topic areas regulated in the IgCC need to remain consistent with the ICC 700

Assembly Motion: **Approved as Submitted**
Online Vote Results: **Failed** - Support: 50% (97) Oppose: 50% (97)
Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Mark Nowak, representing Steel Framing Allaince requests Approve as Submitted.

Commenter's Reason: The current language in the IgCC requires the use of three different documents to enforce a performance compliance approach vastly different than the methods required under the IECC. Energy efficient buildings can be achieved using the methods in the IECC already familiar to designers and code enforcement officials. This proposal simplifies the code for those in the enforcement and design communities by relying on the IECC provisions. It will permit code officials to use a system and

terminology that already exists, is familiar, and has a proven track record. The IECC compliance options are also well supported by the energy simulation software industry, including COMCheck and other tools used heavily to demonstrate compliance.

The current IgCC text also contains arbitrary prescriptive requirements in the form of a 10% reduction factor applied to U-factors, C-Factors, F-factors, and SHGCs. There is little to no savings in most climate zones from this requirement and in the some climates, it can result in a poorer-performing building. This public comment will fix this error by referencing the IECC for energy provisions.

Public Comment 2:

Hope Medina, representing Colorado Chapter of International Code Council (hmedina@coloradocode.net) requests Approve as Modified by this Public Comment.

Modify the proposal 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 of more than 41/2 tons total cooling capability, 54,000 Btu/h, or more than 1800 cfm (9.144 m3/s @ m2) air flow, provided manufacturer's 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~~ 3. 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~~ 4. 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~~ 5. Chillers shall be equipped with an outdoor air lockout thermostat and chilled water reset control.

~~7~~ 6. A maximum 5-year phase out plan shall be provided for buildings with existing systems that use CFC-based refrigerants.

~~8~~ 7. 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~~ 7.1 Allow the owner to set up schedules of operation for the equipment and provide equipment optimal start with adaptive learning;
   - ~~8.2~~ 7.2 Provide trim and respond capabilities based on zone demand;
   - ~~8.3~~ 7.3 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~~ 7.4 Offer economizing based on enthalpy calculation and/or CO2 set point control;
   - ~~8.5~~ 7.5 Offer load shedding when power companies are at peak demand and need; and
   - ~~8.6~~ 7.6 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. 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.~~
4. ~~4~~ 2. Showerhead, toilet, urinal and faucet flow rates shall be in accordance with this code.

Commenter's Reason: We have modified the submitted change by adding the couple of sections that referenced the deleted sections in chapter 6 that we had missed. Other than the added deletions we have not altered any content of our change.

We are witnessing the 2012 IgCC not being adopted. The few jurisdictions that are adopting this IgCC are adopting it with limited scope, as a "voluntary" code or outright deleting Chapter 6 (Dallas, Texas). We stand a chance of losing the IgCC with its valuable environmental contributions, 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 provisions 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 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 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 documents. The ICC 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. We should never be so set in our ways that we cannot think or look outside of the box. What is it that 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. We need to let people catch up with the requirements, verify that the new requirements are usable, and learn new technology and applications before trudging forward. Let's give 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 language that the IBC does. As such it would also allow the use of ASHRAE 90.1.

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 providing the "above code" provisions. Let them carry the IgCC for a cycle. At it's core this proposal is simply an effort to get the IgCC adopted and used by making it simpler and more familiar to the user.

Public Comment 3:

Hope Medina, representing Colorado Chapter of International Code Council (hmedina@coloradocode.net) requests Approve as Modified by this Public Comment.

Modify the proposal 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:

   1.1 A time clock is not required by Section C403.2.4.3 of the International Energy Conservation Code.
   1.2 There is 24-hour occupancy materials with special atmospheric requirements dependent on 24-hour space conditioning.
   1.3 A majority of the areas of the building served by the system are under setback thermostat control.
   1.4 Manufacturer's specifications stipulate that the system must not be shut off.
2. Functional outside air economizers shall be provided on all cooling systems of more than 41/2 tons total cooling capability, 54,000 Btu/h, or more than 1800 cfm (9.144 m3/s @ m2) air flow, provided manufacturer's 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:

   2.1 Section C403.3.1 of the International Energy Conservation Code would not require an economizer.
   2.2 The existing system has a water-based economizer.
   2.3 The existing system does not have an outside air intake.
   2.4 Special economizer operations such as, but not limited to, carefully controlled humidity would require more energy use than is conserved.
   2.5 There is insufficient space to install necessary equipment.
   2.6 Installation of an economizer would require major modifications to the building's life safety system.
   2.7 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:~~

~~3.1 Additional insulation shall not be required for piping where any of the following conditions exist:~~
~~3.1.1 It is located within HVAC equipment;~~
~~3.1.2 It is located within conditioned space that conveys fluids between 60°F (15.6°C) and 105°F (40.6°C);~~
~~3.1.3 Piping that is already insulated and the insulation is in good condition; or~~
~~3.2 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~~ 3. 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~~ 4. 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~~ 5. Chillers shall be equipped with an outdoor air lockout thermostat and chilled water reset control.

~~7~~ 6. A maximum 5-year phase out plan shall be provided for buildings with existing systems that use CFC-based refrigerants.

~~8~~ 7. 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~~ 7.1 Allow the owner to set up schedules of operation for the equipment and provide equipment optimal start with adaptive learning;
   ~~8.2~~ 7.2 Provide trim and respond capabilities based on zone demand;
   ~~8.3~~ 7.3 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~~ 7.4 Offer economizing based on enthalpy calculation and/or CO2 set point control;

~~8.5~~ 7.5 Offer load shedding when power companies are at peak demand and need; and
~~8.6~~ 7.6 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. The insulation shall not be required to extend beyond the building thermal envelope.~~
~~3~~ 2. Circulating pump systems for hot water supply purposes other than comfort heating shall be controlled as specified in Section 607.7.
~~4~~ 3. Showerhead, toilet, urinal and faucet flow rates shall be in accordance with this code.

APPENDIX X
SUPPLEMENTARY ENERGY CONSERVATION REQUIREMENTS

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

~~601.4~~ X101.1 Minimum requirements. *(No change to current text)*

~~601.5~~ X101.2 Multiple buildings on a site and mixed use buildings. *(No change to current text)*

~~601.5.1~~ X101.2.1 Multiple buildings on a site. *(No change to current text)*

~~601.5.2~~ X101.2.2 Mixed use buildings. *(No change to current text)*

SECTION ~~602~~ X102
MODELED PERFORMANCE PATHWAY REQUIREMENTS

SECTION ~~603~~ X103
ENERGY METERING, MONITORING AND REPORTING

SECTION ~~604~~ X104
AUTOMATED DEMAND-RESPONSE (AUTO-DR) INFRASTRUCTURE

SECTION ~~605~~ X105
BUILDING ENVELOPE SYSTEMS

SECTION ~~606~~ X106
BUILDING MECHANICAL SYSTEMS

SECTION ~~607~~ X107
BUILDING SERVICE WATER HEATING SYSTEMS

SECTION ~~608~~ X108
BUILDING ELECTRICAL POWER AND LIGHTING SYSTEMS

SECTION ~~609~~ X109
SPECIFIC APPLIANCES AND EQUIPMENT

SECTION ~~611~~ X110
ENERGY SYSTEMS COMMISSIONING AND COMPLETION

~~602.2~~ X102.2 Annual direct and indirect CO_2e emissions. *(No change to current text)*

~~602.2.1~~ X102.2.1 Onsite electricity. *(No change to current text)*

TABLE ~~602.2.1~~ X102.2.1
ELECTRICITY EMISSION RATE BY EPA eGRID SUB-REGION[a]
(Portions of table not shown remain unchanged)

~~602.2.2~~ X102.2.2 Onsite nonrenewable energy. *(No change to current text)*

TABLE ~~602.2.2~~ X102.2.2
FOSSIL FUEL EMISSION FACTORS
(Portions of table not shown remain unchanged)

~~603.3.7.5~~ X103.3.7.5 Other renewable energy electric production systems. *(No change to current text)*

Commenter's Reason: The first portion of the public comment addresses the 2 Sections in chapter 10 that referenced a section in the energy chapter submitted to be removed.

We wanted to present a solution to those who were in opposition to removing the overly cumbersome energy chapter. We chose to take the sections we had originally proposed to have deleted, and removed them from the body of the energy chapter and place them to an appendix chapter. That gives those jurisdictions that would like to require their energy provisions to go beyond what is required in the 2015 IECC and what is in the body of the 2015 IgCC the option of adopting the appendix chapter. This should address the concerns from both sides. End users are able to have a code where the requirements of the other chapters that are not found in the base codes to produce green projects. Industry gets increased energy requirements as an option.

There are many apprehensions when it comes to writing an energy chapter that is suppose to be above the current IECC. The proposed code changes are due only a couple of months after the IECC final actions hearings have finished. We are trying to write changes for an above code before anyone is able to see what the base code looks like. We are writing up theoretical ideas to put in place as codes, and requiring them before we are able to figure out if they are usable or enforceable. It's the end users who are stuck with figuring it out.

GEW1-14

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

Proposed Change as Submitted

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 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.~~ *International Energy Conservation Code.*

   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 Post certificate of occupancy zEPI, energy demand, and CO2*e* emissions reporting.** Where the jurisdiction indicates in Table 302.1 that ongoing post certificate of occupancy zEPI, energy demand and CO2e emissions reporting is required, and where the jurisdiction has indicated in Table 302.1 that enhanced energy performance in accordance with Section 302.1 or CO2e emissions in accordance with Section 602.2 are required, zEPI, energy demand, and CO2e 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 CO_2e 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_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.

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

Public Hearing Results

Errata

The following is errata that was posted to the ICC webpage.

1003.2.2 Heating, ventilating and air-conditioning.

3. HVAC piping and ducts, including those located above suspended ceilings, shall comply with ~~Sections 606.3 and 606.4.~~ *International Energy Conservation Code*.

The following is errata that was not posted to the ICC webpage.

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, 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, energy demand, and CO_2e emissions reporting shall be provided in accordance with this section.~~

(Portions of the proposal not shown remain unmodified.)

(Errata already incorporated into cdpACCESS.)

Committee Action: **Disapproved**

Committee Reason: Consistent with the actions on GEW1-14 and GEW4-14, the committee disapproved this proposal. The green code needs to have an energy efficiency chapter. This proposal would force all buildings to be subsection to performance modelling which is very expensive; especially for smaller buildings. It is unclear if this is 15 plus 10 percent savings because of the incomplete reference to IECC Section 407. There is merit to a concept of IECC PLUS. The IgCC is an incubator for new ideas, removing the chapter loses that option.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Mark Nowak, representing Steel Framing Alliance requests Approve as Modified by this Public Comment.

Modify as follows:

601.3 Application. Buildings and their associated building sites shall comply with Section C407 of the *International Energy Conservation Code*. ~~and~~ The building energy cost shall ~~exceed the requirements of Section C407 by not~~ be less than ~~10 percent~~. or equal to 85 percent of the standard reference design building.

Appendix E
Energy Efficiency Reduction

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

E101.1 Scope. The provisions in this chapter are designed to achieve energy conservation levels beyond those in the *International Energy Conservation Code.*

E201 Energy efficiency reduction. The building energy cost shall be reduced by 10 percent or greater than the requirements in Section 601.3 of this code.

Commenter's Reason: This public comment simplifies the code by relying on the base IECC code. It will eliminate the need for code officials, designers, owners, and others to learn and implement a performance 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. This is a simplification of the IgCC 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 that call for a 10% decrease in the IECC U-Factors, F-factors, C-Factors and SHGCs. There has never been substantiation provided to support this arbitrary 10% decrease in these values. In warmers climate zones, there will be little to no energy savings from the U-Factor modifications. In colder climates, the SHGC requirements will result in a lower-performing building compared to the IECC. This public comment addresses these errors and provides a compliance path that is familiar to designers and code enforcement officials, has a proven track record, and eliminates the need to show compliance with multiple methods by relying on the IECC provisions.

This public comment further clarifies that the use of the IECC provisions must include the current increase (85% multiplier) in efficiency required when using the IECC performance option. It also recognizes that further increases in efficiency need to consider climate-specific locations in order to not create unintended consequences and to actually deliver energy efficiency increases. Thus, an appendix has been added that communities can adopt to further improve on efficiency. By placing this in an appendix, communities can evaluate the appropriateness of this increase according to their specific climate and other local conditions.

GEW2-14

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

Proposed Change as Submitted

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~~ the required improvement compared to ASHRAE 189.1 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 Improvement compared to ASHRAE 189.1 of Jurisdictional Choice – The jurisdiction shall indicate a zEPI of 46 or less the required energy cost improvement compared to ASHRAE 189.1 in each occupancy for which it intends to require enhanced energy performance.	Occupancy: _____ ~~zEPI~~ Improvement compared to ASHRAE 189.1: _____	
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~~ comply with ASHRAE 189.1 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-OCCUPANC	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupanc	
Chapter						
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
b. Calibration	X	X	Testing and review and evaluation or test reports	During commissioning	Annually	~~603, 610.5~~ Section 10.3 of
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

CONSTRUCTION OR SYSTEM REQUIRING VERIFICATION	PREOCCUPANCY	POST-OCCUPANC	METHOD	OCCURRENCE		SECTION/ REFERENCED STANDARD
				Preoccupancy	Post-occupanc	
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
c. Mechanical system manuals – construction documents to require O&M	X	None	Verification of construction documents	Plan review	None	~~611.1.5.2~~ Section 10.3 of
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
b. Documentation of required commissioning outcomes	X	None	Verification with the building owner	Subsequent to completion of all commissioning	None	~~611.1~~ Section 10.3 of
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~~ Section 10.3 of ASHRAE
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~~ Section 10.3 of ASHRAE
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~~ Section 10.3 of ASHRAE
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~~ Section 10.3 of ASHRAE
g. Preparation of preliminary commissioning report	None	X	HVAC system installer/contractor or commissioning agent	None	Subsequent to commissioning	~~611.1.4~~ Section 10.3 of ASHRAE
h. Acceptance of HVAC systems and equipment/system verification	None	X	Building owner	None	Letter verifying receipt of the commissioning report	~~611.1.4.1~~ Section 10.3 of

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

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 accommodate, but shall not be less than 1/2 -inch (12.7 mm) thick.

2

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 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~~ Section 7 of ASHRAE 189.1 are required, ~~zEPI~~ annual energy cost, energy demand, and CO*2e* 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_2e 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

Public Hearing Results

The following is errata that was posted to the ICC webpage.

302.1 Requirements determined by the jurisdiction.

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~~ the required improvement compared to ASHRAE 189.1 in Table 302.1 for each occupancy required to have enhanced energy performance.

302.1.1 ~~zEPI 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~~ comply with ASHRAE 189.1 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.

(Portions of the proposal not shown remain unmodified.)

(Errata already incorporated into cdpACCESS.)

Committee Action: **Disapprove**

Committee Reason: ASHRAE189.1 was not made available to the committee to allow evaluation as an alternative compliance method for energy conservation requirements. There is already an option to follow 189.1 as an option for the code, there is no reason to allow selective use in this situation.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Submitted.

Commenter's Reason: ASHRAE 189.1-2011 is published with the the current version of the IGCC, and is available for comparison. The 2014 version will be available by late September 2014 or early October 2014. By aligning the provisions as proposed, it will make both codes easier to enforce.

Public Comment 2:

Charles Foster, representing Edison Electric Institute (cfoster20187@yahoo.com) requests Approve as Modified by this Public Comment.

Modify the proposal 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	Energy cost reduction project electives	□ Yes □ No
A106.1	Project Energy cost is at least ~~3~~ 2 percent lower than required by Table 302.1	□ 1 elective
A106.1	Project Energy cost is at least ~~6~~ 5 percent lower than required by Table 302.1	□ 2 electives
A106.1	Project Energy cost is at least ~~9~~ 8 percent lower than required by Table 302.1	□ 3 electives
A106.1	Project Energy cost is at least ~~12~~ 10 percent lower than required by Table 302.1	□ 4 electives
A106.1	Project Energy cost is at least ~~15~~ 13 percent lower than required by Table 302.1	□ 5 electives
A106.1	Project Energy cost is at least ~~18~~ 16 percent lower than required by Table 302.1	□ 6 electives
A106.1	Project Energy cost is at least ~~21~~ 19 percent lower than required by Table 302.1	□ 7 electives
A106.1	Project Energy cost is at least ~~24~~ 22 percent lower than required by Table 302.1	□ 8 electives
A106.1	Project Energy cost is at least ~~27~~ 25 percent lower than required by Table 302.1	□ 9 electives
A106.1	Project Energy cost is at least ~~30~~ 28 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

SECTION	DESCRIPTION	MINIMUM NUMBER OF ELECTIVES REQUIRED AND ELECTIVES SELECTED
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

Commenter's Reason: This proposal would align the energy provisions of the IGCC with the energy provisions of ASHRAE Std. 189.1 while still preserving the jurisdictional elective flexibility of the IGCC.

This public comment takes the original proposal and modifies Table A106 to make it modestly easier to obtain points.

GEW3-14

GEW5-14
601.3, 605.1, 606.1, 607.1, 608.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: While the committee felt that eliminating the multiple references was a good idea, they found the new language in Section 601.3 to be unclear. The phrase 'corresponding requirement' did not provide adequate guidance to the code user.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Jim Edelson, representing New buildings Institute requests Approve as Modified by this Public Comment.

Modify the proposal 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~~ The provisions of this chapter~~, it supersedes~~ shall take precedence over the ~~corresponding requirement~~ provisions 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~~.

Commenter's Reason: How do the measures and provisions of the IgCC relate to the IECC. This frequently asked question is not directly addressed in the current text of the IgCC. Section 101.2 states that the IgCC is an "overlay code", but does not define "overlay". Section 102.4.1 describes what happens when there is a conflict with a code that is not in the list of referenced I-codes, but does not describe what happens when there is a conflict with the referenced I-codes, including the IECC.

This modified comment uses language similar to Section 102.4.1 to specify the relationship of the IgCC to corresponding provisions in the IECC. The Memphis Committee appreciated the attempt to clarify the "overlay" relationship in the original proposal but asked the proponents to improve the language. This modification does that by using one simple declarative sentence to replace a complex if/then sentence structure.

In addition, the proposal makes editorial improvements that are not modified by this Comment. The proposal deletes duplicate language in each of the 60X.1 sections. The proposal also makes the title of 608.1 consistent with the titles of 605.1, 606.1, and 607.1.

Public Comment 2:

Garrett Stone, representing Energy Efficient Codes Coalition (gas@bbrslaw.com); Harry Misuriello, representing American Council for an Energy Efficient Economy (misuriello@verizon.net); Maureen Guttman, representing Building Codes Assistance Project request Approve as Modified by this Public Comment.

Modify the proposal 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 for the same building system or component is ~~provided~~ specified in this chapter and in the International Energy Conservation Code, ~~it~~ the requirement in this chapter 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.

Commenter's Reason: We recommend that this proposal be Approved As Modified in accordance with this public comment. This modification tightens the language of GEW5 and accomplishes the original intent of the proposal. In order for the IgCC to be a true "overlay" code to the IECC, the code should be clear about the applicability of the IECC. Whenever there are requirements in the IgCC that apply to specific systems or components, these requirements essentially replace the IECC requirements.

GEW5-14

GEW9-14
601.3

Proposed Change as Submitted

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, 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*.

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

Public Hearing Results

The following is errata that was posted to the ICC webpage.

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

Committee Action: **Disapproved**

Committee Reason: The committee understood the concept of the proposal, which is to require additional energy enhancement provisions from Section C406 of the IECC, but found the language unclear. For example, the IECC requires one of the six enhancements to be used. This provision requires two. Does that mean a total of 3 (1 plus 2) or a total of 2 (1 plus 1)? The structure of the sentence also made it unclear if two enhancements were required for either Section 601.3.1 or Section 601.3.2 compliance - or if it was require for both. The committee hopes the proponent will return with a public comment to clarify the intent.

Assembly Action: **None**

Analysis:: The published proposal contained two errata in the form of extra commas. One located after Section 601.3.2 in the first sentence and one located after Section 406.1.1 in the second sentence.

Individual Consideration Agenda

Public Comment:

Jim Edelson, representing new buildings institute requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

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

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, 611 and ~~611~~ not less than one additional option from Section C406.1 of the *International Energy Conservation Code*. Existing buildings are not required to comply with Section C406 of the *International Energy Conservation Code*.

Commenter's Reason: The modeled performance compliance path in the IgCC requires a 10% performance improvement over the IECC. To maintain consistency among the energy compliance paths in the IgCC, the prescriptive path should also target 10% energy saving beyond the 2015 IECC. No analysis has identified energy savings in IgCC's prescriptive path where the energy savings taken in total exceed even 5% savings beyond 2015 IECC.

This proposal as modified by the comment takes advantage of the increased number of optional packages in Section C406 of the 2015 IECC. In the 2015 IECC, most buildings must comply with one of six packages from section 406 of the IECC. The energy savings of the IgCC prescriptive path can be enhanced with this new code language by requiring one additional option to be selected in order to garner more energy savings.

The Memphis Committee noted there were confusing elements in the grammatical construction of the original proposal. This was compounded by the fact that an errata was published because two additional commas were present in the monograph that were not in the proposal as submitted. The modification simplifies, shortens and clarifies the language of the original proposal and also places it in Section 601.3.2, which addresses only the prescriptive path. The modification also clarifies that existing buildings are not required to provide any of the packages from Section C406, which is consistent with the charging language in the IECC.

GEW9-14

GEW14-14
601.6 (New)

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that the limitation that would be imposed by the proposed text limit design flexibility and choice. While there was some support of the concept of the proposal in order to limit 'gaming' of the system, the committee felt the proposal was too simplistic. How someone would do an area weighted average was unclear.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Garrett Stone, representing Energy Efficient Codes Coalition (gas@bbrslaw.com); Harry Misuriello, representing American Council for an Energy Efficient Economy (misuriello@verizon.net); Maureen Guttman, representing Building Codes Assistance Project request Approve as Submitted.

Commenter's Reason: We recommend that this proposal be Approved As Submitted because it would establish a meaningful backstop that will help ensure that buildings certified "green" will have reasonably efficient thermal envelope requirements. The Committee's concerns over how to calculate an area-weighted average are misplaced - area-weighted averages have long been a part of the IECC, and several IgCC sections require area-weighted averaging as well. The intent of this proposal is to clarify that because the thermal envelope will likely be unchanged over very long periods of time, trade-offs of these components against shorter-lived components must have some limitations. Allowing area-weighted averaging, as well as a roughly 20% gap between the requirements and the backstop, provide flexibility along with reasonable protection against all of the problems caused by inefficient envelopes.

Public Comment 2:

Name: Jay Crandell, Applied Building Technology Group LLC, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

601.6 Building thermal envelope trade-off allowance. Where compliance with this code permits use of U-factors, C-factors, F-factors, or SHGC values greater than those required by Section 605.1.1, the values permitted shall not exceed by more than 10 percent those required in Tables C402.1.4 and C402.4 of the *International Energy Conservation Code*.

