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SYNOPSIS

INTERNATIONAL GREEN CONSTRUCTION CODE™

PUBLIC VERSION 2.0, NOVEMBER 2010

ASHRAE/USGBC/IES STANDARD 189.1-2009
STANDARD FOR THE DESIGN OF HIGH-PERFORMANCE GREEN BUILDINGS -
A JURISDICTIONAL COMPLIANCE OPTION OF THE IGCC

THE AMERICAN INSTITUTE OF ARCHITECTS

INTERNATIONAL *green* CONSTRUCTION CODE® (I*g*CC®)

SYNOPSIS

(Based on Public Version 2.0 of the IGCC)

December 15, 2010

IGCC OVERVIEW/BACKGROUND

The International Green Construction Code (IGCC) provides a comprehensive set of requirements intended to reduce the negative impact of buildings on the natural environment. It is a document which can be readily used by manufacturers, design professionals and contractors; but what sets it apart in the world of green building is that it was created with the intent to be administered by code officials and adopted by governmental units at any level on a *mandatory* basis. It is designed to drive green and sustainable building significantly beyond the market segment that has been transformed by *voluntary* rating systems. The IGCC has been developed by the International Code Council (ICC) in association with cooperating sponsors ASTM International (ASTM) and the American Institute of Architects (AIA). Other organizations indicating their support include the U.S. Green Building Council (USGBC), producers of the LEED green building rating systems, and The Green Building Initiative (The GBI), producers of the Green Globes green building rating system.

The IGCC was developed with the intent to be consistent and coordinated with the ICC family of Codes & Standards: the I-Codes. It is applicable to the construction of high performance commercial buildings, structures, and systems, including existing buildings subject to alterations and additions, utilizing both traditional and innovative construction practices. It also applies to residential occupancies other than low-rise residential buildings that fall under the scope of the *International Residential Code* (IRC).

The IGCC also allows jurisdictions to choose ASHRAE Standard 189.1 as an alternative compliance path. ASHRAE Standard 189.1, Standard for High-Performance Green Buildings Except Low-Rise Residential Buildings, is an American National Standards Institute (ANSI) standard developed by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) in association with the Illuminating Engineering Society (IES) and the U.S. Green Building Council (USGBC).

Because it is written in *mandatory* language, the IGCC is poised to produce environmental benefits on a massive scale: a scale impossible to attain with purely *voluntary* green building programs and rating systems. *Voluntary* programs have pioneered the Green movement, and with the foundation they have laid, the IGCC is positioned to achieve significant market transformation in those segments that are not likely to react to voluntary programs.

Although the IGCC is not a rating system, it incorporates an innovative new concept, that of *project electives*, which is designed to encourage and drive the construction of buildings that exceed the already stringent minimum requirements of the code, much like rating systems do. In addition, it contains other innovative features which allow jurisdictions to customize and tailor the code to address environmental concerns of a local nature and to respond to environmentally related political agendas.

Even at their higher performance thresholds, most green and sustainable building rating systems typically offer many choices to the owner and designer, but do not *require* increased performance in those specific areas that the jurisdiction may feel are critical. The IGCC, however, provides jurisdictions with a document that allows them to specify enhanced building performance in many specific critical areas of concern, including energy, water, natural resources and material conservation. Rather than relying on an overall score attained by allowing owners and design professionals to choose from a wide array of choices in all environmental categories with few mandatory requirements, as is typical of most green building rating systems, the IGCC takes the opposite approach: the IGCC is composed primarily of mandatory requirements. However, in a departure from other building codes, the IGCC also contains a number of provisions that the jurisdiction must specifically select before they become enforceable, including specific requirements in each environmental category. This was done because some provisions are simply not appropriate for all jurisdictions. For example, checking the "Yes" box to choose the ASHARE 189.1 optional compliance path not only eliminates most of Chapter 3 through the remainder of the IGCC, ASHRAE 189.1 also contains some very restrictive site requirements which could prohibit all construction in some jurisdictions. For other jurisdictions, however, the choice may be quite reasonable and beneficial. The IGCC also prohibits building in floodplains, which could have similar implications in some jurisdictions. Of course, where the IGCC or the IGCC with the ASHRAE 189.1 option is adopted on a *voluntary* instead of a *mandatory* basis (which is also likely to dampen their overall use and effectiveness), those dire implications are removed, and any adoption process can modify the base documents as the jurisdiction finds appropriate.