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~~
For purposes of compliance with this code, each U-factor, C-factor, F-factor and SHGC value in Tables C402.1.4 and C402.4 of the ~~specified tables~~ *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 building roof area.

Exception: Increased U-factor, C-factor, F-factor, and SHGC values shall be permitted in accordance with Section 601.6.

Commenter's Reason: FSC supports the originally submitted GEW14 proposal and also offers this public comment as an alternative to achieve similar purpose. This public comment is coordinated with Section 605.1.1 by adding an exception to make it clear that trade-offs are available as an option to allow relaxation of the prescriptive envelope requirements in the IgCC. It also simplifies and clarifies the prescriptive insulation and fenestration language in Section 605.1.1. In addition, it addresses the committee's confusion with regard to area averaging as referenced in the original proposal. Finally, it makes corrections to coordinate with new table numbers in the 2015 IECC.

The original GEW-14 proposal and this public comment provide the flexibility of a trade-off allowance to reduce envelope requirements by as much as 20% below the IgCC requirements in Section 605.1.1. Thus, envelope requirements in the IgCC can be reduced to a level that is 10% less stringent than the IECC. This "overlay" approach uses the IECC provisions as a foundation for requirements in the IgCC and allows trade-offs to be used such that the familiar prescriptive insulation and fenestration requirements in the IECC can be used (or even further reduced). Consequently, this approach preserves flexibility while also ensuring long-lasting energy efficiency for buildings in a way that aligns with the sustainability intent of the IgCC.

The ICC membership is encouraged to carefully consider the following reasons for voting in support of GEW-14 as submitted or as modified by this public comment:

1. The building envelope performs 24-7-365 for the entire life of the building and is the most durable and reliable aspect of energy conservation. NAHB's report, "Study of Life Expectancy of Home Components", life-cycle of building materials survey indicates that the life-expectancy of insulation is for "lifetime" of the building which is potentially more than 100 years. Other reports by DOE and NIBS confirm this "lifetime" estimate.
2. It is costly to later improve the insulation components concealed with the building structure; therefore, the best time to provide cost-effective envelope performance is when the building is being originally constructed. The best time is now, not tomorrow …or 20 years from now. There is no shortage of materials and methods to provide competitive, safe, durable, and cost-effective solutions for building envelopes; thus, there is no practical need to continue to allow an unlimited trade-off of durable building envelope performance.
3. As IgCC is a "green code", durability and energy efficiency are key aspects of sustainability and the intent of the IgCC. Allowing the most durable aspects of building energy conservation to potentially be traded off by unlimited and potentially

significant amounts should be avoided or at least moderated. This proposal provides a reasonable and moderate allowance.

4. The trade-off allowance concept is not new and it has been included in other codes and standards, such as ASHRAE 189.1 Appendix D (Section D1.3), IECC Section R402.5 (limits on fenestration U-factor and SHGC), California Title 24, Subchapter 7 (limits on maximum U-factor for roofs and walls), and, more recently, Georgia amendments to 2009 IECC (minimum R-values and U-factors for use with trade-offs), and Section R406.2 of the IECC (thermal envelop not less than the 2009 IECC in use of the ERI compliance alternative). Thus, a trade-off limit has been shown to be workable and, for sustainable construction, ensures that the most durable aspect of energy efficiency is not too deeply traded away.
5. Allowing trade-offs at a sensible level is also a principle closely associated with integrated design of overall building systems. Integrated design considers not only the interactions and interdependencies between building systems, but it also considers the vulnerability of over- or under-emphasizing the importance of various parts or sub-systems of the overall building. This proposal provides a back-stop against under-emphasizing the building envelope while still allowing significant flexibility to trade it off for more emphasis of other systems in achieving cost-effective code compliance.
6. Meaningful resiliency of buildings in the face of disaster, power-outages, and extreme winter or summer conditions is also a key component of sustainable construction when approached effectively in a practical and cost-effective way. When a power outage occurs, only the building envelope remains functional in controlling the building indoor environment. Thus, it is important to a resilient response to power outages that may occur at any time and often at very inconvenient times, e.g., winter ice storms, summer thunderstorms and hurricanes, etc. When extreme winters or summers occur (such as the winter of 2013-2014), energy demand peaks, supplies are depleted, and energy prices rise (see charts below). The energy code provisions are based on “average” or “typical” years not extremes that might occur every 5, 10, or more years. With building envelope thermal performance traded-off to unlimited extents currently permitted in the code, the resiliency aspect of sustainability is harmed. The IgCC can help remedy this concern with the approval and inclusion of GEW-14 as submitted or as modified by this public comment.

   Chart 1: Depletion of Natural Gas Reserves (Winter 2013-2014)

   Chart 2: Resulting Spike in Natural Gas Prices (Prices Doubled)

GEW14-14

GEW22-14
602.2

Proposed Change as Submitted

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 pd ≤ ~~≥(zEPI ×~~ CO_2e sr*bd*) × 51/57 **(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.

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal would set the same CO_2e level for all buildings. As the code allows setting a lower zEPI level, they shouldn't be locked into the CO_2e level. If the intent was to eliminate zEPI, the line defining zEPI should have also been struck out.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Neil Leslie, representing self (neil.leslie@gastechnology.org) requests Approve as modified by this public comment.

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 $\leq$ (CO_2e sr*bd*) × 51/57 **(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.

Commenter's Reason: The committee's reason statement is not consistent with the intent of the proposed change. The referenced zEPI equation provides a fixed compliance requirement for a building, as it should, for energy performance. However, the current CO2e compliance requirement for a building floats depending on the proposed building zEPI. That creates an additional and unnecessary hurdle for the compliant building, and is more stringent for more efficient buildings than it is for less efficient buildings, which is not fair. The proposed change fixes this inequity. The comment proposes an amendment to the original proposal to remove the zEPI equals statement because the intent is to remove zEPI from this equation – and it no longer needs to be explained. Not removing the line in the original submittal was an oversight..

GEW22-14

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

Proposed Change as Submitted

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.

$$zEPI = 57 \times (EUIp/EUI) \qquad \textbf{(Equation 6-1)}$$

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~~

~~eGRID 2007 SUB-REGION ACRONYM~~	~~eGRID 2007 SUB-REGION NAME~~	~~ENERGY CONVERSION FACTOR~~
~~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~~.

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

2. ASHRAE Tech Council June 2010 report:
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
http://www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_6_Fugitive_Emissions_from_Oil_and_Natural_ Gas.pdf
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http://www.nytimes.com/2011/09/27/business/energy-environment/in-north-dakota-wasted-n atural-gas-flickers-against-the-sky.html?pagewanted=all
http://www.investmentu.com/2011/September/natural-gas-flaring.html

Cost Impact: Will not increase the cost of construction.

GEW23-14: 602.1-FOSTER456

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that moving from 'source' energy to 'site' energy was a step backwards in the conservation of energy through construction requirements. The committee sees saving energy as a 'societal' good and this proposal doesn't move the discussion forward. Finally, without a reference to Appendix G or a substitution, the code would be without a model by which to judge comparative energy usage.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

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 of ASHRAE 90.1. 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.~~

Commenter's Reason: By aligning the IGCC with ASHRAE 90.1 and 189.1, which use energy costs based on site energy usage, this modification will improve the IGCC. This proposal will ensure that buildings that use the performance path will actually save energy and energy costs, which will be a significant step forward.

GEW23-14

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

Proposed Change as Submitted

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 pd~~p~~ ≥ (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 pd~~p~~ = 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

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal is a broad attempt to clean up text and titles of the sections. The proposal maintains zEPI. It makes the section more easy to understand and apply. The intent in approving this change does not mean that the other substantive changes approved by the committee are overridden. While other proposals on the agenda also addressed improvements to this section, this proposal was seen as the best of the options.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Mark Heizer, representing self, requests Disapprove.

Commenter's Reason: GEW-24 , while a good attempt at fixing the current zEPI method, is incomplete and does not provide a viable performance calculation method for buildings outside of the basic building categories noted in this proposal. In addition, the entire modeling methodology is tied to ASHRAE 90.1 for compliance.

Without an alternate compliance path that may be used by other building types, GEW-24 should be disapproved. GG-76 with Public Comment provides an alternate path for performance based modeling compliance; GG-76 allows for performance modeling based on relative compliance to the IECC. By providing an alternate path of equal or better efficiency for designers that remains within the I-codes, equitable choices are available for compliance. All building types can use GG-76 with Public Comment

If GG-76 with public comment is allowed to move forward, then both GG-76 and GEW-24 would be recommended for approval. Without GG-76, GEW-24 leaves the IgCC with a limited, unfair compliance method based solely on ASHRAE 90.1. And IgCC energy compliance could be required excluding any use of the IECC: As an overlay code, the IECC should be the starting point for IgCC energy compliance and be an allowed methodology to show compliance. Without GG-76 , GEW-24 should not move forward without an I-code path.

GEW24-14

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

Proposed Change as Submitted

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~~

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB-REGION NAME	ENERGY CONVERSION FACTOR
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.

602.1.2.2 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 C*O2e* 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_focus_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.pdf

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-gas-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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal takes the code into a different direction from the previous actions to maintain the use of zEPI. The concern expressed that ASHRAE 90.1 looking future Analysis: factors can be addressed during the updates for future editions of the IgCC. This is a radical change that would need refinement before it comes into the code. Similar to other proposals, the committee found changing from source energy to site energy unacceptable

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Craig Drumheller, representing National Association of Home Builders (CDrumheller@nahb.org) request Approve as Submitted.

Commenter's Reason: This simple change will clarify what the actual requirements are of referenced codes in the IgCC. There are a number of jurisdictions which do NOT adopt the entire family of I-codes or they may have amended a referenced code. For example many western states adopt IAPMO as the plumbing code- so to comply with the IgCC is it necessary to adopt the IPC? Must a building comply with the unamended version of a referenced code, or the code as adopted locally. This language provides a simple solution that adds code adoption flexibility for jurisdictions and clearly states the intension of the IgCC and should be approved As Submitted.

Public Comment 2:

Charles Foster, representing self (cfoster20187@yahoo.com) requests Approve as Submitted.

Commenter's Reason: I agree that this proposal would lead the IGCC in another direction from its present course but respectfully submit that would be a good thing. The IGCC decided it would try a compliance metric not used in any other code or standard, namely Zepi. The IGCC has not gained widespread acceptance and one of the reasons I believe it is viewed as perhaps too difficult for code officials to enforce and too hard for builders to use. This proposal would change the compliance metric to cost -- something everybody understands and that is used in other similar documents like ASHRAE Std 189.1.

Finally, the Committee reasoning suggests that somehow this proposal would change the compliance metric from source to site. They were mistaken. It would change the metric from source to energy cost. Site energy is not mentioned in this proposal.

Public Comment 3:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

602.1.1 yECI. Performance-based designs shall demonstrate an annual energy cost index yECI of not more than 0.8 as determined in accordance with ~~Equation~~ Equations ~~6-1~~ 6-1a and 6-1b for energy cost reduction and shall demonstrate a CO_2e emissions reduction in accordance with Section 602.2 and Equation 6-2 for CO_2e.

yECI = (EUCIp/EUCI) **(Equation 6-~~1~~ 6-1a)**

and

yECI ≤ 0.8 **(Equation 6-1b)**

where:

EUCIp = the proposed annual energy cost for the proposed design of the building and its site calculated in accordance with Section 602.1.2.
EUCI = the base annual energy cost for a baseline building and its site calculated in accordance with Section 602.1.2.

602.1.2 Annual energy cost index. The proposed and base annual energy cost index (~~ECIp~~ EUCIp and ~~ECI~~ EUCI) 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. The annual energy use shall include all energy used for building functions and its anticipated occupancy

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 ≧ ≤ (yECI × CO_2e sr*b*d) **(Equation 6-2)**

where:

yECI = the calculated annual energy cost ratio in accordance with Section 602.1.1.
CO2*e* pd = emissions associated with the proposed design.

$CO_{2e\ srbd}$ = emissions associated with the standard reference budget design in accordance with Section 602.1.2.

Commenter's Reason: The proposed modifications clarify the proposal. This proposal will align the performance path of the IGCC with the performance path of ASHRAE 189.1, which is based on measurable and verifiable energy costs.

GEW26-14

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

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee found that adding a second methodology alongside of zEPI would be confusing to the code users. The committee noted that there were inconsistencies between the methodologies that would hamper understanding.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Keith Dennis, representing NRECA (keith.dennis@nreca.coop) requests Approve as Submitted.

Commenter's Reason: The proposal is clear as written, is easy to understand and gives users an increase desired level of flexibility

Public Comment 2:

Charles Foster, representing self (cfoster20187@yahoo.com) requests Approve as Submitted.

Commenter's Reason: This proposal would modify the current code to allow the use of cost as an alternative means of compliance -- currently the IGCC uses Zepi.

The Committee stated that it felt using cost as a compliance metric would be confusing to users and code officials.

The IECC, ASHRAE Std. 90.1, ASHRAE Std. 189, and most other energy codes and standards use cost as the basis for compliance.

The current compliance metric, Zepi, is confusing. Cost is not.

Please reverse the Committee's decision.

Public Comment 3:

Steven Rosenstock, representing Edison Electric Institute Institute (srosenstock@eei.org) requests Approve as Submitted.

Commenter's Reason: This approach will provide much more flexibility to building owners and designers, and it will provide an approach that is more consistent with the approach taken in ASHRAE 189.1.

GEW27-14

GEW28-14

602.1.2.1, Table 602.1.2.1, 602.1.2.2, Table 602.1.2.2, 602.1.2.3

Proposed Change as Submitted

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.

602.1.2.2 Site to source electric power conversion. In calculating the annual energy use index, electric energy used at the site 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[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.

~~602.1.2.3 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

Public Hearing Results

The following is errata that was not posted on the ICC website.

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.

602.1.2.2 Site to source electric power conversion.

In calculating the annual energy use index, electric energy used at the site 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
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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.

~~**602.1.2.3 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.~~

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this change at the request of the proponent. The actions proposed by GEW28-14 were taken care of through the approval of previous actions (GEW24-14).

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

David Collins, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com) requests Approve as Submitted.

Commenter's Reason: The AIA supports the approval of GEW28 as originally submitted. The three sections in the IgCC concerning a base annual energy use index in Section 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 Standard 90.1, but in reality they are simply attempting to change the methods of evaluating various energy sources so that that may be done with consistency

The modification to Section 602.1.2.1 will match the content of the section with the table modified to include all the specific fuels addressed. Energy use must be converted to consistent units by multiplying the nonrenewable energy fossil fuel use at the utility meter or measured point of delivery in Btus and multiplying that by the conversion factor in Table 602.1.2.2.

Finally, GEW28 modifies Section 602.1.2.3 by deleting the provision already addressed in this proposal in the changes to Section 602.1.2.1 requiring energy to be measured consistently and independent of the fuel type.

These changes make the code much more understandable and provides appropriate means for evaluation of the energy use in a building. We urge the membership to vote for approval as submitted on GEW29.

GEW28-14

GEW29-14
602.1.2.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved the proposal following the testimony of the proponent that the changes included in GEW29-14 have been taken care of by previous actions (GEW24-14).

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

David Collins, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com) requests Approve as Submitted.

Commenter's Reason: The AIA supports GEW29 as originally submitted. The performance modeling required by the IgCC to determine an appropriate zEPI value contains an exception in the energy modeling protocol of ASHRAE Standard 90.1 Appendix G prohibiting the inclusion of on-site or site recovered renewable energy sources. By eliminating this exception, the energy modeling protocol of Standard 90.1 is modified for use in the IgCC to meet the original intent of the Sustainable Building Technology Committee in developing the IgCC 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.

GEW29 modifies this language so that energy use shall be converted by multiplying the nonrenewable energy fossil use at the utility meter or measured point of delivery in Btus and multiplying by the conversion factor in Table 602.1.2.2.

We urge the membership to maintain an equitable means for determining added energy conservation.

GEW29-14

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

Proposed Change as Submitted

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~~ 2010 SUB-REGION ACRONYM	eGRID ~~2007~~ 2010 SUB-REGION NAME	ENERGY CONVERSION FACTOR
AKGD	ASCC Alaska Grid	~~2.97~~ 3.15
AKMS	ASCC Miscellaneous	~~1.76~~ 1.90
ERCT	ERCOT All	~~2.93~~ 3.08
FRCC	FRCC All	~~2.97~~ 3.26
HIMS	HICC Miscellaneous	~~3.82~~ 3.67
HIOA	HICC Oahu	3.14
MORE	MRO East	~~3.40~~ 3.50
MROW	MRO West	~~3.41~~ 3.64
NYLI	NPCC Long Island	~~3.20~~ 3.47
NEWE	NPCC New England	~~3.01~~ 3.03
NYCW	NPCC NYC/Westchester	~~3.32~~ 3.21
NYUP	NPCC Upstate NY	~~2.51~~ 2.66
RFCE	RFC East	~~3.15~~ 3.28
RFCM	RFC Michigan	~~3.05~~ 3.35
RFCW	RFC West	~~3.14~~ 3.29
SRMW	SERC Midwest	~~3.24~~ 3.40
SRMV	SERC Mississippi Valley	~~3.00~~ 3.20
SRSO	SERC South	~~3.08~~ 3.20
SRTV	SERC Tennessee Valley	~~3.11~~ 3.30
SRVC	SERC Virginia/Carolina	~~3.13~~ 3.24

eGRID ~~2007~~ 2010 SUB-REGION ACRONYM	eGRID ~~2007~~ 2010 SUB-REGION NAME	ENERGY CONVERSION FACTOR
SPNO	SPP North	~~3.53~~ 3.57
SPSO	SPP South	~~3.05~~ 3.26
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~~ 2010 SUB-REGION ACRONYM	eGRID ~~2007~~ 2010 SUB-REGION NAME	~~2005~~ CO_2e RATE ~~(lbs/MWh)~~ (kg/kWh)
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

eGRID ~~2007~~ 2010 SUB-REGION ACRONYM	eGRID ~~2007~~ 2010 SUB-REGION NAME	~~2005~~ CO_2e RATE ~~(lbs/MWh)~~ ~~(kg/kWh)~~
NYLI	NPCC Long Island	~~1651~~ 0.698
NEWE	NPCC New England	~~999~~ 0.428
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

Public Hearing Results

The following is errata that was posted on the ICC website:

Table 602.1.2.1
Electricity Generation Energy Conversion Factors by EPA eGrid Sub-region[a]

eGRID ~~2007~~ 2010 Subregion Acronym	**eGrid ~~2007~~2010 Sub-region Name**	**Energy Conversion Factor**
SRSO	SERC South	~~3.08~~3.20
SRTV	SERC Tennessee Valley	~~3.11~~ 3.30

~~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.~~

Table 602.1.2.2
U.S Average Building Fuels Energy Conversion Factors by Fuel Type[a]

Table 602.2.1
Electricity Emission Rate by EPA eGrid Sub-region[a]

eGRID ~~2007~~ 2010 Subregion Acronym	**eGrid ~~2007~~2010 Sub-region Name**	**~~2005~~ CO_2e Rate ~~(lbs/MWh)~~ (kg/kWh)**

(Portions of proposal not shown remain unchanged.)

(Errata already incorporated into cdpACCESS.)

Committee Action: **Approved as Submitted**

Committee Reason: GEW31 relies on the same technology as currently applied in the code, that being the EPA eGRID Subregions. It updates the values from 2007 to 2010.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Charles Foster, representing self (cfoster20187@yahoo.com) requests Approve as Modified by this Public Comment.

Modify the proposal 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 2010 SUB-REGION ACRONYM	eGRID 2010 SUB-REGION NAME	ENERGY CONVERSION FACTOR
AKGD	ASCC Alaska Grid	~~3.15~~ 2.95
AKMS	ASCC Miscellaneous	~~1.90~~ 0.90
ERCT	ERCOT All	~~3.08~~ 2.28
FRCC	FRCC All	~~3.26~~ 2.43
HIMS	HICC Miscellaneous	~~3.67~~ 2.63
HIOA	HICC Oahu	~~3.14~~ 2.98
MORE	MRO East	~~3.50~~ 2.50
MROW	MRO West	~~3.64~~ 2.36
NYLI	NPCC Long Island	~~3.47~~ 3.23
NEWE	NPCC New England	~~3.03~~ 1.71
NYCW	NPCC NYC/Westchester	~~3.21~~ 1.58
NYUP	NPCC Upstate NY	~~2.66~~ 1.08
RFCE	RFC East	~~3.28~~ 1.75
RFCM	RFC Michigan	~~3.35~~ 2.62
RFCW	RFC West	~~3.29~~ 2.31
SRMW	SERC Midwest	~~3.40~~ 2.73
SRMV	SERC Mississippi Valley	~~3.20~~ 2.13
SRSO	SERC South	~~3.20~~ 2.34
SRTV	SERC Tennessee Valley	~~3.30~~ 2.21
SRVC	SERC Virginia/Carolina	~~3.24~~ 1.80
SPNO	SPP North	~~3.57~~ 2.80
SPSO	SPP South	~~3.26~~ 2.84
CAMX	WECC California	~~2.89~~ 1.52
NWPP	WECC Northwest	~~2.32~~ 1.44
RMPA	WECC Rockies	~~3.82~~ 3.05
AZNM	WECC Southwest	~~3.10~~ 2.14
~~None~~	~~Not Included~~	~~3.15~~

Commenter's Reason: GEW31 states that it is based on eGRID 2007 which, in turn, uses 2005 data. The electric industry has changed dramatically over the last 9 years with the proliferation of renewable generation like wind and solar and, separately, the substitution of gas fired generation for coal.

This proposal updates the table to use eGrid 2014 which is based on 2010 data found at http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html.

Explanation of source of data:

1. Click on hyperlink above
2. Select "2010 data files (xls)"
3. when spreadsheet opens, select SRL10 tab
4. divide column F (annual heat input in MMBtu's) by column H (net generation in MWH's)
5. multiply answer to 4 above by 3.413 to convert to BTU's

The IGCC should use the most current data available which is the purpose of this proposal.
This public comment also removes the row entitled "None." This entire row is new - it was not in the 2012 IGCC and there is simply no support for it. For instance, Canada is mostly hydro and would have a source number much lower than 3.15.

Public Comment 2:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Disapprove.

Commenter's Reason: There are many technical and numerical problems with this proposal.

1) Inconsistent units. While the estimated values for electricity would be shown in kilograms (kg), the values for fossil fuels are shown in pounds (lbs). For an IP publication, all values should be in pounds for consistent reference. For an SI publication, all units should be in kg.
2) Opaque revisions for fossil fuels. While the electric estimated values may be based on EPA e-GRID publications (which are publicly available), the changes made to fossil fuels and district energy are based on non-public documents. For example, ASHRAE Standard 105 does not publish values in the body of the standard (they are blank tables). It is not clear why the values for natural gas and propane increase, but the value for fuel oil decreases. Also, it seems inconsistent that the value for natural gas goes up by 2.66%, and the value for fuel oil goes down by 1.31%, but the value for propane (which is a by-product of natural gas and propane) increases by 5.62%.

3) Possibly different years. The estimated values for electricity are based on 2010 data, but it is not clear as to what year the values for fossil fuels and district energy are based on. Is it 2013, 2012, 2011, 2010, 2005, 2000? No information is provided.

4) Incorrect estimates for electricity. The committee rejected the use of "marginal" or "non-baseload" estimates in other proposals, since energy can be saved at any time of day or season. However, the values shown in this table are not the total values shown in the eGRID 9th edition Version 1.0 Year 2010 Summary Tables. Below are some examples:

Value in Proposal (kg/kWh)	equivalent IP units (lb/MWh)	Value in eGRID	difference
AKGD - 0.685	1510	1259.64	+19.9%
CAMX - 0.370	816	613.28	+33.1%
NEWE - 0.428	944	727.60	+29.7%
NYCW - 0.391	862	623.78	+38.2%
"None" - 0.692	1526	1238.52 (US Ave)	+23.2%

5) Other public comments will provide estimates that are more realistic.

GEW31-14

GEW32-14
602.1.2.1, Table 602.1.2.1, 602.2.1, Table 602.2.1

Proposed Change as Submitted

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~~ 3.41
AKMS	ASCC Miscellaneous	~~1.76~~ 3.27
ERCT	ERCOT All	~~2.93~~ 2.89
FRCC	FRCC All	~~2.97~~ 2.99
HIMS	HICC Miscellaneous	~~3.82~~ 3.61
HIOA	HICC Oahu	~~3.14~~ 3.53
~~MORE~~ MROE	MRO East	~~3.40~~ 3.21
MROW	MRO West	~~3.41~~ 3.63
NYLI	NPCC Long Island	~~3.20~~ 3.57
NEWE	NPCC New England	~~3.01~~ 2.80
NYCW	NPCC NYC/Westchester	~~3.32~~ 3.10
NYUP	NPCC Upstate NY	~~2.51~~ 2.82
RFCE	RFC East	~~3.15~~ 3.11
RFCM	RFC Michigan	~~3.05~~ 3.18
RFCW	RFC West	~~3.14~~ 3.26
SRMW	SERC Midwest	~~3.24~~ 3.46
SRMV	SERC Mississippi Valley	~~3.00~~ ~~3.15~~
SRSO	SERC South	~~3.08~~ 3.05
SRTV	SERC Tennessee Valley	~~3.11~~ 3.23
SRVC	SERC Virginia/Carolina	~~3.13~~ 3.14
SPNO	SPP North	~~3.53~~ 3.69

eGRID ~~2007~~ SUB-REGION ACRONYM	eGRID ~~2007~~ SUB- REGION NAME	ENERGY CONVERSION FACTOR
SPSO	SPP South	~~3.05~~ 3.31
CAMX	WECC California	~~2.61~~ 2.99
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

eGRID ~~2007~~ SUB-REGION ACRONYM	eGRID ~~2007~~ SUB-REGION NAME	~~2005~~ CO_2e RATE (lbs/MWh)
SRVC	SERC Virginia/Carolina	~~1220~~ 1923
SPNO	SPP North	~~2106~~ 2451
SPSO	SPP South	~~1780~~ 1818
CAMX	WECC California	~~768~~ 1294
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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee preferred the changes reflected in GEW31-14.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Neil Leslie, representing self (neil.leslie@gastechnology.org) requests Approve as Submitted.

Commenter's Reason: The non-baseload methodolgy that forms the basis of the proposed change provides the most suitable conversion factors for evaluating the impact of technology choices under the performance path.

GEW32-14

GEW33-14

602.1.2.1, Table 602.1.2.1, 602.2.1, Table 602.2.1

Proposed Change as Submitted

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

eGRID 2007 SUB-REGION ACRONYM	eGRID 2007 SUB-REGION NAME	ENERGY CONVERSION FACTOR
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

eGRID ~~2007~~ SUB-REGION ACRONYM	eGRID ~~2007~~ SUB-REGION NAME	~~2005~~ CO_2e RATE (lbs/MWh)
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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee preferred the changes incorporated in GEW31-14.

Assembly Action: **None**

Public Comment 1:

Ben Edwards, representing self, requests Approve as Submitted.

Commenter's Reason: EPA's eGRID values are the basis of the current code. The Committee approved GEW31based on citable values in ASHRAE Standard 105-2014. The values in this proposal are also citable, and it includes more current eGRID data.

Public Comment 2:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal 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~~ 2010 SUB-REGION ACRONYM	eGRID ~~2007~~ 2010 SUB-REGION NAME	ENERGY CONVERSION FACTOR
AKGD	ASCC Alaska Grid	~~3.27~~ 2.95

eGRID ~~2007~~ 2010 SUB-REGION ACRONYM	eGRID ~~2007~~ 2010 SUB-REGION NAME	ENERGY CONVERSION FACTOR
AKMS	ASCC Miscellaneous	~~1.93~~ 0.90
ERCT	ERCOT All	~~3.11~~ 2.28
FRCC	FRCC All	~~3.17~~ 2.43
HIMS	HICC Miscellaneous	~~3.78~~ 2.63
HIOA	HICC Oahu	~~3.29~~ 2.98
MROE	MRO East	~~3.28~~ 2.50
MROW	MRO West	~~3.49~~ 2.36
NYLI	NPCC Long Island	~~3.41~~ 3.23
NEWE	NPCC New England	~~2.94~~ 1.58
NYCW	NPCC NYC/Westchester	~~3.09~~ 1.71
NYUP	NPCC Upstate NY	~~2.55~~ 1.08
RFCE	RFC East	~~3.23~~ 1.75
RFCM	RFC Michigan	~~3.29~~ 2.62
RFCW	RFC West	~~3.27~~ 2.31
SRMW	SERC Midwest	~~3.33~~ 2.73
SRMV	SERC Mississippi Valley	~~3.13~~ 2.13
SRSO	SERC South	~~3.06~~ 2.34
SRTV	SERC Tennessee Valley	~~3.10~~ 2.21
SRVC	SERC Virginia/Carolina	~~3.23~~ 1.80
SPNO	SPP North	~~3.58~~ 2.80
SPSO	SPP South	~~3.22~~ 2.84
CAMX	WECC California	~~2.93~~ 1.52
NWPP	WECC Northwest	~~2.36~~ 1.44
RMPA	WECC Rockies	~~3.48~~ 3.05
AZNM	WECC Southwest	~~3.18~~ 2.14

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 CO2e 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 SUB-REGION ACRONYM	eGRID SUB-REGION NAME	2010 CO_2e RATE (lbs/MWh)
AKGD	ASCC Alaska Grid	~~1577~~ 1260

eGRID SUB-REGION ACRONYM	eGRID SUB-REGION NAME	2010 CO_2e RATE (lbs/MWh)
AKMS	ASCC Miscellaneous	~~639~~ 450
ERCT	ERCOT All	~~1445~~ 1223
FRCC	FRCC All	~~1322~~ 1202
HIMS	HICC Miscellaneous	~~1566~~ 1336
HIOA	HICC Oahu	~~1873~~ 1631
~~MORE~~ MROE	MRO East	~~1813~~ 1620
MROW	MRO West	~~1851~~ 1545
NYLI	NPCC Long Island	~~1447~~ 1341
NEWE	NPCC New England	~~813~~ 728
NYCW	NPCC NYC/Westchester	~~768~~ 624
NYUP	NPCC Upstate NY	~~590~~ 548
RFCE	RFC East	~~1065~~ 1007
RFCM	RFC Michigan	~~1874~~ 1638
RFCW	RFC West	~~1711~~ 1512
SRMW	SERC Midwest	~~1976~~ 1820
SRMV	SERC Mississippi Valley	~~1221~~ 1034
SRSO	SERC South	~~1519~~ 1361
SRTV	SERC Tennessee Valley	~~1538~~ 1397
SRVC	SERC Virginia/Carolina	~~1180~~ 1080
SPNO	SPP North	~~2062~~ 1809
SPSO	SPP South	~~1860~~ 1588
CAMX	WECC California	~~835~~ 613
NWPP	WECC Northwest	~~959~~ 847
RMPA	WECC Rockies	~~2131~~ 1906
AZNM	WECC Southwest	~~1428~~ 1183

Commenter's Reason: If upstream estimates are to be used, then the estimates should be as up to date as possible. The revisions for Table 602.1.2.1 are based on the values found in the eGRID spreadsheets, which can be found at the following web site:http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html file name eGRID_9th_edition_V1-0_year_2010_Data.xls

The calculations used can be found on the attached spreadsheet

For Table 602.1.2.2, the values are from the Summary Tables, page 1, entitled "Year 2010 eGRID Subregion Emissions - Greenhouse Gases" which can be found at the following web site:http://www.epa.gov/cleanenergy/documents/egridzips/eGRID_9th_edition_V1-0_year_2010_Summary_Tables.pdf

Buildings use energy and save energy at all times of the day, not just "at the margin". If these estimated values are to be part of the standard, then the estimated values derived on an annualized basis should be used.

GEW33-14

GEW34-14
Table 602.2.1, 602.2.3, 603.5.1

Proposed Change as Submitted

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

eGRID ~~2007~~ 2012 SUB-REGION ACRONYM	eGRID ~~2007~~ 2012 SUB-REGION NAME	~~2005~~ 2009 CO_2e RATE (lbs/MWh)
SPSO	SPP South	~~1780~~ 1599
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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee preferred the changes incorporated in GEW31-14.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Charles Foster, representing Edison Electric Institute (cfoster20187@yahoo.com) requests Approve as Modified by this Public Comment.

Modify the proposal 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 ~~2012~~ 9th EDITION VERSION 1.0 SUB-REGION ACRONYM	eGRID 2012 SUB-REGION NAME	~~2009~~ 2010 CO_2e RATE (lbs/MWh)
AKGD	ASCC Alaska Grid	~~1281~~ 1259.64
AKMS	ASCC Miscellaneous	~~521~~ 450.1
ERCT	ERCOT All	~~1182~~ 1222.88
FRCC	FRCC All	~~1177~~ 1201.79
HIMS	HICC Miscellaneous	~~1352~~ 1336.02
HIOA	HICC Oahu	~~1593~~ 1630.90
MROE	MRO East	~~1592~~ 1619.84
MROW	MRO West	~~1629~~ 1545.11
NYLI	NPCC Long Island	~~0~~ 1341.01
NEWE	NPCC New England	~~0~~ 727.60
NYCW	NPCC NYC/Westchester	~~0~~ 623.78

NYUP	NPCC Upstate NY	~~0~~ 548.37
RFCE (except MD and DE)	RFC East	~~947~~ 1007.04
RFCM	RFC Michigan	~~1659~~ 1638.34
RFCW (except MD)	RFC West	~~1521~~ 1511.52
SRMW	SERC Midwest	~~1750~~ 1820.43
SRMV	SERC Mississippi Valley	~~1022~~ 1033.58
SRSO	SERC South	~~1326~~ 1361.05
SRTV	SERC Tennessee Valley	~~1358~~ 1396.52
SRVC	SERC Virginia/Carolina	~~1036~~ 1079.57
SPNO	SPP North	~~1816~~ 1808.76
SPSO	SPP South	~~1599~~ 1587.55
CAMX	WECC California	~~0~~ 613.28
NWPP (except CA)	WECC Northwest	~~819~~ 846.97
RMPA	WECC Rockies	~~1825~~ 1906.27
AZNM (except CA)	WECC Southwest	~~1191~~ 1182.89

a. Sources: EPA eGRID 2012 Version 1.0 2009 data; EPA eGrid regional gross grid loss factor.

Commenter's Reason: This public comment updates the values in the table to the most current available from EPA's eGRID 9th Edition, Version 1.0 published in February of this year.

Public Comment 2:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal 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 2012 SUB-REGION ACRONYM	eGRID 2012 SUB-REGION NAME	2009 CO_2e RATE (lbs/MWh)
AKGD	ASCC Alaska Grid	1281
AKMS	ASCC Miscellaneous	521
ERCT	ERCOT All	1182
FRCC	FRCC All	1177
HIMS	HICC Miscellaneous	1352
HIOA	HICC Oahu	1593
MROE	MRO East	1592
MROW	MRO West	1629
NYLI	NPCC Long Island	~~0~~ 1348
NEWE	NPCC New England	~~0~~ 728
NYCW	NPCC NYC/Westchester	~~0~~ 611
NYUP	NPCC Upstate NY	~~0~~ 498
RFCE (except MD and DE)	RFC East	947
RFCM	RFC Michigan	1659
RFCW (except MD)	RFC West	1521
SRMW	SERC Midwest	1750
SRMV	SERC Mississippi Valley	1022
SRSO	SERC South	1326

eGRID 2012 SUB-REGION ACRONYM	eGRID 2012 SUB-REGION NAME	2009 CO_2e RATE (lbs/MWh)
SRTV	SERC Tennessee Valley	1358
SRVC	SERC Virginia/Carolina	1036
SPNO	SPP North	1816
SPSO	SPP South	1599
CAMX	WECC California	~~0~~ 661
NWPP (except CA)	WECC Northwest	819
RMPA	WECC Rockies	1825
AZNM (except CA)	WECC Southwest	1191

a. Sources: EPA eGRID 2012 Version 1.0 2009 data; EPA eGrid regional gross grid loss factor.

Commenter's Reason: This will provide the other values from eGRID for calendar year 2009.

GEW34-14

GEW35-14
602.2.1, Table 602.2.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal tries to address the quickly changing landscape of emission rates and the issuance and potential issuance of new power plant emission standard by EPA. The committee acknowledged the issue, but the proposal doesn't provide the vehicle for resolution. The most current rates have been approved via GEW31-14.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal 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 CO2e conversion factor in Table 602.2.1 ~~based on the EPA eGRID Sub-region in which the building is located~~.

TABLE 602.2.1
INDIRECT ELECTRICITY EMISSION RATE

Location	CO_2e RATE after ~~2015~~ 2016 (lbs/MWh)
All Regions of the US	~~0.0~~ eGRID values for 2012 * 0.7

Commenter's Reason: Under the EPA proposed rule that was issued in June, 2014, existing power plants will have to reduce emissions by 30% compared to 2012 levels. State implementation plans will be due to EPA by June of 2016.

Therefore, to be consistent with national policy going forward, for buildings being built in the future, the estimates associated with upstream power plants should reflect what will happen. The EPA baseline will be 2012 values, and the reductions will use the 2012 values as the baseline. Since EPA is requiring a 30% reduction, the table reflects the result of this policy by 2030 - well within the lifetime of any new building.

GEW35-14

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

Proposed Change as Submitted

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 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.~~

~~**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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal removes the requirement to monitor the information produced from the meters. Further it removes all submetering of tenants which will eliminate the ability for individual tenants to monitor their energy use.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Craig Conner, representing self (craig.conner@mac.com) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

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

Exception: Individual meters shall not be required for tenant spaces less than 2,000 square feet (186 m^2).

Commenter's Reason: There are two main reasons for approving GEW40. First, the existing IGCC neglected to meter service water heating. At best it is in the other miscellaneous category (with vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains and fireplaces, swimming pools, inground spas, snow-melt systems, and exterior lighting). Water heating used for space heating is metered in the HVAC category. No other proposals this cycle specifies metering service water heating. For some occupancies service water heating can be a major energy use, and should be metered separately.

The second reason to approve GEW40 AM is to simplify the existing overly complicated section on metering.

This AM proposal makes one amendment to the original proposal, it adds back tenant metering. Comments at the hearing suggested the separate metering should be retained for tenants. However the committee reason for disapproving GEW41 suggested smaller tenant spaces should not require metering. The tenant metering section is added back with a requirement to meter tenants with 2000 square feet or more separately.

The reformatting of the Section 603.2 to add an end use table as was approved in GEW42 is an improvement that should be retained.

GEW40-14

GEW41-14
603.1.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee generally viewed the proposal as a positive improvement in the clarity of the section. There was also support for exempting smaller tenant spaces from the submetering requirement, but felt that 5000 square feet was too large an exemption threshold

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Jim Edelson, representing New Buildings Institute requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

603.1.1 Buildings with multiple tenants. In buildings with more than one tenant, the metering required by Section 603.3 shall be provided for the entire building and for each tenant space individually. 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~~ 2000 square feet (~~465~~ 186 m^2).

Commenter's Reason: The load type segregation requirements of Section 603.2 can require three to five meters to meet the tenant submetering requirements of 603.1.1 (depending on how many the five load types are delivered to the tenant space). Since in most cases loads will need to be delivered separately to the tenant space, they must be separately metered, and each tenant space of any size would need to have one meter for each load type.

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. The Committee thought the threshold for the exemption at 5000 square feet was set too high. This comment reduces that threshold and exempts tenant spaces only under 2,000 square feet from the submetering requirements.

GEW41-14

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

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved GEW136-14 which would have included the various alternative fuels into the renewable energy section. Until such time as they are in the code, there would be no need to provide for their metering and monitoring

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Charles Foster, representing Edison Electric Institute (cfoster20187@yahoo.com) requests Approve as Submitted.

Commenter's Reason: This proposal is being resubmitted as a public comment. The Committee stated that its reason for disapproving the proposal was because there was no need for it since it had denied GEW136. Without GEW136, there would be no biogas provisions in the IGCC.

In the event GEW136 is brought back as a public comment, this proposal should be approved.

Public Comment 2:

Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal 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 or measured 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 or measured.

603.3.7.7 Biomass energy systems. Equipment and systems providing energy through the use of biomass shall be capable of being metered or measured 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 or measured.

Commenter's Reason: The revisions will provide more flexibility in terms of how the energy output of these systems is obtained and tracked.

GEW49-14

GEW50-14
603.4, 603.4.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The change would limit the application of these two sections to electric energy. The committee felt that all energy sources should be retained in these sections

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Ted Williams, representing American Gas Association requests Approve as Submitted.

Commenter's Reason: The proposal should be approved as submitted. Load type submetering is only relevant to electrical loads where data on submetered loads may provide information on demand management for load control and dispatching of electric generation assets that have the lowest environmental footprint. Load type submetering on other energy form uses provides no comparable benefit.

Public Comment 2:

ME Krebs, representing Laclede Gas (mkrebs@lacledegas.com) requests Approve as Submitted.

Commenter's Reason: As an affected stakeholder, I believe that the rationale stated by the American Gas Association's Paul Cabot is sound yet insufficient. The insufficiency is that the explanation of the negative impacts of sub-metering natural gas does not properly convey the potential for institutionalizing a bias against the direct use of natural gas. The problem is that sub-metering electric loads is relatively easy and cheap whereas sub-metering gas end loads is both complex and expensive; perhaps prohibitively so. Inadvertently or not, this may move the building towards more inefficient use of fossil fuels (via electricity) and subsequent emissions. With this additional rationale, I urge the committee to reconsider and approve GEW 50-14 as originally submitted by Paul Cabot.

GEW50-14

GEW52-14
603.5.1, 603.6

Proposed Change as Submitted

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 CO2*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 CO2e 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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The added requirements do not appear to add value toward the goals of this code. It was felt that it would be misleading to report some of the CO_2 emissions on a daily basis and not all of such.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Charles Foster, representing Edison Electric Institute (cfoster20187@yahoo.com) requests Approve as Submitted.

Commenter's Reason: This proposal simply refines existing requirements of the code and will not add additional cost in either materials or labor.

Firstly, the proposal requires data acquisition systems to be able to parse acquired data into daily increments. This is already done by all products in the market.

Moreover, building owners don't have to make the calculations -- the requirement is simply that they have the capability to do so if they choose.

With respect to the building energy display, the direct emissions can be an input from an emissions monitoring system but it can also be simply a computed value using energy consumption and the default emissions rate found in Table 602.2.2.

This is a green standard and daily emissions and direct emissions are important data for building owners and managers.

Public Comment 2:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

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 13 months.
4. The current direct and indirect emissions for building equipment, updated for each fuel type.
5. The total direct and indirect emissions of building equipment for the previous day and the same day the previous year.
6. The total direct and indirect emissions of building equipment for the previous 13 months.

Commenter's Reason: The revisions provided will meet the concerns of the committee, and such a display will add more value to the code and to the display.

GEW52-14

GEW54-14

202, 604.1, 604.2, 604.3, 604.3.1 (New), 604.4, 611.3.3.5 (New)

Proposed Change as Submitted

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:

DEMAND RESPONSE PERIOD: A period of time during which electricity or other fuel loads are modified in response to a demand response signal.

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.

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.

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

Non-Critical: A demand response zone that is not defined as critical.

OCCUPANT CONTROLLED SMART THERMOSTAT. A control device that is capable of both receiving and responding to demand response signals with occupant override capabilities.

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.~~

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.

Exception: Auto-DR infrastructure is not required for the following buildings and systems:

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.

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*.

Exception: The following buildings and lighting systems need not be addressed by the Auto-DR system:

1. Luminaires or signage on emergency circuits.
2. Luminaires located within a *daylight zone* that are dimmable and connected to automatic *daylight controls* in accordance with the *International Energy Conservation Code*.
3. Luminaires or signage for which a lighting power reduction would endanger patient care, occupant safety or occupant security.

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.

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

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

604.4 Lighting. Where buildings in Group B office occupancies, Group E occupancies and Group M occupancies 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*.

Exception: The following buildings and .....

(The remainder of the proposal remains unmodified.)

Committee Reason: The proposal was modified to limit the application of the lighting requirement to buildings in Groups B, E and M occupancies. This was seen as the appropriate application of these provisions at this time. The committee found the overall proposal a good update and revision to this complex section.

Assembly Action: **None**

Public Comment 1:

Steven Rosenstock, Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 202
DEFINITIONS

DEMAND RESPONSE PERIOD. A period of time during which electricity or other fossil fuel loads are modified in response to a demand response signal.

DEMAND RESPONSE SIGNAL. A signal sent by the local utility, gas utility, energy provider, independent system operator (ISO), or designated curtailment service provider or aggregator, to a customer, indicating a price or a request to modify electricity or fossil fuel consumption, for a limited time period.

OCCUPANT CONTROLLED SMART THERMOSTAT. A control device that is capable of both receiving and responding to demand response signals with limited or full occupant override capabilities.

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.

Exception: Auto-DR infrastructure is not required for the following;buildings and systems:

1. Buildings located where the electric utility ~~or~~ , gas utility, energy provider, 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 or fossil fuel 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 or fossil fuel 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.

604.3 Heating, ventilating and air-conditioning (HVAC) systems not equipped with DDC.

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, packaged terminal air conditioners, and packaged terminal 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 where allowed by the demand response program.
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, whichever is greater.
5. In response to demand response signals, the OCST shall default to an event response that initiates setpoint offsets of +4°F or more for cooling and -4°F or more 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 room temperature and the current setpoint.

Commenter's Reason: The proposed modifications will clarify the proposal and provide language that will make the code more compatible with different types of demand response programs.

Public Comment 2:

Jonathan Siu, City of Seattle, Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee (jon.siu@seattle.gov) requests Approve as Modified by this Public Comment.

Modify the proposal 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~~ be provided with Auto-DR infrastructure in accordance with Sections 604.1 through 604.4.