In addition to the jurisdictional requirements determined by the jurisdiction in Table 302.1, the IGCC contains a relatively small number of owner/designer choices. The IGCC regulates these owner/designer choices as *project electives*. A minimum number of *project electives*, as determined by the jurisdiction for all projects, must be chosen by the owner or design professional for implementation on each specific project. These choices are to be indicated in Table 303.1, the *Project Electives Checklist*, which is intended to be filled out and included in the construction documents. As a result of these features, the IGCC is able to produce more predictable results which are closely aligned with each jurisdiction's specific environmental goals. Even if a jurisdiction chooses to enforce only the minimum criteria in the IGCC, because the IGCC is intended to be adopted as a mandatory document, it is still poised to significantly reduce the impact of the built environment on the natural environment.

The IGCC:

- Is applicable to new construction, as well as alterations and additions to existing buildings.
- Is written in mandatory language that is coordinated with the family of codes produced by the International Code Council.
- Is intended to be adopted by jurisdictions on a *mandatory* basis.
- Is intended to be administered primarily by building officials.
- *S*ets stringent minimum mandatory requirements and performance thresholds in many specific areas, some of which are determined by the jurisdiction.
- Is intended to be useable by manufacturers, design professionals and contractors.
- Is intended to be adopted by governmental units and administered by building departments.
- Is applicable to all buildings other than low-rise residential buildings which fall under the scope of the IRC.

- Incorporates features which allow jurisdictions to customize requirements to suit local geographical conditions and environmental priorities and agendas.

- Incorporates a relatively small number of "project electives", a minimum number of which must be selected by the owner or design professional and implemented on each project, as a means to:

    - Encourage practices which are difficult to mandate; and

    - Encourage higher performance buildings (buildings with lower environmental impact which exceed the minimum requirements of the IGCC).

- Is *not* a rating system and is *not* intended to provide a single metric indicative of overall building performance.

- In a single code or volume, is applicable to new construction, existing construction, building shells, multiple occupancy classifications and community development, etc.

CONTEXT

The IGCC is founded on principles consistent with those of other codes produced by ICC (I-Codes): to adequately protect public health, safety and welfare; to provide requirements that do not unnecessarily increase construction costs; and to provide requirements that do not restrict the use of new materials, products or methods of construction and do not give preferential treatment to particular types or classes of materials, products or methods of construction, except where environmental impact or sustainability considerations require so.

The IGCC is an overlay code which relies on the foundation provided by other International Codes to provide communities with buildings that are safe and sustainable. Rather than the past approach of creating buildings which are capable of resisting environmental forces, consideration is given in the IGCC to the impacts of building construction on the natural environment and how negative impacts can be mitigated. The IGCC, much like the International Energy Conservation Code (IECC), is a code which regulates buildings primarily from a *public welfare* perspective. The IGCC is uniquely formatted not only to require the implementation of environmentally related best practices, but to encourage practices which are difficult to mandate, as well as to offer customization to jurisdictions, all in the name of reducing the negative impact of the built environment on the natural environment.

The benefits of the IGCC are not only environmental. Because the IGCC approaches conservation from many perspectives, and conservation inherently means *less* materials, water and energy, etc.., in some scenarios, especially when considered over the useful life of buildings and structures which conform to the IGCC, owners are likely to realize cost savings. There will also be less strain placed on infrastructure such as roadways, public sewer and water, electric and gas utilities, etc., and, therefore, jurisdictions and utility companies may benefit financially, which means additional savings are likely to be passed on to consumers. In certain cases, even higher initial costs will be more than offset: where projects are financed, reduced monthly utility charges may more than offset the increased monthly finance costs attributed to green and sustainable practices.

Subsequent development of the IGCC is tentatively scheduled as follows:

- Public Version 2.0 posted for code change submittals November 3, 2010, with comments due by January 3, 2011.

- IGCC Code Development Hearings to be held May 16 through 22, 2011 in Dallas, Texas.

- Public Comment deadline: August 12, 2011
- IGCC Final Action Hearings to be held November 3 through 6, 2011 in Phoenix, Arizona, in conjunction with the ICC Annual Conference. The Final Action Hearing vote is restricted to ICC governmental members as they will be charged with enforcing the code.
- The First Edition of the IGCC is scheduled to be published in March 2012.
- Once the 2012 edition of the IGCC is published, it will be updated every three years along with the other I-Codes through ICC's Code Development Process.