Exception: Auto-DR infrastructure is not required for the following; buildings and systems:

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 removal and smoke control systems.
6. Means of egress illumination required by Chapter 10 of the *International Building Code.*
~~6~~7. Manufacturing process systems

~~7~~8. 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~~9. Systems serving process loads where constant temperatures are necessary to prevent degradation of plants, animals, or other temperature-sensitive materials.

Commenter's Reason: The first change to the main paragraph is an editorial fix to clean up the charging language.

The changes to the exception are intended to exempt emergency systems required by the building code from Auto-DR requirements. Critical systems to deal with smoke include smoke removal (IBC Section 403.4.7) and smoke control (IBC Section 909), not just smoke exhaust systems. Similarly, egress lighting should not be overridden by Auto-DR control systems, since they may need to operate at any time.

GEW54-14

GEW57-14
604.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The original intent of the code in this section is to address electrical demand. The proposal would imply that there is also a requirement imposed on the provision of gas. The resulting code would be confusing.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Charles Foster, representing Edison Electric Institute (cfoster20187@yahoo.com) requests Approve as Submitted.

Commenter's Reason: During the last winter, there were numerous reports of propane shortages throughout the continental U.S. as shown in the following story:

http://finance.yahoo.com/news/u-propane-shortage-hits-millions-164337796.html

"Prices of the fuel, a liquefied petroleum gas, have rocketed to all-time highs in Midwestern states, distributors are rationing supplies, and some schools have shut due to a lack of the fuel during this year's second bout of Arctic weather."

"The U.S. Department of Transportation has issued emergency orders suspending the limits on the amount of time truck drivers can spend on the road for 10 Midwestern states and 12 Northeastern states, a rare regional order."

"A spokesman for Pennsylvania-based AmeriGas, the largest U.S. propane retailer, said it was rationing deliveries to "small pockets" of Alabama, Georgia and Tennessee on Thursday, reducing supplies to 100 gallons per customer from the standard delivery of some 250 gallons."

Gas utilities themselves have offered "interruptable" rates to certain customers that agree to have their service curtailed during periods when gas demand exceeds supply since the 1970's.

Because of new techniques in drilling, natural gas supplies have grown dramatically over the last decade. With lower prices, consumer demand can be expected to rise.

Even with increased supplies, there can be issues with delivery during "peak" demand days, due to pipeline constraints or other operational issues.

The Committee stated that the intent of the section was to apply only to electricity. A plain language read of the section doesn't reveal such an intent but, assuming that it was the intent at some point, it shouldn't be the intent now.

The IGCC appropriately addresses electric peak demands and it should also address gas peak demands.

Bibliography: http://finance.yahoo.com/news/u-propane-shortage-hits-millions-164337796.html

Public Comment 2:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal 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~~ <u>fossil fuel</u> 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.

Commenter's Reason: This modification will help to clarify the proposal. A good green building will not increase any type of energy demand over the standard reference design. This will help prevent game playing and fuel switching.

GEW57-14

GEW58-14
604.1

Proposed Change as Submitted

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~~ 1. Buildings with a peak electric demand not greater than 0.75 times that of the standard reference design.

~~3~~ 2. 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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Deleting the exception would result in requiring an Auto DR system to be installed even in locations where the utility isn't set up to take advantage of such systems. It would also impact small buildings, imposing costs for a system the local utility may never operate. The committee felt this was somewhat of a chicken and egg issue and therefore felt this needed to remain a local option where, locally, the availability of the utility having the infrastructure to utilize Auto DR's systems installed in buildings.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Meg Waltner, representing Natural Resources Defense Council (mwaltner@nrdc.org) requests Approve as Modified by this Public Comment.

Modify the proposal 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.

Exceptions: Auto-DR infrastructure is not required for the following:

1. Buildings that are less than 25,000 square feet (2323 m^2) in *total building floor area* and 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.

Commenter's Reason: Demand response (DR) allows building owners to reduce their energy use and costs while increasing grid reliability, in particular during peak loads. DR helps prevent blackouts during extreme weather events and is becoming an increasingly important resource to help manage variable demand. Wide variations in the shape of the electricity load demand curve is rapidly becoming a critical grid issue in many areas of the country with the increased rate of PV installations.

Section 604 requires certain building types to include controls that are able to adjust the energy used by the building's HVAC and lighting systems in response to a signal from the grid operator or other automated source. Section 604 is a jurisdictional elective, meaning that it is only effective in jurisdictions that positively select it.

If a jurisdiction elects to have the requirements of Section 604 apply, this indicates that there is likely a need for demand response in that jurisdiction. If there aren't currently existing programs in these jurisdiction, there will likely be so in the near future. In order for DR programs to serve the grid, they need DR resources, and removing the exemption for buildings over 25000 square feet would help build this resource. Given that the jurisdiction has positively elected this requirement, it clearly values DR and sees a need for DR capabilities in commercial buildings going forward. For these jurisdictions, the requirements of Section 604 should apply to large buildings when the IgCC takes effect, not be delayed until a DR program is formally implemented by the utility.

This comment would continue to exempt small buildings and directly addresses the committee's concern that the original proposal would adversely affect small buildings. The 25000 square feet threshold matches the threshold set for mandatory submeters in Section 603.4 of the IgCC.

GEW58-14

GEW60-14
604.4

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was not convinced that removal of the exception, that being to not have the emergency lights circuits, was appropriate.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com) requests Approve as Submitted.

Commenter's Reason: The Committee misunderstood the proposal. The proposal does not change the exemption of emergency lighting from Auto DR requirements. The proposal only simplifies the exceptions by removing redundant or unnecessary language, and provides alignment with IECC. There is no change in stringency. The original reason statement is still complete and valid. This proposal just simplifies and clarifies the code, nothing more.

GEW60-14

GEW62-14
202 (New), 604.5 (New)

Proposed Change as Submitted

Proponent: Charles Foster, Steffes Corporation, 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 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

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee found that adding criteria for storage systems to the AUTO DR provisions both timely and appropriate. Such systems are already being installed. This gives the designer of the system more flexibility. It gives the local official criteria by which to evaluate and approve the system.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

ME Krebs, representing Laclede Gas (mkrebs@lacledegas.com) requests Disapprove.

Commenter's Reason: GEW 62-14 should be disapproved because it specifically and unfairly discriminates against common non-electric forms of energy storage such as propane or diesel. It also fails to acknowledge that "energy storage" does not necessarily mean on-site energy storage. For example, natural gas is stored; typically in deep underground "salt domes," which is dispatchable via gas transmission and distribution systems to both gas utilities and electric utilities (for gas-fueled electrical generation).

In addition, GEW-62 sets the stage for GEW-63 inclusion of inefficient technologies such as electric resistance heat to be stored. Assuming that the Committee rejects this request, it should insure that the inefficient nature of such form of electric energy storage are properly accounted for by full fuel-cycle methodologies; as should the increased environmental emissions caused by such inefficiencies.

Public Comment 2:

Ted Williams, representing American Gas Association requests Disapprove.

Commenter's Reason: While energy storage systems are extremely important, the proposal is unnecessarily restricted to electricity-sourced energy. Thermal storage systems, even as a means for alleviating electric loads, may be gas fired. This proposal would not recognize such systems and, as such, are design restrictive.

GEW62-14

GEW63-14
202 (New), 604.3

Proposed Change as Submitted

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.

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Cost Impact: Will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee saw this as a companion proposal with GEW62-14, which they also approved. This proposal provides appropriate definitions for these systems. It is also appropriate to list GETS as one of the strategies appropriate to AUTO-DR systems.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

ME Krebs, representing Laclede Gas (mkrebs@lacledegas.com) requests Disapprove.

Commenter's Reason: At a minimum, the excerpt shown below is a ploy to promote highly inefficient electric resistance water heating under the guise of "demand response." I urge the committee to acknowledge it as such and disapprove.

Add new definition as follows

Book

2012 International Green Construction Code

Section

202

Title

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)

Public Comment 2:

Ted Williams, representing American Gas Association requests Disapprove.

Commenter's Reason: Grid-Interactive Electric Thermal Storage (GETS) is a term of art and is not sufficiently defined in proper standards for technology and equipment. The IgCC should not promulgate definitions for a broad range of technologies for which limited or no standardized definitions exist. With respect to electric storage water heaters, GETS-type systems, controls are not covered by national consensus standards and provide great opportunities for abusive operating practices at odds with load control goals. All GETS-type electrc storage water heaters provide a consumer override of load control functions that may render grid-interactive load control obsolete. Until standards coverage of these functions is addressed, a discrepency exists between how that appliance "ought to" be operated and how it is "will" be operated. Beyond GETS-type electric storage water heaters, whose baseline efficiency is covered by Federal minimum efficiency standards, othe types of thermal storage systems are not covered by any national consensus standards in terms of their design or operation. Clearer definition of these technologies is needed and standards coverage developed before model codes "define" those technologies. Additionally, the restriction of thermal storage systems to electric thermal storage is unduly restrictive since thermal storage, even to alleviate peak electrical demands, need not be electricity powered.

GEW63-14

GEW64-14
605.1.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was rejected because removal of the section eliminates a key enhanced envelop requirement without replacing it with any other changes to the code. Perhaps if there were other changes which increased envelope efficiency in the IgCC, this broad brush provision could be eliminated. The 10% broad brush approach is acknowledged as problematic in determining and showing compliance, but it just because it's difficult, doesn't justify its removal without some sort of balancing the loss.

Assembly Motion: **Approved as Submitted**
Online Vote Results: **Failed** - Support: 48.63% (89) Oppose: 51.37% (94)
Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Jay Johnson, representing Thomas Associates, Inc., Metal Building Manufacturers Association (jjohnson@thomasamc.com) requests Approve as Submitted.

Commenter's Reason: We respectfully disagree with the code development committee reason for disapproval. Our position is that the prescriptive building envelope provisions referenced in the IECC 2015 has reach its point of diminishing returns to gain energy efficiency. Adding an additional stringency over and above the referenced IECC is not necessary.

Over the past 5 years both the IECC and ASHRAE codes and standards organizations have made significant strides towards increasing the stringency of their energy efficiency requirements. These increases were based upon various energy models of actual buildings and end uses and estimates of increased cost of energy. These new standards were carefully studied and determined to be a practical balance between being both reasonably achievable, highly energy efficient, and affordable.

This proposal removes the arbitrary 10% increase in stringency that has no technical merit or any basis for further increasing building envelope efficiency. An arbitrary percentage increase in stringency results in little to no benefit when you consider the already low U-factors of 2015 IECC code compliant assemblies. The 10% would however add a level of complexity and judgment regarding compliance that could be avoided by simply referring to the recognized 2015 IECC building envelope provisions, which in and of itself has reach its point of diminishing returns.

Public Comment 2:

Mark Nowak, representing Steel Framing Alliance requests Approve as Submitted.

Commenter's Reason: The proposal as submitted will improve the code by eliminating arbitrary U-factor, C-factor, and F-factor modifications that result in little to no savings in warm climates and SHGC values that will produce less efficient buildings in colder climates.

Public Comment 3:

Julie Ruth, representing American Architectural Manufacturers Association (julruth@aol.com) requests Approve as Submitted.

Commenter's Reason: This Public Comment seeks approval of GEW64 as submitted. Approval of GEW64 would remove the problematic provisions of Section 605.1.1 in their entirety. Section 605.1.1 requires the building envelope U-factor, C-factor, F-factor and SHGC be 10% lower than that prescribed in the prescriptive provisions of the IECC for commercial buildings.

In its consideration of GEW64 the code change committee suggested that replacement language be offered rather than deleting the current criteria completely. This suggestion assumes that the current language provides some value to the IgCC. It does not. In many instances reducing these factors by 10% will NOT result in a 10% reduction in energy usage. In some cases it may even result in an increase in energy usage.

One example of this is with regards to lowering the maximum permitted SHGC by 10%. The maximum SHGC permitted for fenestration oriented to the south in Climate zones 1, 2 and 3 in commercial buildings without overhanging projections under the 2015 IECC is 0.25. Reducing this by 10% would result in a maximum SHGC of 0.22 for the same installation under the 2015 IgCC.

40% of the energy wavelengths emitted by the sun are in the range of visible light. Restricting the maximum SHGC of a fenestration product to 0.22 could mean that almost half the available light from the sun ((0.40-0.22)/0.40) = 45%) is prevented from passing through that product. This can not only increase the overall lighting load for the building, it may also increase the cooling load due to the additional heat given off by the required, additional artificial lighting in the building.

In other climate zones the potential energy savings from reducing SHGC during the cooling season is not sufficient to counter the increase in heating load during the heating season. This situation is aggravated by reducing the maximum SHGC by 10%. For example, the maximum SHGC permitted for fenestration in commercial buildings without overhanging projections and oriented to the south in Climate Zone 8, under the 2015 IECC, will be 0.45. Reducing this SHGC by 10% results in a maximum SHGC of 0.40. This means that only 40% of the potential heat energy from the sun is provided through the fenestration in a climate zone that has 12,600 Heating Degree Days (HDD). The overall potential increase in heating load due to this is significant.

Another example of the potential, negative ramifications of Section 605.1.1 is the potential effect of reducing the envelope U-factor by 10% in all climate zones. The overall effect of this would be to reduce the heat loss through the building envelope by 10%. This would result in a net energy savings during the heating season in heating dominated climates. But it restricts the ability to cool a building's interior during the transition period in cooling dominated climates, with an overall net increase in potential cooling load in those climates.

Also, the current language does not consider other methods of reducing potential solar heat gain, such as shading devices other than overhanging projections. If overhanging projections greater than a specific size are provided then the 2015 IECC permits an increase in the maximum SHGC of the associated fenestration. Similar provisions are not provided, however, for other types of shading devices. Provisions for automatic shading devices were approved with the approval of GEW72 at the 2014 IgCC Committee Action Hearings in Memphis. Under the current provisions fenestration shaded by these devices, however, would still need to have an SHGC 10% lower than that permitted for unshaded fenestration in the 2015 IECC.

The only way to achieve a targeted level of improvement of energy performance over the IECC is to do performance analysis or outcome based design.

This fact is recognized in Section 302.1.1 of the IgCC. This section limits the use of prescriptive design to commercial buildings < 25,000 sq. ft. in area in jurisdictions that choose to require enhanced energy performance (zEPI < 47). Since buildings built to the 2012 IECC are considered to have a zEPI of 57 this limit would apply if a jurisdiction chooses to require an improvement in energy efficiency of 18% (10/57) over the 2012 IECC, or approximately 8-10% over the 2015 IECC.

Section 302.1.1 also specifies that buildings built using prescriptive provisions shall be considered to have a zEPI of 51. This would be a 10% improvement over the 2012 IECC (6/57), which is approximately equivalent to the 2015 IECC.

Therefore, Section 302.1.1 adequately addresses the use of prescriptive design in jurisdictions that choose to seek energy performance that is enhanced beyond that of the IECC. As such, the provisions of Section 605.1.1. are not needed.

Overall, Section 605.5 is overly simplistic and does not guarantee an increase in energy efficiency of the 2015 IgCC over the 2015 IECC. Since the current criteria is of limited benefit to energy efficiency, could be detrimental and the use of prescriptive

design is already adequately addressed in Section 302.1.1, the provisions of Section 605.1.1 should be removed from the IgCC without replacement.

GEW64-14

GEW65-14
605.1.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal is similar to GEW64, but retains the 10% increase for only the colder climates. Climate zones 1 through 5 would be eliminated from the increased stringency of the envelope; these zones cover the majority of the United States. The committee felt that increased efficiency is achievable in all zones, and these 5 should not be excluded.

Assembly Motion: **Approved as Submitted**
Online Vote Results: **Failed** - Support: 41.34% (74) Oppose: 58.66% (105)
Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Mark Nowak, representing Steel Framing Alliance (mark@mnowak.net) requests Approve as Modified by this Public Comment.

Modify the proposal 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 the requirements of Tables C402.1.2 and C402.3 of the *International Energy Conservation Code*, In climate zones 6, 7, and 8, each U-factor, C-factor, and F-factor ~~and SHGC~~ in Tables C402.1.2 and C402.3 of the *International*

Energy Conservation Code 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 roof area.

Commenter's Reason: This proposal will reduce the application of an arbitrary U-factor, C-factor, F-factor and SHGC 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 adjustment only to the coldest climate zones where the potential energy savings, although still small, is more significant than in the warmer climates.

During the first hearings, it was pointed out that the code currently requires SHGC values to be reduced in cold climates, resulting in less efficient envelopes in these climate zones. The modification to the original proposal in this public comment corrects this flaw in the current code text as well as the broader arbitrary reduction issues. The committee also recognized that the 10% was problematic and reduced it to 5% in approving GEW 66. This public comment is an overall better solution to the U-factor issue in warmer climates while following the lead established on GEW 66 in colder climate zones.

GEW65-14

GEW66-14
605.1.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal reduces the blanket envelop increased stringency from the current 10% to only 5%. The reduction was considered to be reasonable increase over the increased stringency of the improved IECC. It provides better flexibility for the designer, building owner and contractor to reach the above code goal.

Assembly Motion: **Disapprove**
Online Vote Results: **Failed** - Support: 48.55% (84) Oppose: 51.45% (89)
Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Jay Crandell, Applied Building Technology Group LLC, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz) requests Approve as Modified by this Public Comment.

Modify the proposal 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 ~~5~~ 15 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 ~~5~~ 15 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.

Commenter's Reason: The pursuit of sustainable or "green" construction is one of making reasonable incremental advancements, particularly in areas that have a significant impact such as energy efficiency. The clear message from the first hearing is that some level of advancement above the base code is important. However, a 5% change implies an unjustifiably low valuation of energy efficiency, especially for a green code. It also is no simpler to implement and enforce than the current 10% improvement in the IgCC. The current 10% level of improvement in envelope requirements is less than the level of change between many climate zones in the IECC and is, therefore, quite achievable and practical. In fact, even a 20% level of change is consistent with the level of change in envelope requirements between many climate zones in the IECC. Given that a 10% to 20% change is no more significant than the difference between requirements from one climate zone to the next, this public comment recommends a moderate 15% improvement which falls well within the range of envelope requirements and practices that are already in the IECC base code in various climate zones (and which have been largely unchanged between the 2012 and 2015 IECC). For these reasons, the ICC membership is encouraged to vote to support this public comment to modify GEW66 and uphold energy efficiency as an important and practically achievable component of a green code.

Public Comment 2:

Marcelo Hirschler, GBH International, representing North American Flame Retardants Alliance (gbhint@aol.com) requests Disapprove.

Commenter's Reason: Please disapprove this proposal.

The most important way to have a positive effect on the environment is to decrease energy consumption. The intent of the IgCC is to be a significant improvement in energy savings over the traditional energy consumption contained in the IECC. The fact that a 10% improvement in energy savings is difficult to achieve should be an incentive so that the IgCC is not just a rubber stamp but a significant step forward. It is important that the "green seal of approval" provided by the IgCC code be a real improvement.

Public Comment 3:

Garrett Stone, representing Energy Efficient Codes Coalition, (gas@bbrslaw.com); Harry Misuriello , representing American Council for an Energy Efficient Economy (misuriello@verizon.net) request Disapprove.

Commenter's Reason: We recommend that this proposal be Disapproved because it weakens the thermal envelope requirements of the IgCC without justification.

This proposal creates a problem because it focuses only on the IgCC's thermal envelope improvement requirement (over the IECC) and cuts it in half - from 10% to 5%. To be clear, the EECC does not support any decreases in efficiency in the 2015 IgCC, but this decrease is uniquely problematic. The proponent does not explain why such a decrease is warranted, nor why it should come entirely at the expense of the thermal envelope, which is arguably the portion of the building that will be the most permanent over the lifetime of the building. Given the long expected lifetime of building thermal envelope components versus the shorter lifetimes of equipment and lighting, the IgCC should have envelope provisions that at least keep pace with the remainder of the IgCC's requirements. A 10% thermal envelope improvement is reasonable and achievable. To begin compromising the IgCC's "overlay" requirements simply because the base code has improved would defeat the concept of having an overlay code in the first place.

GEW66-14

GEW67-14
605.1.1

Proposed Change as Submitted

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. 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**.** 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

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal was seen as editorial in that 10% of zero is still zero. The added text clarifies how the 10% would apply (or in this case not apply). If the intent of the code isn't served by this resolution, the committee urged alternatives to be presented via public comments.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Martha VanGeem, representing the Portland Cement Association and the Masonry Alliance for Codes and Standards; Emily Lorenz, representing Precast, Prestressed Concrete Institute (emilyblorenz@gmail.com) request Approve as Modified by this Public Comment.

Modify the proposal 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. Where Table C402.2 of the *International Energy Conservation Code* provides for no requirement (NR) for the R-value of an assembly, the U-factor ~~is~~, C-factor, and F-factor are not required to be reduced. Sky Type "C" locations specified in Section 808.4, the skylights shall not exceed 5 percent of the building roof area.

Commenter's Reason: This modification adds C-factor (for below grade walls) and F-factor (for slab-on-grade floors) to the items that do not need to be reduced if the R-value is indicated as NR. This correction reflects an oversight in the original proposal. It is also consistent with how similar language in ASHRAE/IES/USGBC 189.1-2014 (addendum AL) will be worded.

GEW67 is a clarification to the IgCC on how to comply for cases where the R-value is NR in the IECC. Additional reasoning for below grade walls and slabs is found in the original proposal, which intended to include this modification, but did not.

GEW67-14

GEW68-14
605.1.1.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: While the testimony indicated that the shading and SHGC requirements found in the IECC and the IgCC may not be completely compatible, the committee did not agree that deletion of the requirement was the appropriate action.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Garrett Stone, representing Energy Efficient Codes Coalition (gas@bbrslaw.com); Harry Misuriello, representing American Council for an Energy Efficient Economy (misuriello@verizon.net); Maureen Guttman, representing Building Codes Assistance Project request Approve as Submitted.

Commenter's Reason: While we prefer GEW70 to this proposal, we recommend that this proposal be Approved As Submitted if GEW70 is not adopted because it would simplify the IgCC and make it more useful for a wider range of building projects. In the 2012 IgCC, all buildings built to the prescriptive path must use permanent shading devices, unless one of a few extremely narrow exceptions applies. This requirement makes the prescriptive path almost unusable for many commercial green buildings. Permanent shading devices can be used effectively to reduce solar gain, but they are not the only (or even the best) option in most circumstances.

Moreover, the language of Section 605.1.1.1 is inconsistent with the method of calculating projection factors in the IECC and ASHRAE 90.1. It does not make sense to include such a restrictive, complicated requirement in the IgCC, especially if it conflicts with requirements in the IECC and ASHRAE 90.1 GEW68 solves the problem by removing this prescriptive requirement and allowing design professionals to continue to use the broader range of options for reducing solar heat gain offered by the IECC and ASHRAE 90.1.

Finally, if this prescriptive overhang requirement is removed, architects will still retain the option of installing overhangs or more efficient fenestration (lower SHGC) and achieving basically the same energy efficiency under either option. Specifically, the IgCC is based on the IECC, which is neutral between an overhang and improved SHGC - both the IECC and the IgCC offer the architect credit for installing an overhang by offsetting it with a higher fenestration SGHC. As a result, this overly restrictive design requirement does not even provide any energy savings, since the savings from the overhang will be fully offset by a higher SHGC.

GEW68-14

GEW70-14
605.1.1.1

Proposed Change as Submitted

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.

4. Where fenestration has an solar heat gain coefficient (SHGC) equal to or less than 0.25.

~~4.~~ 5. 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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Because of the minimum SHGC required in southern climate zones, this proposal would result in eliminating the shading requirement in the climate zones where they would be most effective. The committee felt such an outcome was not appropriate.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Garrett Stone, representing Energy Efficient Codes Coalition (gas@bbrslaw.com); Harry Misuriello, representing American Council for an Energy Efficient Economy (misuriello@verizon.net); Maureen Guttman, representing Building Codes Assistance Project request Approve as Submitted.

Commenter's Reason: We recommend that this proposal be Approved As Submitted because it adds a simple, effective exception to the complicated and design-restrictive permanent shading requirements in Section 605.1.1.1.

Section 605.1.1.1 intends to limit solar heat gain through permanent shading, but it ignores the use of low-SHGC glazing to limit heat gain in a similar and more cost effective manner. Although the IECC and ASHRAE 90.1 both allow permanent shading to be used as part of a strategy to reduce solar heat gain through fenestration, both model codes also allow low-SHGC glazing as another option to achieve that objective. The current IgCC creates an unnecessary, additional requirement for permanent shading, regardless of whether it is the right choice for a specific project and regardless of how much or how little solar heat gain is allowed through the fenestration.

We disagree with the Committee that the SHGC required by the code in southern climates would eliminate the shading requirement in these climates without further improvements. The Committee failed to recognize changes in the 2015 IECC in this area, which sets the maximum prescriptive SHGC at 0.30 (for south, east and west orientations) for vertical fenestration with a projection factor of 0.25 (see Table C402.4). Under the IgCC, such vertical fenestration would be required to be less than or equal to 0.27 SHGC (10% less than IECC Table C402.4 values assuming Section 605.1.1 remains the same in the 2015 IgCC as in the 2012 IgCC).

As a result, if this proposal is adopted, architects will have the option of an overhang and 0.27 SHGC fenestration or no overhang and 0.23 SHGC fenestration (since the IgCC would require 0.23 SHGC with no projection - the IECC's 0.25 SHGC requirement reduced by 10% under Section 605.1.1). This is similar, but more stringent than the choices under the IECC of 0.30 SHGC with a 0.20 or greater PF or 0.25 SHGC without an overhang.

Proponents and stakeholders from a variety of backgrounds all agreed that the IgCC must be simplified. This proposal clearly simplifies the section while maintaining efficiency, and would ultimately make the IgCC easier to adopt and use.

GEW70-14

GEW71-14
605.1.1.1

Proposed Change as Submitted

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. Fenestration used to enclose a vestibule.

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee did not feel a blanket exception was appropriate. There were concerns about a lack of any size limitations; lack of any limitation on use occurring in the vestibule. Perhaps a refinement related to climate zone may be appropriate.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Barry Greive, representing Target Corporation (barry.greive@target.com) requests Approve as Submitted.

Commenter's Reason: The committee felt that the term vestibule was too broad and that it could be confusing. The term is already used and mandated by the IECC in many climate zones. There should be no confusion on what a vestibule is. Many buildings such as those in a main street atmosphere along a public right away will be difficult to be made to comply. If there is a vestibule; there is already a separation from the inside of the building which will address the reason for this code section.

GEW71-14

GEW77-14
202 (New), 605.1.2.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapprove**

This code change proposal was heard by the IgCC General Committee.

Committee Reason: As the proposed information addresses existing buildings, it belongs in Chapter 10 of the International Green Construction Code, which also addresses existing buildings.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Jason Wilen, National Roofing Contractors Association (NRCA) (jwilen@nrca.net) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

202 ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

202 ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

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.~~

1003.2.8 Air barriers for roof repair, roof recover and roof replacement. For buildings where the energy use 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.

Commenter's Reason: For this proposal, the following Committee Reason appears in the Report of Committee Action Hearings:

"As the proposed information address existing buildings, it belongs in Chapter 10 of the International Green Construction Code, which also addresses existing buildings."

This Pubic Comment complies with the direction given by the IgCC General Committee by moving the proposed text to IgCC Chapter 10.

The purpose of this code change is to make IgCC text consistent with IECC because of a Public Comment for proposal CE165-13 that was approved during the Group B Public Comment Hearings.

The proposed definitions will also make IgCC consistent with proposal CE56-13 that was part of the consent agenda during the Group B Public Comment Hearing.

GEW77-14

GEW78-14
605.1.2.2

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved the change as providing a compliance option when the test alone doesn't show compliance. There was concern expressed regarding the vagueness of some of the terms in the text such as the term 'practicable'. Also of concern is there was no upper limit as to how badly a test result might exceed the 0.25 cfm/ft^2 limit.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Jay Crandell, Applied Building Technology Group LLC, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

605.1.2.2 Testing requirement. The building thermal envelope air tightness shall be tested and the air leakage rate of the total area of the building thermal envelope 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. Where the tested rate exceeds 0.25 cfm/ft^2, leaks shall be sealed to the extent practicable and another test conducted to confirm the difference between the initial tested

air leakage rate and the required rate is reduced by at least 50 percent. A report that includes the tested surface area, floor area, air by volume, stories above grade, corrective actions taken when a second test was required, and leakage rates shall be submitted to the code official and the building owner. ~~Where the tested rate exceeds 0.25 cfm/ft2, 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.~~

Commenter's Reason: You can drive a bus through the envelope with the currently approved language in GEW78 and still result in compliance without any confirmation that a reasonable attempt was made to meet or even come close to the required air leakage rate. This proposal addresses that problem and provides flexibility should a failed test occur with some assurance that a reasonable effort was made to meet the required air leakage rate.

GEW78-14

GEW81-14
605.2

Proposed Change as Submitted

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 **e**xisting 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

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provisions for insulation on roof replacements are now found in the IECC. This IgCC provision is now redundant

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Mike Fischer, CPI, representing The Center for the Polyurethanes Industry (mfischer@kellencompany.com) requests Disapprove.

Commenter's Reason: This proposal inadvertently removes a needed reference to ensure that buildings undergoing roof replacements meet an appropriate level of energy efficiency improvement. The base code (IECC) does clarify the need to meet current energy code requirements during roof replacements; however, the IgCC does not also require the additional 10% envelope improvement for such building renovations. The reference to Chapter 10 is necessary to clarify that roof replacements are not subject to the 10% envelope improvement of the IgCC.

GEW81-14

GEW83-14
605.3 (New)

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapprove**

Committee Reason: The committee heard testimony that raised concerns regarding potential impacts to the roof structure, light reflected onto other buildings and lack of clear connection to the requirements in IECC. The committee felt that there was insufficient information provided regarding the energy savings this change would provide.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Amy Dickie, representing Global Cool Cities Alliance (amy@globalcoolcities.org) requests Approve as Submitted.

Commenter's Reason: Several new additional studies supporting the need for cool roofs in climate zone 4 have or will be published between the Memphis and Ft. Lauderdale hearings. The proponents will make this body of research available to the assembly, and we believe the entire assembly should have the opportunity to consider this issue at that time.

Public Comment 2:

Mike Fischer, representing The Roof Coatings Manufacturers Association and the Asphalt Roofing Manufacturers Association (mfischer@kellencompany.com) request Disapprove.

Commenter's Reason: The proposal intends to extend cool roof requirements into Chapter 6, and into climate zone 4. The envelope energy efficiency requirements in the IgCC are based on an incremental increase of performance values (R-Value, U-Factor etc.) that is 10% higher than the IECC. Given the fact that there is no requirement for Climate Zone 4 in the base code, this proposal adds a much greater increase above the base code, and does so in areas of the country where the benefit of cool roofing is greatly reduced. The extension of cool roof requirements into Climate Zone 4 was disapproved in the 2015 IECC; it makes no sense to add it into the IgCC, especially at the proposed levels.

GEW83-14

GEW85-14
606.2.2.1, 606.2.2.2

Proposed Change as Submitted

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 OR GEOTHERMAL 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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: There is confusion regarding the terms, and the committee did not find that the change resolved the confusion. There was no testimony addressing the change to the values. There need to resolve that one term is renewable source, others are not and they are both in the same code provision. The committee encouraged the preparation of a public comment to update the table values.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Charles Foster, representing Edison Electric Institute (cfoster20187@yahoo.com) requests Approve as Modified by this Public Comment.

Modify the proposal 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 OR GEOTHERMAL HEAT PUMPS

PRODUCT TYPE[a]	MINIMUM EER	MINIMUM COP	TEST PROCEDURE
Water-to-Air Closed loop	17.1	3.6	ISO 13256-1
Water-to-Air Open loop	21.1	4.1	ISO 13256-1
Water-to-Water Closed loop	16.1	3.1	ISO 13256-2
Water-to-Water Open loop	20.1	3.5	ISO 13256-2
Direct Expansion (DX) or Direct GeoExchange (DGX)	16.0	3.6	AHRI 870

~~a. Efficiency values apply to systems with a maximum rated cooling capacity of 65,000 Btu/hour.~~

Commenter's Reason: This public comment would retain the addition of the term "geothermal heat pump" but would remove the under 65,000 btuh limitation that was contained in the original proposal.

By removing the 65,000 btuh limitation, the substantive provisions of the IGCC 2012 would remain identical.

With respect to the addition of the term "geothermal heat pump," this would help to avoid confusion in the marketplace. Both terms (ground source and geothermal) are used regularly but the term "geothermal heat pump" is used much more frequently. For instance, the U.S. Dept of Energy uses the term geothermal heat pump (http://energy.gov/energysaver/articles/geothermal-heat-pumps).

So does the U.S. EPA (http://www.energystar.gov/certified-products/detail/heat_pumps_geothermal)

So does Carrier (http://www.carrier.com/homecomfort/en/us/products/heating-and-cooling/geothermal-heat-pumps/)

So does Water Furnace (http://www.waterfurnace.com/geothermal-heat-pumps.aspx)

So does ClimateMaster (http://www.climatemaster.com/residential/geothermal-heat-pumps/)

So does GeoExhange (http://www.geoexchange.org/)

So does Florida Heat Pump (http://www.fhp-mfg.com/)

So does Trane (http://www.trane.com/residential/products/geothermalsystems)

As do lots of other folks (Vermont - http://www.geoexchange.org/category/news/regional-news/vermont-news/, Bryant - http://www.bryant.com/products/geoheatpumps/, This Old House - http://www.thisoldhouse.com/toh/article/0,,20162296,00.html, Maryland -http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MD21F, NYSERDA - https://www.nyserda.ny.gov/Energy-Efficiency-and-Renewable-Programs/Renewables/Geothermal-Heat-Pumps.aspx, and many others)

Public Comment 2:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal 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 ~~OR GEOTHERMAL~~ HEAT PUMPS

PRODUCT TYPE[a]	MINIMUM EER	MINIMUM COP	TEST PROCEDURE
Water-to-Air Closed loop	17.1	3.6	ISO 13256-1
Water-to-Air Open loop	21.1	4.1	ISO 13256-1
Water-to-Water Closed loop	16.1	3.1	ISO 13256-2
Water-to-Water Open loop	20.1	3.5	ISO 13256-2
Direct Expansion (DX) or Direct GeoExchange (DGX)	16.0	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.

Commenter's Reason: This revision will result in the modification of table efficiency values to be up to date with current Energy Star values.

GEW85-14

GEW86-14
606.2.2.3

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concerned that this change in text in combination with changes to the IECC would result in there being no efficiency requirements for motors between 1 and 5 horsepower.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Amanda Hickman, representing AMCA International (amanda@intercodeinc.com) requests Approve as Submitted.

Commenter's Reason: AMCA International (AMCA) developed the concept of Fan Efficiency Grades (FEG) in response to direction from regulatory bodies and ASHRAE that fan efficiency requirements were needed in energy codes and standards. AMCA Standard 205, Energy Efficiency Classification for Fans, was initially published in 2010. The 2012 IgCC was the first model code to reference it for the first explicit fan efficiency requirement for commercial fans in a model standard.

Since that time, AMCA 205 was revised and accredited by ANSI in 2012, and referenced by ASHRAE 90.1 in 2013, and the 2015 IECC. An addendum to ASHRAE 189.1 toward the 2014 edition has passed public peer review and committee votes, and is awaiting final ballot by the ASHRAE Board of Directors.

The analyses that went into the codes and standards actions subsequent to the 2012 IgCC have led to provisions that better reflect the needs of the market. Therefore, AMCA encourages approval of GEW86 for the following reasons:

1. The proposal fixes the following problems with the existing language:

   The existing language uses the term "peak total or static efficiency." The Fan Efficiency Grade metric is based on peak total efficiency, so having "static" in the provision is inconsistent with the definition of FEG and could cause confusion among designers and manufacturers and inconsistent enforcement.

2. The proposal will exempt safety fans and power roof ventilators (PRVs).

   Safety fans and PRVs (low pressure centrifugal and axial roof and wall exhausters) are exempted from 90.1, 189.1, and the IECC. Fans that are run only during emergencies are exempted because they do not consume energy on a regular basis, and when they are run during emergencies, their efficiency is not a concern. PRVs are exempted because they consume only about 6% of the total connected fan load as they run at very low pressures. With such low pressure points of operation it is difficult to operate PRVs near a peak efficiency.

   Please note that all PRVs utilize NEMA rated Energy Efficient Motors for all motors greater than or equal to 1 HP. Below 1 HP, an increasing number of PRVs are utilizing the ASHRAE code whereby they must use either an electronically controlled (EC) motor or a 70 percent efficient fractional motor.

3. The proposal harmonizes fan sizes with other codes and standards.

   Re-setting the lowest range of covered fan sizes from > 1 HP to >5 HP harmonizes IgCC with IECC, and ASHRAE 90.1 and 189.1. Furthermore, fan efficiencies for smaller fans are inherently lower than larger fans of the same size, which is masked by FEG ratings. Therefore, the provision to increase to the large HP sizes will not decrease energy efficiency as much as it might seem. Based on 2012 fan sales data collected by AMCA from 21 member companies, which was constituted into a database containing more than 1.3 million fan sales records, the reduction in energy savings that this proposal amounts to is approximately 1.25%. This information was not available at the time of the Committee Action Hearing.

4. The proposal reduces fan energy consumption by approximately 10% over the 2015 IECC.

   Please note that according to the database analysis mentioned above, the proposal will reduce fan energy consumption by approximately 10% over the 2015 IECC.

Public Comment 2:

Vickie Lovell, representing self (vickie@intercodeinc.com) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

606.2.2.3 Fan efficiency. ~~Fans shall~~ Fans over 1 hp shall comply with the provisions of Section C403.2.12.3 of the International Energy Conservation Code, provided that the total efficiency of the fan at the design point of operation shall be within 10 percentage points of the maximum total efficiency of the fan.

Commenter's Reason: AMCA International (AMCA) developed the concept of Fan Efficiency Grades (FEG) in response to direction from regulatory bodies and ASHRAE that fan efficiency requirements were needed in energy codes and standards. AMCA Standard 205, Energy Efficiency Classification for Fans, was initially published in 2010. The 2012 IgCC was the first model code to reference it for the first explicit fan efficiency requirement for commercial fans in a model standard.

Since that time, AMCA 205 was revised and accredited by ANSI in 2012, and referenced by ASHRAE 90.1 in 2013, and the 2015 IECC. An addendum to ASHRAE 189.1 toward the 2014 edition has passed public peer review and committee votes, and is awaiting final ballot by the ASHRAE Board of Directors.

The analyses that went into the codes and standards actions subsequent to the 2012 IgCC have led to provisions that better reflect the needs of the market. During the IgCC Committee Action Hearing, the panel expressed concern that the proposal would set the minimum fan size too high to have a material effect on reducing fan energy consumption. The proposal, therefore, has been modified to address this concern by keeping the lower fan size limit the same. That being said, other reasons for passing proposal GEW86 are as follows:

1. The proposal fixes the following problems with the existing language:

   The existing language uses the term "peak total or static efficiency." The Fan Efficiency Grade metric is based on peak total efficiency, so having "static" in the provision is inconsistent with the definition of FEG and could cause confusion among designers and manufacturers and inconsistent enforcement.

2. The proposal will exempt safety fans and power roof ventilators (PRVs).

   Safety fans and PRVs (low pressure centrifugal and axial roof and wall exhausters) are exempted from ASHRAE 90.1, 189.1, and the IECC. Fans that are run only during emergencies are exempted because they do not consume energy on a regular basis, and when they are run during emergencies, their efficiency is not a concern. PRVs are exempted because they consume only about 6% of the total connected fan load as they run at very low pressures. With such low pressure points of operation it is difficult to operate PRVs near a peak efficiency.

   Please note that all PRVs utilize NEMA rated Energy Efficient Motors for all motors greater than or equal to 1 HP. Below 1 HP, an increasing number of PRVs are utilizing the ASHRAE code whereby they must use either an EC motor or a 70 percent efficient fractional motor.

3. The proposal saves 11% more than the 2015 IECC.

   A 10% improvement in energy use results from the 10-point selection window (vs. 15 points away from peak total efficiency in the IECC). An additional 1.25% is available from the growth of coverage to motors greater than 1 HP, up to and including 5 HP.

GEW86-14

GEW87-14
606.2.2.4 (New), Table 606.2.2.4 (NEW), Chapter 12

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent identified that there were errors in the proposal which needed to be addressed during public comment.

Assembly Action: **None**

Analysis: For staff Analysis: of the content of AHRI 560-00 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/ProposedStandards-042314.pdf

Individual Consideration Agenda

Public Comment:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

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~~ 1.11	1.05	AHRI 560
Direct Fired, Double Effect	1.05	1.05	AHRI 560

Commenter's Reason: The revision has been made to the proposal.

GEW87-14

GEW94-14
606.8

Proposed Change as Submitted

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:

~~**606.8 Laboratory 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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was unsure of what final approved language contained in the IECC 2015 will be, therefore they felt this deletion to be premature.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

John Williams, representing Adhoc Health Care Committee (AHC@iccsafe.org) requests Approve as Modified by this public comment.

606.8 Laboratory exhaust systems. Laboratory exhaust systems shall comply with the provisions of Section C403.2.7 of the *International Energy Conservation Code* except as specified in Section 606.8.1.

Commenter's Reason: During the testimony it was stated that laboratory exhaust systems will be addressed in the 2015 IECC. While there isn't a specific section regarding laboratory exhaust systems in the IECC, there provisions which address laboratory fume hoods. Section C403.2.7 requires energy recovery ventilation systems. The section provisions an exception for laboratory fume hood systems meeting certain criteria. These criteria need to be considered in conjunction with the provisions of 606.8 and 606.8.1 when the IgCC is adopted. Rather than our original proposal of striking very generic reference to the IECC, we think it is important to have a specific reference since the requirement is 'hidden' in an exception.

GEW94-14

GEW98-14
607.5, A106.3.2

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based on the Committee's approved as modified action on GEW101-14, the Committee determined that approval of this proposal was unnecessary.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

John Williams, representing Adhoc Health Care Committee (AHC@iccsafe.org) requests Approve as Submitted.

Commenter's Reason: The development committee disapproved this change believing it was resolved by the action on GEW101-14. However, only half of this change was resolved.

Section 607.5 has been entirely replaced by GEW101-14. The modification deleted the Group I-2 list from that proposal. Therefore the issue with Section 607.5 is resolved if GEW101-14 remains approved as submitted.

The change to A106.3.2 is editorial. Group I-2 includes all these types of facilities. Putting in the list here implies that there are some Group I-2 types of facilities that would not be covered.

GEW98-14

GEW114-14
608.2, 608.2.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The change provides consistency between the text of the IECC revised provisions and the IgCC. The IgCC provisions are retained because they are more stringent than the IECC. There was a suggestion that the text be revised to say 'master control device or system', in that the installation may be more than a single device. The committee suggested the revision be considered during public comment when it can be better ascertained with the added text was also in the IECC.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Marilyn Williams, representing National Electrical Manufacturers Association (mar_williams@nema.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

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 sensor controls that require manual intervention to energize circuits.

Exception: 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 or system for the sleeping unit.

Commenter's Reason: The committee was in error in approving this proposal without consideration of the floor modification that was proposed. The floor modification had the endorsement of the proposal's proponent. The committee's rationale for not approving the floor modification was that did not maintain consistency with the IECC. It is respectfully submitted that the IECC is deficient in using only the term "device" to satisfy this requirement because it implies that only one device can be utilized, when in actuality it requires a system to comply. Just because the IECC has it wrong, does not mean it should be propagated into this code, thusly making the IgCC un-enforceable. The committee's approved language will make the enforcement of this code very difficult because the requirement cannot be satisfied with a single device. A system is required in order to comply with this requirement. It is respectfully requested that the members make their lives less complicated by approving this public comment.

Public Comment 2:

Marilyn Williams, representing National Electrical Manufacturers Association (mar_williams@nema.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

608.2 Sleeping unit controls. Sleeping units in Group R-1 and R-2 occupancies shall have a master control device or system that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants have left the room.

Exception: Luminaires and switched receptacles controlled by captive key controls.

Commenter's Reason: The committee was in error in approving this proposal without consideration of the floor modification that was proposed. The floor modification had the endorsement of the proposal's proponent. The committee's rationale for not approving the floor modification was that did not maintain consistency with the IECC. It is respectfully submitted that the IECC is deficient in using only the term "device" to satisfy this requirement because it implies that only one device can be utilized, when in actuality it requires a system to comply. Just because the IECC has it wrong, does not mean it should be propagated into this code, thusly making the IgCC un-enforceable. The committee's approved language will make the enforcement of this code very difficult because the requirement cannot be satisfied with a single device. A system is required in order to comply with this requirement. It is respectfully requested that the members make their lives less complicated by approving this public comment

Public Comment 3:

Wayne Stoppelmoor, representing Schneider Electric (wayne.stoppelmoor@schneider-electric.com) requests Disapprove.

Commenter's Reason: The committee was in error in approving this proposal without consideration of the floor modification that was proposed. The committee's approved language will make the enforcement of this code very difficult because the requirement cannot be satisfied with a single device. It is respectfully submitted that the language existing in the code is better than the proposed language and this proposal be disapproved.

GEW114-14

GEW119-14
608.7

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that the use of gas lights was not always restricted to 'process' loads. A growing use of such lighting is anticipated.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Neil Leslie, representing self (neil.leslie@gastechnology.org) requests Approve as Submitted.

Commenter's Reason: Gas lights are decorative appliances that provide ambiance for specific applications. They are not intended to meet space lighting needs. The provision creates strong disincentive for the installation of gas lights that have unique value in some building types such as restaurants. The proposed change would remove that disincentive and provide more equitable treatment of this decorative appliance option.

GEW119-14

GEW120-14
608.7

Proposed Change as Submitted

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

Revise as follows:

608.7 Fuel gas and liquid fuel lighting systems. Fixtures that generate illumination by combustion of fuel gas or liquid fuel 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 or liquid fuel lighting system/3.413.