IGCC FORMAT/CONTENT

Building codes and standards are often thought of as establishing minimum requirements for construction practice. The IGCC, however, uses a new twist on that concept, that of *project electives*, to achieve the intent of various provisions while preserving flexibility and choice. Without flexibility and choice, mandatory enforcement of some of the code's provisions could become unreasonable or infeasible, effectively diminishing the applicability of the code, as well as its potential adoption, use and enforcement. For example, given current technologies, *mandating* that all buildings be *net-zero energy* designs (designed and constructed so that they generate at least as much energy as they consume) would be considered quite onerous by many. However, *encouraging* the *voluntary* implementation of practices which move toward *net-zero energy* buildings is a reasonable approach, and is the one incorporated in the IGCC. The IGCC uses the concept of *project electives* to *encourage*, but not require, the consideration and implementation of various environmentally beneficial practices which may not be suitable for every project and, therefore, may not be suitable as strictly mandatory requirements. The IGCC does not require that all *project electives* be complied with. Rather, it requires that a minimum number of *project electives* be complied with on each project, allowing the owner or design professional to select which specific ones are to be implemented on each project. *Project electives* enable the IGCC to drive the construction of buildings which may far exceed its minimum requirements. Such buildings will come much closer to fulfilling the ideal goals of sustainability. The IGCC uses the concepts of zEPI (zero Energy Performance Index), EUI (Energy Use Intensity) and outcome based compliance, in combination with *project electives*, to encourage the construction of *net-zero energy* buildings and to realize buildings which come much closer to meeting their intended energy goals. (See the Chapter 6 overview for more on zEPI, EUI and outcome based compliance.)

The IGCC contains:

- Requirements which are chosen by the jurisdiction and become applicable to all buildings constructed in the jurisdiction (Chapter 3 - Table 302.1)
- Project specific electives (*project electives*) which are chosen by the owner/designer (Chapter 3 - Table 303.1)
- Requirements for Existing Buildings (Chapter 10)
- Chapters which address fundamental aspects of green and sustainable building, including:
    - Site development and land use(Chapter 4)
    - Material resource conservation and efficiency (Chapter 5)

- Energy conservation, efficiency and earth atmospheric quality (Chapter 6)
- Water resource conservation and efficiency (Chapter 7)
- Indoor environmental quality (Chapter 8)
- Building operation, maintenance and owner education (Chapter 9)

IGCC CHAPTER 1 OVERVIEW: ADMINISTRATION

Section 101.2 - Scope:

The IGCC is applicable to the following aspects of buildings and building sites:

- Design and construction
- Additions , alterations and demolition
- Change of use or occupancy
- Equipment
- Location
- Maintenance

The IGCC is applicable to all occupancies other than low-rise residential occupancies that fall under the scope of the International Residential Code (i.e., detached one- and two-family dwellings and townhouses that are 3 stories or less in height and are provided with separate means of egress.)

The IGCC is *not* applicable to equipment or systems used primarily for industrial or manufacturing processes, except as provided (some energy provisions address limited aspects of process energy).

Section 101.3 – Intent:

- To safeguard the environment, public health, safety and general welfare through the establishment of requirements related to sustainability
- To reduce the negative potential impacts and increase the positive potential impacts of the built environment on the natural environment and building occupants, by means of minimum requirements related to:
    - Conservation of natural resources, materials and energy;
    - The employment of renewable energy technologies;
    - Indoor environmental quality;
    - Air quality; and
    - Building operations, building maintenance and owner responsibility".

Section 102.1 – General:

The IGCC is *not* to be used as a stand alone construction regulation document or to abridge or circumvent safety, health or environmental requirements under other codes, such as the *International Building Code* and the *International Fire Code*.

Section 102.4 - Referenced codes and standards

The codes and standards referenced in Section 102.4 and elsewhere in the code are considered as part of the requirements of the code to the extent prescribed in each reference. The following codes and standards are referenced in Sections 102.4.1 through 102.4.12:

- International Building Code
- International Fuel Gas Code
- International Mechanical Code
- International Plumbing Code
- International Property Maintenance Code
- International Fire Code
- International Energy Conservation Code
- International Wildland-Urban Interface Code
- International Code Council Performance Code
- International Existing Buildings Code
- International Zoning Code

Numerous standards are referenced throughout the code and a comprehensive list is contained in Chapter 12. The following is a small sampling of the ASTM standards referenced in the IGCC, for which the code will reference the latest available versions:

- *D3960 - Standard Practice of Determining Volatile Organic Compound (VOC) Content of Paints & Related Coatings*
- *D5093 - Standard Test Method for Field Measurement of Infiltration Rate Using Double-Ring Infiltrometer With Sealed-Inner Ring*
- *E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal And Low-Sloped Opaque Surfaces*
- *E2398 - Standard Practice for Water Capture and Media Retention of Geocomposite Drain Layers For Green Roof Systems*

IGCC CHAPTER 2 OVERVIEW: DEFINITIONS

Although the IGCC shares some definitions which are common to other International codes, most are unique to the IGCC. The following is a small sampling of those definitions:

BIO-BASED MATERIAL. A commercial or industrial material or product, other than food or feed, that is composed of, or derived from, in whole or in significant part, biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials.

COMMISSIONING. A process that verifies and documents that the selected *building* and site systems have been designed, installed, and function according to the owner's project requirements and *construction documents*, and to minimum code requirements.

CONSERVATION AREA. Land designated by the jurisdiction or by state or federal government, as a result of a community planning process, as appropriate for conservation from development because of the land possessing natural values important to the community including, but not limited to wildlife habitat, forest or other significant vegetation, steep slopes, ground water recharge area, riparian corridor or wetland.

DAYLIGHT SATURATION. The percentage of daytime hours throughout the year when not less than 28 foot-candles (300 lux) of natural light is provided at a height of 30 inches (762 mm) above the floor.

DEMAND RESPONSE, AUTOMATED (AUTO-DR). Fully Automated Demand Response initiated by a signal from a utility or other appropriate entity, providing fully-automated connectivity to customer energy end-use control strategies.

LIFE CYCLE ASSESSMENT (LCA). A technique to evaluate the relevant energy and material consumed and environmental emissions associated with the entire life of a *building*, product, process, material, component, assembly, activity or service.

LOW EMISSION, HYBRID AND ELECTRIC VEHICLE. Vehicles that achieve EPA Tier 2, California LEV-II, or a minimum of EPA LEV standards, whether by means of hybrid, alternative fuel, or electric power.

MUNICIPAL RECLAIMED WATER. Wastewater that has been reclaimed, recycled, reused or treated by a municipality for specific non-potable uses.

POST-CONSUMER RECYCLED CONTENT. Proportion of recycled material in a product generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product that can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

PRE-CONSUMER (POST-INDUSTRIAL) RECYCLED CONTENT. Proportion of recycled material in a product diverted from the waste stream during the manufacturing process. Pre-consumer recycled content does not include reutilization of material such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

PROJECT ELECTIVE. Provisions contained in Sections 407, 507, 613, 710, 809 and 905 for which compliance is not mandatory unless selected under Section 303.1 for a specific *building* design. The minimum aggregate total number of compliance electives which must be selected and complied with is indicated in Table 302.1.

VOLATILE ORGANIC COMPOUND (VOC). A chemical compound based on carbon chains or rings that typically contains hydrogen and sometimes contains oxygen, nitrogen and other elements, and that has a boiling point in the range from (50^{O} C to 100^{O} C) to (240^{O} C to 260^{O} C).

ZERO ENERGY PERFORMANCE INDEX (zEPI). A scalar representing the ratio of the energy performance of the proposed design compared to the average energy performance of buildings in the benchmark year of 2000, with similar occupancy, operation schedule and climate. The ratio is multiplied times 100 such that 100 represents a building that uses the same amount of energy as the 2000 average and zero represents a zero net energy building.

IGCC CHAPTER 3 OVERVIEW: JURISDICTIONAL REQUIREMENTS AND PROJECT ELECTIVES

Chapter 3 is formatted to:

- Facilitate the customization of the code to address local agendas,

- Encourage construction that exceeds the minimum requirements of the code and
- Encourage the implementation of best practices which are difficult, if not impossible, to mandate.

Table 302.1, which addresses *requirements detemined by the jurisdiction*, and Table 303.1, which introduces the concept of *project electives*, are contained in Chapter 3 and are fundamental to the understanding and use of the IGCC.

- The *jurisdiction*, upon its adoption of the IGCC, is directed to fill in the information required in Table 302.1, *Requirements Determined by the Jurisdiction*.
    - The jurisdiction identifies whether specific provisions are to be enforced in the jurisdiction in Table 302.1.
    - These requirements are then applicable to all buildings constructed in the jurisdiction.
    - For some provisions, the jurisdiction must indicate the level of compliance required.
- The *owner or design professional* selects *project electives* from Table 303.1, the *Project Electives Checklist*.
    - *Project electives* selected and indicated by the owner or design professional in the Project Electives Checklist become mandatory for that project.
    - Different combinations of *project electives* can be selected for each project
    - The minimum number of project electives required to be implemented is the same for all projects in the jurisdiction, and that number is determined by *the jurisdiction* in Table 302.1.