Equation 6-5

Exception: Fuel gas or liquid fuel 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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee considered the change to be an undesirable change to the scope of the code.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Submitted.

Commenter's Reason: This language will close a loophole for these types of products, and ensure that all types of lighting energy are accounted for.

GEW120-14

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,

Proposed Change as Submitted

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 I*nternational 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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal is incomplete. There needs to be some collaborative work with the proponents of GEW133 and return to public comment hearing with better proposal. Exception 1 to Section 610.3 is unclear and may result in double counting. The proposal wouldn't apply to buildings which don't use electricity, and therefore would not be required to address renewables.

Assembly Motion: **None**

Individual Consideration Agenda

Public Comment:

Craig Conner, representing self (craig.conner@mac.com); Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com), request Approve as Modified by this Public Comment.

Modify the proposal as follows:

610.3 Alternative sources ~~The~~ Either of the following shall be considered ~~as substitutes for any portion of the renewable energy requirement of~~ compliance with Section 610.1:

1. Conserving additional non-renewable energy, ~~where~~ equal to at least 4 percent of the ~~conserved non-renewable~~ estimated annual energy ~~equals twice the renewable energy credited~~ use for heating, cooling, ventilation, lighting and service water heating; or.
2. ~~Renewable~~ Purchasing renewable energy credits (RECs) or local utility green power ~~is purchased, where the purchased amount equals ten times the renewable~~ equal to at least 20 percent of one year's estimated energy ~~credited. Documentation of the purchase shall be provided~~.use for heating, cooling, ventilation, lighting and service water heating.

Commenter's Reason: This clarifies Section 610.3 on alternatives to onsite renewable energy systems. Many buildings are located such that renewable energy systems on the building or site are difficult or impractical, often because of the shading that blocks some or all of the sun. Therefore it is important that alternatives be clear.

Approval of this comment will mean a much more understandable section on renewables. The result of this comment would be the code section below. Note how much shorter and more understandable this is when compared to the existing IGCC Section 610.

610
RENEWABLE ENERGY SYSTEMS

610.1 Renewable energy requirements. 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.

610.2 Building averaging. The required renewable energy shall be computed for each building or for a group of buildings.

610.3. Alternative sources. Either of the following shall be considered compliance with Section 610.1:

1. Conserving additional non-renewable energy equal to at least 4% of the estimated annual energy use for heating, cooling, ventilation, lighting, and service water heating; or
2. Purchasing renewable energy credits (RECs) or local utility green power equal to at least 20% of one year's estimated energy use for heating, cooling, ventilation, lighting, and service water heating.

610.4 Prescriptive compliance. 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 System requirements. 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.

610.6 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.

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). A REC represents the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation. A REC is sold separately from the electricity associated with a renewable energy source.

RENEWABLE ENERGY SOURCE. Energy derived from solar radiation, wind, waves, tides, biogas, biomass, or geothermal energy.

GEW132-14

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

Proposed Change as Submitted

Proponent: Lorraine Ross, Intech Consulting, Inc, representing The Dow Chemical Company (Intech@tampabay.rr.com)

Revise definitions 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 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~~ ONSITE 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. S~~~~olar 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

Public Hearing Results

Committee Action: Disapproved

Committee Reason: The committee acknowledged that the provisions of Section 610 need improvement. GEW133 had more committee members feel that it provided the better foundation for the next code. The committee hopes that this proponent will work

with the proponents of the related proposals to provide through the public comment process a comprehensive revision to the section. Of concern are provisions which would place the local code official in the middle of contractual relationships between a building owner and the seller of renewable energy credits. There needs to be more information provided regarding the change in the power units. The terms 'demand' and 'power use' seem to be used interchangeably when they are distinct terms.

Assembly Motion: **Approve as Submitted**
Online Vote Results: **Failed** - Support: 37.01% (57) Oppose: 62.99% (97)
Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Lorraine Ross, representing Intech Consulting Inc for The Dow Chemical Company (Intech@tampabay.rr.com) requests Approve as Modified by this Public Comment.

Replace the proposal as follows:

SECTION 202
DEFINITONS

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~~ A REC represents the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation. ~~An~~ A REC, and its associated attributes and benefits, is sold separately from the underlying physical electricity associated with an ~~onsite~~ on-site 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.~~

~~**202**~~ **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.~~

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

SECTION 610
ONSITE RENEWABLE ENERGY SYSTEMS

610.1 Onsite renewable energy systems. Each building or its associated building site shall be equipped with any combination of onsite renewable energy systems in accordance with one of the following:

1. Provide not less than 0.50 watts per square foot (5.4 W/m^2) of conditioned floor area of the building.
2. Provide not less than 3 percent of the energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4 of the *International Energy Conservation Code*.

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. Onsite renewable energy systems shall be tested after installation to verify that the installed performance meets design specifications. A report of the tested performance shall be provided to the building owner and the building official. Onsite renewable energy systems shall be individually metered in accordance with Section 603.3.7

Exceptions:

1. For buildings where the registered design professional certifies that the incident solar radiation available to the building or its associated building site is not sufficient to meet the requirements of Section 610.1 and where the owner shall contract for no less that 87 kWh Renewable Energy Credits per square foot of conditioned floor area. The Renewable Energy Credits shall comply with Section 610.2.2
2. Building occupancies listed below, where at least 10 percent of the building's total annual estimated hot water consumption is met with any combination of onsite renewable energy systems designed, constructed and installed in accordance with manufacturer's instructions.
   2.1 Group A-2, restaurants and banquet halls
   2.2 Group F, laundries
   2.3 Group R-1, boarding houses, hotels, motels

2.4 Group R-2 occupancies
2.5 Group A-3, health clubs and spas
2.6 Group I-2, hospitals, psychiatric hospitals and nursing homes

3. Buildings where at least 10 percent of the buildings total annual estimated space heating or space cooling is met by any combination of onsite renewable energy systems designed constructed and installed in accordance with manufacturer's instructions.

610.2 Renewable energy credit (REC). A renewable energy credit (REC) shall comply with all of the following:

1. 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,
2. 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.
3. Not be simultaneously used to meet a local, state or federal energy mandate or other legal requirement.
4. Not represent renewable energy, renewable attributes or environmental attributes that can be legitimately claimed by another party.

Commenter's Reason: As stated in the 2014 Report of the Committee Action Hearings Results, "The committee acknowledged that the provisions of Section 610 need improvement. GEW 133 had more committee members (lost by only 1 vote) feel that it provided the better foundation for the next code."

This Public Comment reflects a comprehensive revision to the section, largely based on committee comments, stakeholder testimony and newly approved and published 2015 code revisions for building, energy, 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, in order to assure maximum flexibility and design choice, three exceptions are granted, including the use of Renewable Energy Credits (RECS) as an alternate method to meet the onsite renewable energy system requirement under certain specific building and associated site 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, either on the building or on its associated building site. Either a prescriptive or performance approach to compliance is shown. The values for each are taken directly from 2015 IECC Section C406.5 and addresses regulated loads.

The detailed installation, fire, structural, electrical, and other requirements for these systems are now very clearly defined in the 2015 IBC, 2015 IFC, and NFPA 70. System performance verification and metering language is consolidated and is unchanged from 2012 IgCC (Sections 610.2.2.1 Performance verification and Section 610.5.1 Metering.)

Exceptions:

The existing exceptions were radically rewritten based on committee comments and stakeholders testimony.

Exception 1 - recognizes that there are conditions, such as building orientation, limited roof area, other adjacent existing buildings or site vegetation or topography, where the onsite renewable energy system alone cannot provide the minimum energy required in Section 610.1. In this case, the entire requirement in this section can be met by RECS alone. To comply with this exception, the registered design professional shall certify that this condition exists AND the building owner shall commit to secure Renewable Energy Credits that provide 87 kWh per square foot of conditioned floor area. The 87 kWh per square foot of conditioned floor area value matches the prescriptive requirement of 0.50 watts per square foot found in Section 610.1 Item 1.

Exception 2 – granted to certain occupancies where there is a high volume of hot water consumption. In these cases, compliance with this section is demonstrated by supplying 10% of the hot water needs in these buildings with ANY COMBINATION of onsite renewable energy systems. This change is in response to various stakeholders' testimony that correctly noted that flexibility in selection of the type of onsite renewable energy systems is desirable in the IgCC.

Exception 4 - granted to buildings where ANY COMBINATION of onsite renewable energy systems provide at least 10% of the buildings space heating or space cooling. As with Exception 2, this change is in response to various stakeholders' testimony that correctly noted that flexibility in selection of the type of onsite renewable energy systems is desirable in the IgCC.

Section 610.2

This section outlines criteria for Renewable Energy Credits. It was widely recognized by the committee in discussion of GEW 137 that additional definition of RECs was needed to be able to determine which RECs were acceptable to meet the requirements of the code.

The precedent for using RECs as an alternative to onsite renewable energy systems was set by ASHRAE 189.1. ASHRAE 189.1-2011 references the "Green-E" standard to ensure the acceptability of the RECs used for compliance with the Standard. However, because Green-E is not ANSI certified, it cannot be cited in the IgCC. For this reason, GEW137-14 was written as a

means to provide the critical criteria in the IgCC by which the acceptability of RECs can be evaluated. As was noted by the Committee, this additional "definition" is needed in the IgCC to provide guidance for users, code officials, and RECs providers.

"Renewable Energy Credit" is defined in the code; however, that definition is conceptual. It does not reflect a market where the quality and attributes of RECs can vary drastically. The set of qualifying requirements in GEW 137 ensures that RECs used in the IgCC meet a minimum level of quality. They ensure that the environmental benefits of the REC can be attributed to the IgCC project, and the IgCC project alone, with no "double-dipping." If the environmental benefit of the REC is claimed elsewhere, or mandated by another regulation, then there is no environmental benefit remaining to meet the IgCC requirement. Energy codes do not allow the insulation installed in other buildings to be used to meet code requirements in the subject project. The code should not allow RECs "installed" elsewhere to be used to meet IgCC requirements. The set of qualifiers in GEW137 is needed to ensure this because the both the unregulated RECs market and the current IgCC definition do not.

Chapter 2:

Definitions for Renewable Energy Credit (REC) and Renewable Energy Source, Onsite have 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.

GEW133-14

GEW134-14
610.1, 610.1.1, 610.1.2, 610.4

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee did not see that this proposal provided any improvement to the section. It also places the code official in a position over monitoring a post Certificate of Occupancy contract which most local agencies will not want to be involved.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal 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 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 5 percent of the total annual building energy consumption from renewable generation takes the form of a ~~10~~ 5-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 5 percent of the total annual building energy consumption from renewable generation.

610.4 Solar water heating equipment. Not less than ~~20~~ 15 percent of the building's annual estimated hot water energy usage shall be supplied by onsite solar water heating equipment.

Commenter's Reason: The modifications will be in line with the intent of the proposal on the term of RECs and increasing the requirements in this section.

GEW134-14

GEW135-14
610.2, 610.3, 610.5.1, 610.5.2

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal revises text which implies in some sections that only electric energy is being addressed versus a variety of fuels discussed in other sections. The proposal also improves the clarity of the metering and monitoring requirements

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

ME Krebs, representing Laclede Gas (mkrebs@lacledegas.com) requests Disapprove.

Commenter's Reason: Despite its appearances, GEW 135-14 is biased against non-electric energy sources by requiring more renewables for buildings that use energy forms other than electricity (e.g., natural gas). As such, it will significantly increase construction costs of multi-fueled buildings OR assure that such buildings are electric only. Therefore, Mr. Foster's proposal GEW 135-14 should be disapproved.

GEW135-14

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)

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The text of the proposal would require that the 'fuel' for these alternative energy sources be derived on the site. For some of these not enough 'fuel' would be generated on a single site to make the recovery of the energy practical.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Charles Foster, representing Edison Electric Institute (cfoster20187@yahoo.com) requests Approve as Submitted.

Commenter's Reason: The original proponents reason is persuasive; namely that the IGCC allows the use of biomass and biogas to meet renewable energy requirements but there are no guidelines on their respective calculation.

As submitted, this proposal would give guidance to users interested in biogas and biomass.

Public Comment 2:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

~~**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.~~

~~**610.6.2 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.~~

Commenter's Reason: The proposed modifications will allow the use of alternative energy sources that are not produced on-site..

GEW136-14

GEW137-14
610.1.1 (New)

Proposed Change as Submitted

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

Add new text as follows:

610.1.1 Renewable energy credit (REC). A renewable energy credit (REC) shall comply with all of the following:

1. 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.
2. 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.
3. Not be simultaneously used to meet a local, state or federal energy mandate or other legal requirement.
4. Not represent renewable energy, renewable attributes or environmental attributes that can be legitimately claimed by another party.

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

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee felt that as the Renewable Energy Credit (REC) are already in the code, they need to be 'defined' carefully. The proposal provides a clear set of standards by which to judge the acceptability of RECs.

Assembly Motion: **Disapprove**
Online Vote Results: **Successful** - Support: 54.19% (84) Oppose: 45.81% (71)
Assembly Action: **Disapproved**

Individual Consideration Agenda

Public Comment 1:

Jim Edelson, representing New buildings Institute requests Approve as Submitted.

Commenter's Reason: The Memphis Committee approved GEW137-14 with an 11-2 vote. It was widely recognized that additional definition of RECs was needed to be able to determine which RECs were acceptable to meet the requirements of the code.

The precedent for using RECs as an alternative to onsite renewable energy systems was set by ASHRAE 189.1. ASHRAE 189.1-2011 cites to the "Green-E" standard to ensure the acceptability of the RECs used for compliance with the Standard. However, because Green-E is not ANSI certified, it cannot be cited in the IgCC. For this reason, GEW137-14 was written as a means to provide the critical criteria in the IgCC by which the acceptability of RECs can be evaluated. As was noted by the Committee, this additional "definition" is needed in the IgCC to provide guidance for users, code officials, and RECs providers.

"Renewable Energy Credit" is defined in the code; however, that definition is conceptual. It does not reflect a market where the quality and attributes of RECs can vary drastically. The set of qualifying requirements in GEW 137 ensures that RECs used in the IgCC meet a minimum level of quality. They ensure that the environmental benefits of the REC can be attributed to the IgCC project, and the IgCC project alone, with no "double-dipping." If the environmental benefit of the REC is claimed elsewhere, or mandated by another regulation, then there is no environmental benefit remaining to meet the IgCC requirement. Energy codes do not allow the insulation installed in other buildings to be used to meet code requirements in the subject project. The code should not allow RECs "installed" elsewhere to be used to meet IgCC requirements. The set of qualifiers in GEW137 is needed to ensure this because the both the unregulated RECs market and the current IgCC definition do not.

Public Comment 2:

Assembly Action requests Disapprove.

Commenter's Reason: This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action. The assembly action for Disapprove was successful by a vote of 54.19% (84) to 45.81% (71) by eligible members online during the period fo May 19 - May 30, 2014.

Public Comment 3:

Craig Conner, representing self (craig.conner@mac.com); Hope Medina (hmedina@coloradocode.net) requests Disapprove.

Commenter's Reason: This change limits REC sales from renewables to 15 years (if not repowered). Most renewables last longer than 15 years, sometimes much longer. Wind turbines last 15 to 30 years. Utility scale photovoltaic (PV) may have a 25 to 30 year life. Hydro dams and geothermal facilities have much long useful lifetimes.

The proposed 15-year limit reduces the value and financial viability of new renewable projects. Why would the IGCC want to undercut the value of new renewable projects?

Preventing double counting is one reason for this change. REC tracking programs already watch for double counting by selling the same thing twice. Neither the IGCC nor the code official should try to regulate the RECs market.

Public Comment 4:

Charles Foster, representing Edison Electric Institute (cfoster20187@yahoo.com) requests Disapprove.

Commenter's Reason: The proponent's intentions were good in this proposal but, as written, it is problematic.

REC's are a creation of state statutes. There are no federal REC's. This means that what qualifies for a REC in one state may or may not qualify in another. For instance, electricity from incinerated waste is a REC in Maryland but not in New Jersey, Washington, DC or Delaware.

As another example, Pennsylvania defines coal mine methane as renewable. No other states do. Maryland allows poultry litter incineration as a REC but not other states.

Each state has its own rules for the definition of renewable energy credits and this proposal would pit the IGCC against the states.

The IGCC's definition of REC's should defer to the definition of REC's in the state where a building is sited.

Please disapprove this proposal.

See attachment.

Public Comment 5:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Disapprove.

Commenter's Reason: The intent of the proposal is understandable, but there are many enforcement issues with the language.

-How is a code official supposed to determine the age of the off-site renewable generation facility or facilities? What if some of the facilities are over 15 years old, and the others are newer?

-There is language about "where required under any legal requirement". That language is vague, and could be interpreted to cover a contract between a building owner and developer who have signed a legal requirement for the use of RECs.

-What if a state or locality allows RECs to be used to meet local or state renewable energy requirements? This language could contradict state or local laws, leaving the code official in an enforcement bind.

GEW137-14

GEW139-14
610.4, Chapter 12

Proposed Change as Submitted

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.

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.

Add new standard as follows:

SRCC
Solar Rating & Certification Corp.,
400 High Point Drive, Suite 400,
Cocoa, FL 32926

SRCC 300-2013-09 Minimum Standards for Solar Water Heating Systems

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concerned that the provisions conflicted or at the very least overlapped with requirements of the IMC. This is proposed to the wrong code.

Assembly Action: **None**

Analysis:: For staff Analysis: of the content of SRCC 300-2013-09 Minimum Standards for Solar Water Heating Systems relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/ProposedStandards-042314.pdf

Individual Consideration Agenda

Public Comment:

Jim Huggins, Solar Rating & Certification Corp., representing SRCC (jhuggins@solar-rating.org) requests Approve as Modified by this Public Comment.

Modify the proposal 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.

The solar water heating equipment shall comply with the *International Mechanical Code* and 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.

Commenter's Reason: A new standard on solar thermal systems is being developed by ICC. This standard is based on and expands beyond SRCC Standard 300. The new ICC standard is currently out for public comment (http://www.iccsafe.org/cs/standards/IS-STSC/Pages/default.aspx). During next review cycle for the IMC, proposals will be submitted to update it to reference this new ICC standard. SRCC Standard 300 is already referenced in the 2015 IRC. The IRC reference will be updated to the new ICC standard during the next IRC review cycle. Inclusion of a reference to SRCC Standard 300 in the IgCC during this code cycle will facilitate conversion to the ICC version of the solar thermal systems standard during the next review cycle. Meanwhile, users of the IgCC can benefit from the expanded coverage found in SRCC Standard 300 compared to Chapter 14 of the IMC. Most of the items in Chapter 14 of the IMC are also addressed in SRCC Standard 300, along with many more issues of concern in solar thermal systems. Finally, since this paragraph of the IgCC requires estimation of the annual energy supplied by onsite solar water heating equipment, inclusion of guidance on how to do this estimation is approprate for inclusion here.

GEW139-14

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. Where there is not an actively monitored and managed *energy management and control* *system*, 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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was somewhat receptive to the concept but felt the proposal would work better as an exception to the general rule. Among the concerns was the possibility that the 'actively' monitored system wasn't monitoring all those things for which commissioning is required. There also needs to be more clarity as to what 'actively monitored' means.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Barry Greive, representing Target Corporation (barry.greive@target.com) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

611.1.5.5 Post-occupancy recommissioning. ~~Where there is not an actively monitored and managed energy management and control system, the~~ 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.

Exception: Buildings monitored by an energy management and control system.

Commenter's Reason: Many buildings have an energy management and control system (EMCS) which means that the system is essentially being commissioned on a daily basis. With these types of systems there is no reason to have a commissioning company repeat this work. If a report is required by the Code Official the owner needs to provide a report on the EMCS system and how the components are functioning.

Public Comment 2:

Steven Rosenstock, Edison Electric Institute, representing self (srosenstock@eei.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

611.1.5.5 Post-occupancy recommissioning. Where there is not an actively monitored and managed energy management and control system that can provide post-occupancy commissioning reports, 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.

Commenter's Reason: The modification provides clarification so that multi-site customers with sophisticated building and energy management systems can more easily comply with this section.

GEW145-14

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)

Proposed Change as Submitted

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

Climate zone [a]	1A	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	6A	6B	7	8
Bank	154	159	154	151	140	137	167	144	152	179	155	190	176	208	282
Medical office (non-diagnostic)	115	118	115	113	104	102	125	108	114	134	116	148	131	156	210
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 I*nternational 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.

612.2.2 Onsite nonrenewable energy. For the purpose of determining compliance with the provisions of Section 612.2, the CO2e emissions associated with onsite non-renewable energy use shall be calculated in accordance with Section 602.2.2.

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

Public Hearing Results

The following errata is not posted to the ICC website.

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~~ 612.1 shall be adjusted based on the monthly weighted average percentage of occupied floor area during the 12-month compliance period as documented is accordance with Section 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.

~~**603.2.2**~~ **612.2.2 Onsite nonrenewable energy.** For the purpose of determining compliance with the provisions of Section 612.2 the CO_2e emissions associated with onsite non-renewable energy use shall be calculated in accordance with Section 602.2.2.

(The errata been incorporated into cdpACCESS.)

Committee Action: **Approved as Modified**

Modify the proposal as follows:

612.2 Annual direct and indirect CO_2e emissions.

CO_2er = emissions associated wtih the EUIr as determined in accorance with Section 612.1.3 utilizing the same mix of specific energy types used by the actual building in calculation of CO_2ea.

~~**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.~~

(Portions of the proposal not shown remain unmodified.)

Committee Reason: The proposal is an important step forward in how the energy efficiency of buildings are evaluated and measured. Our existing paths are flawed. The prescriptive path can be too restrictive; the performance path is not actually predicting the expected energy use of the completed building. This method, as another option for compliance, establishes a target for energy use and evaluates the completed building against the target. It makes the building owner a part of the 'team' who must make a commitment to operate the building within the parameters of the approved and completed. Designers who participate in this option approach can manage their risk through their contract.

The amendment clarifies how the CO_2er is calculated.

The proposal needs further refinement. At this time, some committee members felt that the best solution may be to place this in the code as a new apprendix. There was some discomfort with using a model set in 2000 data, can something more recent be employed. The Analysis: period of 12 months can be cherry picked out the 36 month period. There is concern a design professional will be held responsible for non-compliance where the designer has not control over what the building owner does in the building for those 36 months. There also seems no control of how tenant spaces are filled out; and if those are or are not within the control of the code official. What is the result of non-compliance? There is discomfort with holding a Certificate of Occupancy hostage for 3 years. Finally there remains concern of trying to impose a 36 observation period on the local code officials.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Ryan Colker, representing National Institute of Building Sciences (rcolker@nibs.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

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 ~~utilizing~~ where the EUIr is apportioned with the same ~~mix~~ distribution of ~~specific energy~~ fuel types ~~used by~~ as measured in the ~~actual building in calculation of CO2ea~~ EUIa.

Commenter's Reason: As indicated by the committee upon initial approval of the underlying proposal, "This proposal is an important step forward in how the energy efficiency of buildings are evaluated and measured. Our existing paths have inherent limitations when seeking the higher levels of performance required by modern codes, especially the IgCC. The prescriptive path can be too restrictive; the performance path is not actually predicting the expected energy use of the completed building. This method, as another option for compliance, establishes a target for energy use and evaluates the completed building against the target. It makes the building owner part of the 'team' and [they] make a commitment to operate the building within the parameters of the approved. Designers who participate in this option approach can manage their risk through their contract."

Through this public comment, the proponent and supporting organizations address the concerns raised by the committee. The EUIr values present in Table 612.1 which serve as the basis of the outcome targets are based on the data from the 2003 Commercial Building Energy Consumption Survey (CBECS). CBECS is conducted by the U.S. Department of Energy's Energy Information Administration. It is the most comprehensive and statistically accurate assessment of the nation's building stock. It is widely recognized across the industry and is utilized as the underlying data for numerous programs including the EPA Energy Star Program, the USGBC's LEED program, GBI's Green Globes, and ASHRAE's Building Energy Quotient (bEQ). Within the IgCC, the 2003 CBECS data serves as the baseline for determination of the zEPI. Therefore, the use of 2003 CBECS data under this proposal provides consistency with the rest of the code.

This comment provides clearer language regarding the calculation of the CO2er to assure that the methodology provides a meaningful relationship between the energy calculations and the calculation of CO2e emissions.

This proposal recognizes the fact that many jurisdictions do not have the personnel or fiscal resources to adequately ensure compliance with energy and sustainability requirements. By focusing on the outcome, code officials and communities can be assured that requirements are being met while not incurring additional enforcement burdens. If an owner and design team elect to pursue this path, they ultimately bear the burden of demonstrating compliance and achievement of the outcome.

Many communities have begun development and implementation of programs to reduce energy use or greenhouse gas emissions across multiple sectors--including buildings. The establishment of benchmarking and reporting requirements, 2030 Districts and goals for zero energy buildings are based on the achievement of actual energy savings, not theoretical results. Providing a pathway within code to focus on actual energy use can help communities drive achievement of energy and greenhouse gas emission goals.

This additional option for compliance with the energy provisions of the IgCC provides a framework for leading communities, code departments, building owners and design teams to realize actual energy use results.

Public Comment 2:

Hope Medina, representing Colorado Chapter of International Code Council (hmedina@coloradocode.net) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 202
DEFINITIONS

POST OCCUPANCY VERIFICATION PERMIT. A permit issued before a certificate of occupancy requirements of this code that occur post occupancy.

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.

Exception: Where the code official has issued a post occupancy verification permit in accordance with Section 612.3.3, the code official shall issue a Certificate of Occupancy.

612.3.3 Post occupancy verification permit Within 36 months of issuance of a post occupancy verification permit, 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 during which the building complied with Sections 612.1 and 612.2. The documentation shall include occupancy or use type for the occupied period, the beginning and ending dates of the 12-month period, and the total conditioned floor area of the building. The post occupancy verification permit shall remain in effect until the code official has received the documentation verifying compliance with Sections 612.1 and 612.2.

Commenter's Reason: Alterations to section 612.3 address the concerns expressed by a few jurisdictions where temporary certificates of occupancy may not be issued until the project is in full compliance. This public comment would allow jurisdictions the option to issue a Post Occupancy Verification Permit (POVP) to serve as the method for addressing compliance with post-occupancy requirements. Like the Temporary Certificate of Occupancy, the post Occupancy Verification Permit would place the burden on the building owner or representative to satisfy the conditions of the TCO or POVP.

We recognize and want to address the committee's concern over "holding a Certificate of Occupancy hostage for 3 years" this public comment provides solutions for their concerns. As a reminder the owner or owner's representative has chosen this compliance path fully aware that it involves 12 consecutive months of compliance post occupancy. This comment allows for the owner to secure it's financing while still allowing the code official flexibility to enforce post occupancy issues.

The establishment of a POVP is a new concept for everyone involved, and is outside the box of "normal" code enforcement. We have come to a juncture with code compliance where more requirements are being required post occupancy, and we must provide a solution for this. The POVP is the framework for a possible solution for code officials to handle these provisions in a fashion that does not impede development for their jurisdiction.

Public Comment 3:

Charles Foster, representing Edison Electric Institute (cfoster20187@yahoo.com) requests Disapprove.

Commenter's Reason: The IGCC has had difficulty achieving adoption by jurisdictions and, if approved, this proposal will only add to those problems.

By the Committee's own words, this "proposal needs further refinement.." Firstly, it is based on a 14 year old data set. Next, it imposes a continuing obligation on code officials for 3 years after a COO is issued!

The use of source energy brings it own set of problems as does the lack of flexibility in choosing the building type.

There are many problems with this proposal.

Please disapprove it for this code cycle.

Public Comment 4:

Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org) requests Disapprove.

Commenter's Reason: There are many problems with this proposal.

-The use of CBECS 2003 data means that the compliance is based on comparing a green building to all buildings built at least 14 years ago. The CBECS data set contains energy usage for buildings that were built in the early 1900's through the year 2003. The average / median age of a building in the CBECS data set is about 40-45 years old. It is not clear if the values in the table are using numbers for buildings built between 2000 and 2003, or for all buildings in the database.

-The use of source energy will lead to game playing and possible fuel switching, as different types of fuel have different source energy estimates associated with them. Also, it is not clear if the "source" estimates in the table are based on recent source estimates or for source estimates for some or all of the years between 1903 and 2003. In addition, building owners only receive site energy information on their energy bills, and the use of source estimates produced in different years leads to variable outputs.

-Proposed Equation 6-4 mixes on-site renewable energy production with energy end-use intensity. Producing energy on-site does not make a building more efficient (in nearly all cases), and distorts any comparisons with buildings that do not have renewable energy production facilities on-site. This equation allows less efficient buildings with on-site production to be "compliant" with this option, as long as the EUIa value is less than shown in the table.

-The table is incomplete. The following facility types are not shown in the table, and could not use this option: Retail stores, Restaurants (fast food or full service), Religious Worship, Theaters, High Schools, Colleges, Hotels, Motels, and Data Centers. Therefore, it is not a full compliance option for many types of commercial buildings.

In addition, the committee provided several reasons why this proposal should not be approved:

"The proposal needs further refinement. At this time, some committee members felt that the best solution may be to place this in the code as a new apprendix. There was some discomfort with using a model set in 2000 data, can something more recent be employed. The analysis period of 12 months can be cherry picked out the 36 month period. There is concern a design professional will be held responsible for non-compliance where the designer has not control over what the building owner does in the building for those 36 months. There also seems no control of how tenant spaces are filled out; and if those are or are not within the control of the code official. What is the result of non-compliance? There is discomfort with holding a Certificate of Occupancy hostage for 3 years. Finally there remains concern of trying to impose a 36monthobservation period on the local code officials." (emphasis added)

GEW147-14

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Given that this code encourages the use of nonpotable water sources, providing for safe water consumption needs to be a part of the scope of the IgCC.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

David Collins, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com) requests Approve as Submitted.

Commenter's Reason: The AIA supports the approval of GEW148 as originally submitted. This proposal deletes the requirement for "safe water consumption" since it is not possible to ensure this given the myriad scenarios and occupant behavior that could occur after the water is supplied. Section 102 already states that, as an overlay code, the IgCC and its provisions shall not be deemed to nullify any provision of law that prohibits the provision of unsafe water. The intent of this section of the IgCC is to address water resource quality and conservation. Any different intent for this clause would call for a separate, appropriate revision.

We urge the membership to vote to approve this change as submitted..

GEW148-14

GEW149-14
702.1

Proposed Change as Submitted

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. 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.
5. 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.

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed changes are safety related items that are better suited to be proposed to the IPC.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

David Collins, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com) requests Approve as Submitted.

Commenter's Reason: The AIA supports GEW149 as originally submitted. 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. The original proponent of GEW149, Karen Hobbs representing the Natural Resources Defense Council, cited in her reason statement several studies testing combinations of valves and shower heads to determine whether pressure-compensating valves and thermostatic valves rated for 2.5 gpm would perform adequately at lower flow rates. The results indicated that a significant share of shower valves rated for 2.5 gpm failed to provide the scald protection specified when tested at lower flow rates.

To help ensure that new buildings built to the IgCC can safely accommodate showerheads with this flow rate, GEW149 modifies Section 702.1 to require pressure balance tempering valve on showers to operate at the reduced flow rates of the 2.0 gpm maximum allowed under the IgCC. It includes a marking requirement that is necessary to facilitate inspection and compliance and will provide a point of reference for building occupants to consider when changing showerheads in the future.

We ask the membership to approve this change as submitted.

Public Comment 2:

Karen Hobbs, representing Natural Resources Defense Council (khobbs@nrdc.org) requests Approve as Submitted.

Modify the proposal 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. 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~~ 2.0 gpm ± 0.1 qpm (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.
5. 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

Commenter's Reason: Current language in the code is inadequate to ensure that the health and safety protection provided by a shower mixing valve is not diminished by mismatching the rated flow of the valve with the flow rate of the showerhead during installation. This public comment modifies the original proposal by changing the flow rate to 2.0 gpm, matching the current IgCC requirement, and ensuring that the protective components of the valve will not be compromised by the flow rate required by the IgCC. The marking requirement is critical to enable the code official to do his or her job efficiently.

This public comment addresses the Committee's reason for disapproval, which was, "The proposed changes are safety related items that are better suited to be proposed to the IPC." We agree that the IPC should also include provisions to provide thermal protection to consumers. However, the IgCC is described as follows on its website: "...the first model code to include sustainability measures for the entire construction project and its site — from design through construction, certificate of occupancy and beyond. The new code is expected to make buildings more efficient, reduce waste, and have a positive impact on health, safety and community welfare." As such, it would seem that the IgCC should address health and safety issues that arise when market changes -- spurred, in part, by the IgCC itself -- move towards greater efficiency faster than the accompanying standards can move. As noted in our original reason statement, showerheads with maximum flow rates of 2.0 gpm and below are widely available on the market today and simple replacement of a showerhead is typically not subject to code. The current U.S. EPA WaterSense specification for showerheads has a maximum flow rate of 2.0 gpm, and more than 800 WaterSense showerheads (from 45 manufacturers) are already available with flow rates between 2.0 and 1.5 gpm. Given the findings of the studies cited in our original reason statement and current manufacturing trends, matching of showerheads to shower control valves is more essential to user health and safety than was the case previously.

Two additional points:

1. The 2012 Uniform Plumbing Code, Section 408.3, contains similar provisions as to 'matching' valve and showerhead flow rates as follows: "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 of the installed showerhead." The IgCC should be no less protective of public health than the UPC.
2. The two relevant product standards (ASSE 1016-2011/ASME A112.1016-2011/CSA B125.16-11 for shower control valves and ASME A112.18.1-2011/CSA B125.1-11 for showerheads) both provide for marking of flow rates on their respective packaging. Showerheads are required to be marked with their flow rate; however, the 1016 standard does not require shower control valves to be marked with the minimum rated flow. Both standards also recommend on their packaging that showerhead and shower control valve be matched as to flow rate.

GEW149-14

GEW150-14
702.1, Table 702.1, 702.2

Proposed Change as Submitted

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~~ 1.75 gpm and WaterSense labeled
Lavatory faucet ~~and bar sink —~~ private	~~1.5~~ 1.0 gpm
Lavatory faucet—public (metered)	0.25 gpc[b]
Lavatory faucet—public (nonmetered)	0.5 gpm
Kitchen faucet and bar sink — private	~~2.2~~ 2.0 gpm
~~Kitchen and bar sink faucets in other than dwelling units and guestrooms~~	~~2.2 gpm~~
Urinal	~~0.5~~ 0.125 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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The reduction of shower head flow will be too much of a sacrifice for users. The current designs of 1.75 gpm showerheads do not offer a reasonable level of comfort for most users.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Kathleen Petrie, City of Seattle, Department of Planning and Development, representing Regional Code Collaboration (kathleen.petrie@seattle.gov); Maureen Traxler, Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov) requests Approve as Modified by this Public Comment.

Modify the proposal 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 in2 (1.7 m2)~~, 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 in2 (1.7 m2), the combined flow rate from simultaneously operating shower water outlets shall not exceed 2.0 gpm (7.6 L/min) for each additional 2600 in2 (1.7 m2) 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 in2 (1.01 m2) 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 in2 (1.7 m2) 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]	~~1.75~~ 2.0 gpm and WaterSense labeled
Lavatory faucet—private	1.0 gpm
Lavatory faucet—public (metered)	0.25 gpc[b]
Lavatory faucet—public (nonmetered)	0.5 gpm
Bar Sink Faucet—private	1.0 gpm
Kitchen faucet ~~and bar sink—private~~	2.0 gpm
Kitchen and bar sink faucets in other than dwelling units and guestrooms	2.2 gpm
Urinal	0.125 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	1.28 gpm and Watersense labeled
Drinking fountains (manual)	0.7 gpm
Drinking fountains (metered)	0.25 gpc[b]

Commenter's Reason: The following changes have been made to Table 702.1:

- The shower head flow requirement has been increased from 1.75gpm back to the original 2.0gpm based on feedback from the IGCC Hearing Committee who stated that the current 1.75 gpm showerheads do not offer a reasonable level of comfort for most users.
- The reference to kitchen and bar sink faucets in other than dwelling units and guestrooms has been returned to the original IGCC 2012 language based on feedback from the IGCC Hearing Committee.

GEW150-14

GEW151-14
Table 702.1

Proposed Change as Submitted

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 at 60 psi
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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The Committee was opposed to removal of Chapter 6 regulating energy conservation from the IgCC. Even if jurisdictions choose to not adopt one chapter or another, the IgCC needs to contain the full complement of topics. If the code doesn't contain a chapter on energy conservation, there is no chapter available for adopting jurisdictions to consider. The general topic areas regulated in the IgCC need to remain consistent with the ICC 700

Assembly Motion: **Approved as Submitted**
Online Vote Results: **Failed** - Support: 50% (97) Oppose: 50% (97)
Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Hope Medina, Cherry Hills Village, representing Colorado Chapter of International Code Council (hmedina@coloradocode.net); Craig Conner (craig.conner@mac.com) requests Approve as Modified by this Public Comment; Gary Klein, representing self (gary@aim4sustainability.com)

Modify the proposal 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 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 at 60 psi

FIXTURE OR FIXTURE FITTING TYPE	MAXIMUM FLOW RATE
Kitchen faucet—private	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]

Commenter's Reason: The values and testing standards are what should be placed in the code. EPA's WaterSense is a governmental funded program which is subject to budget cuts or with a change of administration may no longer exist. EPA's WaterSense program values are not set through a consensus process, as this code or standards within the I code family are. We have no control over what direction the EPA's WaterSense program may choose to go, but we do have control over this code with its values.

By requiring these fixtures to be labeled in accordance to WaterSense we may start to eliminate innovation from smaller companies that would not have the financial opportunity to acquire the WaterSense label, but have products that meet or exceed those specific requirements.

Public Comment 2:

Shawn Strausbaugh, Arlington County, VA, representing Arlington County, VA (sstrausbaugh@arlingtonva.us) requests Approve as Modified by this Public Comment.

Modify the proposal 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 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 at 60 psi
Kitchen faucet—private	1.8 gpm at 60 psi [g]
Kitchen and bar sink faucets in other than dwelling units and guestrooms	2.2 gpm at 60 psi[g]
Urinal	0.5 gpf and WaterSense labeled or nonwater urinal

FIXTURE OR FIXTURE FITTING TYPE	MAXIMUM FLOW RATE
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[f]
Drinking fountains (metered)	0.25 gpc[~~bb~~,f]

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~~ Water dispensers 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 2.2 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.

Commenter's Reason: The term bottle filling stations has been struck and replaced with water dispenser which is a defined term in the 2015 IPC. This term includes any plumbing fixture that dispenses potable drinking water into a receptacle such as a cup, glass, or bottle.

As stated in the original reason statement there is no reason to limit the flow rate of such as device as it will not save water just lengthen the time to fill the receptacle

GEW151-14

GEW154-14
202, 702.5 (New)

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Bottle filling stations should not be a mandatory substitution for drinking fountains.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

John Watson, representing Elkay Manufacturing (john.watson@elkay.com) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

702.5 ~~Bottle filling stations~~ Water Dispensers. ~~Bottle filling stations~~ Water dispensers shall be integral to, or used as a substitute for, not less than 50 percent of the required number of drinking fountains.

Commenter's Reason: The discussion at the Committee Hearing was centered more around the language being correct than it was about the concept being accepted; that is, I believe the Committee felt the concept was good but that we needed to get the language correct. Given that, I've modified that language to utilize the term "water dispenser" which is consistent with the definitions used in the 2015 IPC.

The reason for using of water dispensers remains the same as the original proposal - they save water and generate less plastic bottle waste.

Public Comment 2:

John Watson, representing Elkay Manufacturing (john.watson@elkay.com) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 202
DEFINITIONS

~~**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.~~

Commenter's Reason: With the term "water dispenser" written into the 2015 IPC, there is no need to define the term in this IgCC document.

GEW154-14

GEW156-14
702.6.4 (New), 702.6.5 (New)

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Section 702.16 already has limitations for water flow for food waste disposers for commercial food establishments. The proposed language would be inappropriate for residential occupancies that are within the scope of coverage of the IgCC.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Julius Ballanco, JB Engineering, representing InSinkErator (JBENGINEER@aol.com) requests Approve as Modified by this Public Comment.

Modify the proposal 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.~~

702.16 Food waste disposers. The water flow into a commercial food waste disposer in a food establishment shall be controlled by a load-sensing device such that the water flow does not exceed 1 gpm (3.78 Lpm) under no-load operating conditions and 8 gpm (30.2 Lpm) under full-load operating conditions. Such 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**~~ **702.17 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.

Commenter's Reason: The mistake made with the original proposal was following the electronic edition of the 2012 IgCC rather than the printed version. The change has been corrected to address the existing Section 702.16 to include a run-cycle time limiting means. This prevents a food waste disposer from wasting energy by operating for long periods of time. Manufacturers have this type of control available for disposers.

The other two devices used in commercial kitchens, pulpers and mechanical strainers, are not currently regulated by the IgCC. These devices can waste large quantities of water which is not green. Pulpers have been proven to operate efficiently with 2 gpm or less of water. Similarly, mechanical strainers only require 2 gpm. Both devices can be turned on and operated for a long period of time, even when they are not in use. By having a run-cycle time limiting means, energy is saved. This is a necessary green requirement.

GEW156-14

GEW159-14
702.8, 702.8.1, 702.8.2, Table 7022.8.2, 702.8.2.1

Proposed Change as Submitted

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~~

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)~~
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

Public Hearing Results

The following is errata that was posted to the ICC website:

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).

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.

(Errata already incorporated into cdpACCESS.)

Committee Action: **Approved as Submitted**

Committee Reason: The changes in the proposal are necessary to correlate with the language in the 2015 IECC.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Gary Klein, representing self (gsmklein@comcast.net) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

702.8 Efficient heated water supply piping. Heated water supply piping to plumbing fixtures and appliances shall be in accordance with Section ~~702.8.1 or~~ C404.5 of the International Energy Conservation Code except that the maximum allowable piping lengths in the "Other fixtures and appliances" column of Table C404.5.1 of the IECC shall be as indicated in Table 702.8 and the maximum volume indicated in Section ~~702.8.2. The flow rate through 1/4 inch piping~~ C404.5.2 of the IECC for other fixtures and appliances shall ~~not exceed 0.5 gpm~~ be 24 ounces (~~1.9 Lpm~~ 0.72 L). 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).

~~**702.8.1 Maximum allowable pipe length method.** For fixtures other than public lavatory faucets, the maximum allowable piping length from the nearest circulation loop pipe or an electrically heat-traced pipe to the termination of the fixture supply pipe shall be in accordance with the maximum pipe length column 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 circulation loop pipe or an electrically heat-traced pipe shall be 24 ounces (0.7 L).~~

TABLE ~~702.8.2~~ 702.8
PIPE VOLUME AND MAXIMUM PIPING LENGTH

NOMINAL PIPE OR TUBE SIZE (inch)	~~LIQUID OUNCES PER FOOT OF LENGTH~~	MAXIMUM PIPING LENGTH (feet)
¼ ~~a~~	~~0.33~~	16
5/16 ~~a~~	~~0.5~~	16
3/8 ~~a~~	~~0.75~~	16
½	~~1.5~~	16
5/8	~~2~~	12
¾	~~3~~	8
7/8	~~4~~	6
1	~~5~~	5

NOMINAL PIPE OR TUBE SIZE (inch)	~~LIQUID OUNCES PER FOOT OF LENGTH~~	MAXIMUM PIPING LENGTH (feet)
1 ¼	~~8~~	3
1 ½	~~11~~	2
2 or larger	~~18~~	1

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 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. The volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.~~

Commenter's Reason: Availability of the 2015 IECC now allows for a better understanding of what the original proposal was trying to accomplish. Although I am very appreciative of the Committee's understanding and approval of the proposal's original form, some opposing testifiers were confused about the intent. This Public Comment should clear up the confusion and make the IgCC much easier to understand.

Section C404.5 of the 2015 IECC limits the volume of water in heated water piping from the source of the heated water to the end of the plumbing fixture (or appliance) supply pipe.

The volume limitation for piping to "all other fixtures and appliances" is limited (by Section C404.5 of the IECC) so that the user doesn't waste a significant amount of water while waiting for heated water to arrive at the fixture. Any inefficient heated water piping arrangements have significant local (and regional) energy use implications as well as water waste implications.

The purpose of revising Section 702.8 in the IgCC is simply to reduce the volume limitation for heated water piping to "all other fixtures and appliances". The volume limitations in the 2015 IECC for these fixtures are quite liberal and easy to attain with some simple planning. With better planning of the piping arrangement and better choice of pipe sizes, significantly more water volume can be saved from going down the drain before the user starts to use the fixture. Consider the age old practice of turning on the hot water in a shower, leaving the room to go make coffee and then coming back to get in the shower because that's how long it takes for the hot water to arrive at the shower head! At 2.0 gallons per minute shower head flow, a five minute delay in use means that 10 gallons of potable water has gone to waste. Per person! Other fixtures have similar water waste problems.

I urge your approval of my refined proposal that already initially received approval from the Committee.

For your reference, here is the language for Section C404.5 of the 2015 IECC:

C404.5 Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section C404.5.1 or Section C404.5.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 L/m). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 L/m). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 L/m).

Maximum allowable pipe length method. The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe shall be in accordance with the following. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.

1. For a public lavatory faucet; use the "Public lavatory faucets" column in Table C404.5.
2. For all other plumbing fixtures and plumbing appliances; use the "Other fixtures and appliances column" in Table C404.5.1.

TABLE C404.5.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

Nominal Pipe Size (inch)	Volume (liquid ounces per foot length)	MaximumPiping Length (feet)	
		PUBLIC LAVATORY FAUCETS	OTHER FIXTURES AND APPLICANCES
1/4	0.33	6	50
5/16	0.5	4	50
3/8	0.75	3	50
1/2	1.5	2	43
5/8	2	1	32
3/4	3	0.5	21
7/8	4	0.5	16
1	5	0.5	13

1 ¼	8	0.5	8
1 ½	11	0.5	6
2 or larger	18	0.5	4

For SI: 1 Gallon = 128 ounces. >For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

C404.5.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section C404.5.2.1. Water heaters, circulating water systems and heat-trace temperature maintenance systems shall be considered sources of heated water. The volume from the nearest source of heated water to the termination of the fixture supply pipe shall be as follows:

1. For a public lavatory faucet: no more than 2 ounces (0.06 L).
2. For other plumbing fixtures or plumbing appliances; no more than 0.5 gallon (1.89 L)

C404.5.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table C404.5.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Public Comment 2:

Caija Owens, representing National Association of Home Builders (cowens@nahb.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

702.8 ~~Efficient heated~~ 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).

702.8.1 Maximum allowable pipe length method. For fixtures other than public lavatory faucets, the maximum allowable piping length from the outlet of heated water source, nearest circulation loop pipe or an electrically heat-traced pipe to the termination of the fixture supply pipe shall be in accordance with the maximum pipe length column 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 outlet of the heated water source, nearest 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

NOMINAL PIPE OR TUBE SIZE (inch)	VOLUME (liquid ounces per foot of length)	MAXIMUM PIPING LENGTH (feet)
1/4[a]	0.33	16
5/16[a]	0.5	16
3/8[a]	0.75	16

~~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.~~

(Portions of the table not shown remain unchanged)

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 outlet of the heated water source, the circulation loop pipe or an electrically heat-traced pipe and the termination of the fixture supply pipe. The volume of the piping shall be determined from the volume ~~liquid ounces per foot~~ column of Table 702.8.2 or the actual volume derived from internal dimensions of the piping. 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. The volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Commenter's Reason:

702.8

The section should be titled "Heated Water Supply Piping" as using the word "Efficient" in the title isn't good code language.

702.8.2.1

In order to support this proposal a "fix" has been provided that would allow for a more accurate selection of piping. It has been determined that CPVC and PEX volume per unit length are as much as 30% less volume per unit length then volumes in table 702.8.2 based on the calculated comparison to Copper and PVC. For example, for 3/4 inch piping the proponent states that 8 feet is the appropriate length, however when using PEX, accurate length is 10.2 ft (24 oz as per table 702.8.2 divided by 2.35 PEX liquid oz per foot length). Another example is for 1 inch piping the proponent states that 5 feet is the appropriate length, however when using PEX, accurate length is 6.4 ft (25 oz as per table 702.8.2 divided by 3.91 PEX liquid oz per foot length). Piping lengths should be neutral and should not place users of different materials at a disadvantage. In order to accurately determine interior pipe volume users should be permitted to use manufacturer's dimensions.

The original proposal also does not address systems that should not need a circulation loop. As written it appears that all systems, regardless of length, require a circulation loop. More compact systems that meet the maximum pipe length from the hot water source to the fixture supply pipe should also be acceptable.

Footnote “a” is being removed because it is redundant and is already mentioned in 702.8.

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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

Proposed Change as Submitted

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.

W160-14: 702.8.1-CUDAHY839

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The addition of more tables for piping lengths and volume would be in conflict with the 2015 IECC.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Michael Cudahy, representing Plastic Pipe and Fittings Association (mikec@cmservices.com) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

702.8 Efficient ~~hot and tempered~~ heated water ~~distribution~~ supply piping. ~~Hot and tempered~~ Heated water ~~distribution shall comply with either the maximum pipe length or maximum pipe volume limits in this section. Hot and tempered water~~ supply piping 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~~ The flow rate through 1/4 inch piping shall ~~include tubing~~ not exceed 0.5 gpm (1.9 Lpm). ~~For purposes of this section, the source of hot or tempered water~~ The flow rate through 5/16 inch piping shall ~~be considered to be a water heater, boiler, circulation loop~~ not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping ~~or electrically heat- traced piping.~~shall not exceed 1.5 gpm (5.7 Lpm).

702.8.1 Maximum allowable pipe length method. ~~The~~ For fixtures other than public lavatory faucets, the maximum allowable ~~pipe~~ piping length from the ~~source of hot~~ nearest circulation loop pipe or ~~tempered water~~ an electrically heat-traced pipe to the termination of the fixture supply pipe shall be in accordance with the maximum pipe length columns in Tables ~~702.8.2~~ 702.8.1(2) through ~~702.8.2~~ 702.8.1(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~~ 702.8.1(2) through ~~702.8.2~~ 702.8.1(10), Table ~~702.8.2~~ 702.8.1(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 Maximum allowable pipe volume method. The ~~maximum~~ water volume ~~of hot or tempered water~~ in the piping ~~to public lavatory faucets, metering or nonmetering,~~ shall be ~~2 ounces (0.06 L)~~ calculated in accordance with Section 702.8.2.1. For fixtures other than public lavatory faucets, the maximum volume ~~shall be 64 ounces (1.89 L) for hot or tempered~~ of heated water ~~from a water heater or boiler; and 24 ounces (0.7 L) for hot or tempered water~~ in the piping from ~~a~~ the nearest 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~~ 24 ounces (0.7L).

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~~ circulation loop pipe or an electrically heat-traced pipe and the termination of the fixture supply pipe. The volume shall be determined from the liquid ounces per foot of length column of the appropriate Tables ~~702.8.2 (2)~~ 702.8.1 (2) through ~~702.8.2~~ 702.8.1(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~~ 702.8.1(2) through ~~702.8.2~~ 702.8.1(10), Table ~~702.8.2~~ 702.8.1 (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~~ The volume shall include the portion of the fitting on the ~~source~~ branch pipe that supplies water to the fixture.

TABLE ~~702.8.2~~ 702.8.1(1)
VOLUME AND MAXIMUM LENGTH OF PIPE OR TUBE OF A TYPE UNKNOWN OR NOT COVERED~~[b]~~[a]

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM PIPE OR TUBE 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~~
1/2	1.5	~~43~~	16	~~2~~

NOMINAL PIPE OR TUBE SIZE (inch)	LIQUID OUNCES PER FOOT OF LENGTH	MAXIMUM PIPE OR TUBE 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)~~
5/8	2	~~32~~	12	~~1~~
3/4	3	~~21~~	8	~~0.5~~
7/8	4	~~16~~	6	~~0.5~~
1	5	~~13~~	5	~~0.5~~
1 1/4	8	~~8~~	3	~~0.5~~
1 1/2	11	~~6~~	2	~~0.5~~
2 or larger	18	~~4~~	1	~~0.5~~

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~~ a. Not covered means pipe or tube types not covered by Tables ~~702.8.2~~ 702.8.1(2) through ~~702.8.2~~ 702.8.1(10).

TABLE ~~702.8.2(2)~~ 702.8.1(2)
VOLUME AND MAXIMUM LENGTH OF TYPE K COPPER TUBING

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube Length (feet)		
		~~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~~ 28.6	~~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)~~ 702.8.1(3)
VOLUME AND MAXIMUM LENGTH OF TYPE L COPPER TUBING

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube 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 non-metering) (feet)~~
3/8[a]	0.97	~~38.7~~	~~12.4~~ 24.7	~~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)~~ 702.8.1(4)
VOLUME AND MAXIMUM LENGTH OF TYPE M COPPER TUBING

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube 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 non-metering) (feet)~~
3/8[a]	1.06	~~35.4~~	~~11.3~~ 22.6	~~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)~~ 702.8.1(5)

VOLUME AND MAXIMUM LENGTH OF CPVC TUBING, CTS[a]

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube 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 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)~~ 702.8.1(6)

VOLUME AND MAXIMUM LENGTH OF CPVC PIPE, SCHEDULE 40

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Pipe 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 non-metering) (feet)~~
3/8[a]	1.17	~~32.1~~	~~10.3~~ 20.5	~~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)~~ 702.8.1(7)

VOLUME AND MAXIMUM LENGTH OF CPVC PIPE, SCHEDULE 80

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Pipe 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 non-metering) (feet)~~
3/8[a]	0.86	~~43.6~~	~~14.0~~ 27.4	~~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) 702.8.1(8)

VOLUME AND MAXIMUM LENGTH OF PE-AL-PE TUBING

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube 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 non-metering) (feet)~~
3/8[a]	0.63	~~59.5~~	~~19.0~~ 38.1	~~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)~~ 702.8.1(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 (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 non-metering) (feet)~~
3/8[a]	0.6	~~58.6~~	~~18.8~~ 37.5	~~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)~~ 702.8.1(10)
VOLUME AND MAXIMUM LENGTH OF PEX-AL-PEX TUBING

Nominal Tube Size (inch)	Liquid Ounces per Foot of Length	Maximum Tube 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 non-metering) (feet)~~
3/8[a]	0.63	~~59.5~~	~~19.0~~ 38.1	~~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 min
a. The flow rate for 3/8 inch size is limited to 1.5 gpm.

Commenter's Reason: This comment modifies the original proposal to fit the format and content of proposal GEW 159-14, and matches the tables to that format, and corrects a spreadsheet error for 3/8" volumes. The 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. One could imagine the challenges that could occur if a building was designed in a way that did not deliver the hot water as calculated.

GEW160-14

GEW161-14
702.10, Chapter 12

Proposed Change as Submitted

Proponent: Jeffrey Waterman, representing Liberty Pumps, Inc. (jwater@libertypumps.com)

Revise as follows:

702.10 Water-powered sump 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)~~1.4 gallons (5.3 L) of water to a height of ~~8 feet (2438 mm)~~10 feet (3048 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). Pumps shall be clearly marked as to the gallons (liters) of water pumped per gallon (liters) of potable water consumed. Water-powered sump pumps shall comply with IAPMO PS 119.

Add new standard as follows:

IAPMO Group
4755 E. Philadelphia
Ontario, CA 91761

IAPMO PS 119-2012ae1 Water-Powered Sump Pumps

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 truthfullIt 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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The IAPMO standard is not a consensus document. Currently, there are no known water-powered sump pumps that can meet the criteria of the proposed standard.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Jeffrey Waterman, representing Liberty Pumps, Inc. requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

702.10 Water-powered sump 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 1.4 gallons (5.3 L) of water to a height of 10 feet (3048 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). Pumps shall be clearly marked as to the gallons (liters) of water pumped per gallon (liters) of potable water consumed. ~~Water-powered sump pumps shall comply with IAPMO PS 119~~.

Modify standard as follows:

~~IAPMO Group~~
~~4755 E. Philadelphia~~
~~Ontario, CA 91761~~

~~IAPMO PS 119-2012ae1 Water-Powered Sump Pumps~~

Commenter's Reason: I propose that GEW 161-14 be approved, but with the last sentence referencing IAPMO PS 119 removed. Also remove the request that IAPMO PS 119-2012ae1 be added to the IGCC as a reference standard.

The Committee action to disapprove GEW 161-14 was correct as per their given reason that the proposed modification to the IGCC Section 702.10 included reference to the non-consensus document IAPMO PS 119. The as-documented Committee Reason also however incorrectly states that no water-powered pumps can meet the criteria of the proposed standard. What actually was said at the hearing, and what the proponent's primary point in requesting the change to the IGCC, was that no water-powered pumps meet the requirements of the IGCC 2012, and this change was proposed to correct this.

The facts stated in the proponent's original reasons for requesting the rest of the change remain. The performance criteria used for IGCC 2012, Section 702.10, was developed prior to having accurate performance data available. IAPMO's Green Plumbing and Mechanical Code Supplement (GPMCS), was re-written for the 2012 edition subsequent to the analysis of the IAPMO listed water powered pumps on the market. The changes to the 2012 GPMCS would allow use of WPP's so long as they were a backup to primary electric pumps, they were equipped with a usage alarm, and they had the performance values as proposed in GEW 161-14.

For the sake of harmonization between the respective Green Codes, 702.10 should be changed as per GEW 161-14, but with the elimination of the last sentence that references IAPMO PS119. Showing the other changes from the initial proposal, the modification would read as follows:

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)~~ 1.4 gallons (5.3 L) of water to a height of ~~8 feet (2438 mm)~~10 feet (3048 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). Pumps shall be clearly marked as to the gallons (liters) of water pumped per gallon (liters) of potable water consumed.

GEW161-14

GEW162-14
702.18, 702.18.1

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: There is too much water wasted by autoclaves and sterilizers to justify completely removing the current code requirements. Perhaps an exception for health care facilities could be brought forth in a public comment.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

John Williams, representing Adhoc Health Care Committee (AHC@iccsafe.org) requests Approve as Modified by this Public Comment.

Replace proposal as follows:

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.

Exception: Autoclaves and sterilizers in Group I-2, Condition 2 facilities and ambulatory care facilities are not required to comply with this section.

Commenter's Reason: This proposal responds to the committee reason. The committee felt that autoclaves and sterilizers should not be removed totally from the requirements, but that an exception specific to health care facilities to address the health concerns brought up by the Adhoc Health Care committee. These concerns are:

Availability of medical grade sterilizers that are designed for use with non-potable water.

Sterilizers are regulated by FDA and the FDA has not approved any medical grade sterilizer that is designed to use non-potable water. The development/clearance process for a medical grade sterilizer to use non-potable water will take a minimum of 3-5 years if the FDA is willing to approve such a design. This approval may not be obtainable due to the fact that non-potable water could be an infection risk when aerosols are creating during discharge process. Since there is not an available solution on the market to currently meet this code of no-potable water use this exception is necessary.

Sterilizers are used in two primary locations:

DEDICATED STERILE PROCESSING DEPARTMENT (SPD) - large volume batch processing of ALL instrumentation in for surgical use. These sterilizer units use vacuum pumps and not venturi systems.

OPERATING ROOM - Secondary location is within the OR Suite, a sensitive clinical environment where sterilizer cycles are used for emergency situations only (rarely used/low volume). Sterilizers are in rooms connected/immediately adjacent to surgeons operating on patients, where mechanical noise of pumps, compressors, or other intermittent loud sounds should be avoided. Healthcare governing agencies such as AAMI and AORN recommend the elimination of sterilizer cycle use in the OR where possible.

ISSUES WITH CURRENT CODE REQUIREMENTS:

Surgical Disruption - Surgical sterilizers continue to use venturi systems to prevent pump cycling noise immediately adjacent to an Operating Room, where procedures such as Neuro Surgery, Opthamology and other sensitive procedures are done. Clinicians do not want the noise to distract surgery.

Limited Options for Customers - Only one manufacturer currently offers a non-venturi system for the OR, which would limit options for hospitals.

Public Comment 2:

John Williams, representing Adhoc Health Care Committee (AHC@iccsafe.org) requests Approve as Modified by this Public Comment.

Replace proposal as follows:

~~**702.18.1 Vacuum autoclaves and sterilizers.** Vacuum sterilizers shall be prohibited from utilizing venturi-type vacuum mechanisms using water.~~

Commenter's 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. Proprietary requirements are a violation of CP28 Section 3.6.

Additionally, sterilizers are used in two primary locations:

DEDICATED STERILE PROCESSING DEPARTMENT (SPD) - large volume batch processing of ALL instrumentation in for surgical use. These sterilizer units use vacuum pumps and not venturi systems

OPERATING ROOM - Secondary location is within the OR Suite, a sensitive clinical environment where sterilizer cycles are used for emergency situations only (rarely used/low volume). Sterilizers are in rooms connected/immediately adjacent to surgeons operating on patients, where mechanical noise of pumps, compressors, or other intermittent loud sounds should be avoided. Healthcare governing agencies such as AAMI and AORN recommend the elimination of sterilizer cycle use in the OR where possible.

ISSUES WITH CURRENT CODE REQUIREMENT:

Surgical Disruption - Surgical sterilizers continue to use venturi systems to prevent pump cycling noise immediately adjacent to an Operating Room, where procedures such as Neuro Surgery, Opthamology and other sensitive procedures are done. Clinicians do not want the noise to distract surgery.

Limited Options for Customers - Only one manufacturer currently offers a non-venturi system for the OR, which would limit options for hospitals.

GEW162-14

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Although the proposed requirements may be a best practices approach, other items such as phosphates and suspended solids are not addressed. The Committee recommends that a public comment be submitted to address those items and possibly other water quality issues that are related to cooling towers.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Daryn Cline, EVAPCO,Inc., representing EVAPCO (dcline@evapco.com) requests Approve as Modified by this Public Comment.

Modify the proposal 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. Phosphate in ppm

~~10.~~ 11. Iron in ppm

12. Total Suspended Solids in ppm

The plan shall:

1. Address the control of microbiological activity, scale and corrosion.
2. ~~specify~~ Specify the equipment and products used for treating the water of an open recirculating loop.
3. ~~maximize~~ Maximize cycles of concentration as required by Section 703.7.7.
4. ~~address~~ Address equipment and product compatibility with equipment materials of construction and system metallurgy.
5. ~~include~~ Include a schedule for the required inspection, maintenance and monitoring of the system and shall include a corrective actions log.
6. ~~include~~ Include owner's training and commissioning documents.
7. ~~identify~~ Identify the persons responsible for providing and maintaining the system water treatment.

Commenter's Reason: It is reasonable to include phosphates in the analysis as well as total suspended solids. TSS is valuable when considering the use of alternate water sources.

I have revised the table to include these parameters.

GEW173-14

GEW174-14
703.7.7, Table 703.7.7

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Cycles of concentration depend greatly on the source water used. Holding time index should be considered. LSI is not a good predictor of corrosion issues. The Committee suggests that a public comment be made to make the proposed requirements more technical.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment:

Daryn Cline, EVAPCO,Inc., representing EVAPCO (dcline@evapco.com) requests Approve as Submitted.

Commenter's Reason: We agree on the committee's comment regarding cycle levels and water source. EVAPCO's submitted table of parameters provides a better technical solution to the existing language which was based on water hardness only.

The Table of Parameters, with not to exceed values, provides more flexibility with varying water chemistries and closely aligns with the current LEEDv4 WE Cooling Tower Water Use credit, albeit our parameters are slightly more conservative. But overall, it seeks to maximize water savings and cycles of concentration to levels that are acceptable and maintain equipment longevity.

Regarding the consideration of a holding time index, it would be hard to quantify in a table, considering varying system volume, cycles of concentration and treatment program required.

Holding time is defined as the time required for 50% of the chemical treatment to remain in the system, and calculated as .7 x Volume of system (gallons)/Blowdown rate (gpm)=.7xV/B and should be considered when designing a water treatment program.

Since Section 703.7.7 Discharge Water is focused on water efficiency or conservation, I would not add Holding Time Index in this section, but maybe add to Section 703.7.6.1. Water Treatment Plan.

Agree, LSI is a predictor of scale formation, not corrosion. Corrosion coupons could be considered and added to the water treatment plan in Section 703.7.6.1.

GEW174-14

GEW176-14
703.10 (New)

Proposed Change as Submitted

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal could have far-reaching effects such as prohibiting certain types of systems. It is unclear what qualifies as the standard reference design.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Steven Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org) requests Approve as Submitted.

Commenter's Reason: The term "Standard Reference Design" is defined in Chapter 2 of the IGCC. Any system that meets the IECC can be used in the Standard Reference Design. This will ensure that HVAC systems, whatever the choice(s), do not use more water in the proposed design.

Public Comment 2:

Charles Foster, representing Edison Electric Institute (cfoster20187@yahoo.com) requests Approve as Modified by this Public Comment.

Modify the proposal 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.~~

Commenter's Reason: This public comment would remove the exception from the proponent's original proposal.

With the exception removed, it simply requires a building's HVAC water consumption in the proposed building to no more than the HVAC water consumption in the reference building.

This is a very rational requirement and mimics the existing requirements for energy -- that energy consumption in the proposed building can not exceed energy consumption in the reference building.

GEW176-14

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

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposed requirements are really important to achieve lower water consumption by occupants in tenant spaces.

Assembly Action: **None**

Individual Consideration Agenda

Public Comment 1:

Karen Hobbs, representing Natural Resources Defense Council (khobbs@nrdc.org) requests Approve as Modified by this Public Comment.

Modify the proposal as follows:

TABLE 705.1.1
METERING REQUIREMENTS

APPLICATION	REQUIREMENTS
~~Non-residential tenant~~ Commercial building spaces	~~Non-residential tenant spaces such as for~~ Medical offices, dental offices, dine-in restaurants, cafeterias and laundries ~~and any other occupancy that is estimated to consumeover 1000 gallons of water per day~~ shall be metered individually.
Residential ~~tenant spaces~~ dwelling units	Residential ~~tenant spaces~~ dwelling units shall be metered individually.

Commenter's Reason: This proposal was approved as submitted. The Committee asked that two changes be made:

1. Remove the existing language on 1000 gallons of water per day; and
2. The Committee also asked that two terms be changed to align with existing IgCC or IECC definitions. As a result, "non residential tenant" has been changed to "commercial building" and "residential tenant spaces" changed to "residential dwelling units." Both "commercial building" and "dwelling unit" are defined in the IECC.

Public Comment 2:

Kirk Nagle, City of Arvada, representing Colorado Chapter ICC (knagle@arvada.org) requests Approve as Modified by this Public Comment.

Modify the proposal 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.

TABLE 705.1.1
METERING REQUIREMENTS

APPLICATION	REQUIREMENTS
Irrigation	~~In ground~~ Irrigation systems for outdoor landscaping shall be metered.
Non-residential tenant spaces	Non-residential tenant spaces ~~such as for medical offices, dental offices, dine in restaurants, cafeterias, laundries and any other occupancy~~ that are estimated to consume over 1000 gallons of water per day shall be metered individually.

(Portions of table not shown remain unchanged.)

Commenter's Reason: The original proposal was approved by the committee but it went backwards in relationship to saving water. In table 705.1.1 restricting monitoring to underground irrigation systems does not make sense because water leaking in any form is

bad, if your goal is to make sure your irrigation system is not wasting water. People that manage building and grounds do not always have the opportunity to check on the irrigation systems visually as they run, especially if they are running at night. Having personnel observe the irrigation system as it runs is not feasible and it could be months before a problem is noticed. Every time the irrigation system is in operation water is being wasted. Monitoring allows for a precise measurement of the water being used the day it happens, so the building and grounds personnel would be able to see that last night the irrigation system used an extra 100 gallons and they need to go find the leak and repair it. If you don't monitor all of the irrigation systems you would have no idea that you have a problem and you could be wasting thousands of gallons of water before the problem will brought to the attention of the building and grounds crew. Wasting water does not just happen because the system is inground all systems can leak and monitoring is the best way to make the repairs before more water is wasted.

The second section of the table was modified to remove a list that does not clarify or enhance the code and in my opinion makes it probable for building officials/sustainability coordinators to over look the other tenant spaces that also need to be monitored. By saying "all tenant spaces that use more than a 1000 gallons per day" is much clearer than having the statement "Non-residential tenant spaces such as medical offices dental offices, dine in restaurants, cafeterias, laundries and any other occupancies that are estimated to use more than 1000 gallons per day shall be metered individually." A laundry list is not effective for code compliance and having the extra language only causes confusion. This will help promote the application and usability of the IGCC and the water savings that we will get when monitoring all tenant spaces if they use more than 1000 gallons a day.

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