It is important to remember that Tables 302.1 and 303.1 represent only a small portion of the provisions contained in the IGCC. The remainder, or the vast majority of all provisions contained in the IGCC, are mandatory as applicable, just as is the case with provisions in all other I-Codes. Furthermore, if the jurisdiction is confused by jurisdictional requirements and project electives, the IGCC provides means for the jurisdiction to easily opt out of the enforcement of the provisions, while still retaining an effective document to guide building sustainability.

Table 302.1 –REQUIREMENTS DETERMINED BY THE JURISDICTION:

By means of Table 302.1, the IGCC facilitates customization of the code by jurisdictions such that their specific geographical and political priorities related to sustainability may be addressed, including, but not limited to, the potential to address:

- Urban sprawl,
- Heat island effects,
- Stormwater runoff and landscape irrigation, and
- Water and energy minimum performance thresholds.

Table 302.1 allows the local jurisdiction to meet regional goals and priorities by determining whether certain provisions are to be enforced in the jurisdiction and whether enhanced energy performance or reduced plumbing fixture reduced flow rates will be required for compliance with the code. However, if the jurisdiction feels that various provisions are not appropriate for the jurisdiction, the jurisdiction can simply opt out of those provisions by selecting the “No” box for such provisions. The reality is that many, if not most of, the provisions in Table 302.1 may not be appropriate for many jurisdictions. That is why they are in this table. If they were appropriate choices in all jurisdictions, they would have been incorporated into the base code as mandatory requirements. For example, checking the “Yes” box related to Greenfields and Section 402.2.6 could potentially prohibit all construction in some jurisdictions, as it limits construction to sites that have been previously developed, previously contaminated and reclaimed, or are in close proximity to a mass transit station or other existing

development. Such requirements may be potential "time bombs" in some jurisdictions, but may be quite reasonable and appropriate in other jurisdictions. Jurisdictions should exercise caution with each "Yes" box they select in Table 302.1. But, jurisdictions should also take comfort in the fact that, even if they check only "No" boxes, they still have an effective code to drive sustainable construction – as the vast majority of the IGCC provisions are mandatory requirements that are not tied to a choice in Table 302.1.

Table 302.1 also requires that the local jurisdiction indicate a value between 1 and 14 as the minimum number of *project electives* that must be satisfied in order to comply with this code. *Project electives* are the vehicles by which the IGCC encourages the consideration and implementation of environmentally beneficial practices which may not be appropriate as strict mandatory requirements in some scenarios. *Project electives* are also used to encourage construction and performance that exceeds the minimum requirements of the code.

TABLE 302.1
REQUIREMENTS DETERMINED BY THE JURISDICTION

Section	Section Title or Description and Directives	Jurisdictional Requirements	
CH 3. JURISDICTIONAL REQUIREMENTS AND PROJECT ELECTIVES			
302.1 (2)	Optional compliance path – ASHRAE 189.1	☐ Yes	☐ No
302.1 (3)	Project Electives – The *jurisdiction* shall indicate a number between 1 and 14 to establish the minimum total number of *project electives* that must be satisfied.	_____	
CH 4. SITE DEVELOPMENT AND LAND USE			
402.2.3	Conservation area	☐ Yes	☐ No
402.2.5	Agricultural land	☐ Yes	☐ No
402.2.6	Greenfields	☐ Yes	☐ No
403.4.1	High occupancy vehicle parking	☐ Yes	☐ No
403.4.2	Low emission, hybrid and electric vehicle parking	☐ Yes	☐ No
405.1	Light pollution control	☐ Yes	☐ No
CH 5. MATERIAL RESOURCE CONSERVATION AND EFFICIENCY			
502.1	Minimum percentage of waste material diverted from landfills - Select a percentage only where "Yes" is selected in the previous row.	☐ 65% ☐ 75%	
CH 6. ENERGY CONSERVATION AND EARTH ATMOSPHERIC QUALITY			
Table 602.1, 302.1, 302.1.1	*zEPI* of Jurisdictional Choice - The *jurisdiction* shall indicate a *zEPI* of 46 or less in Table 602.1 for each occupancy for which it intends to require enhanced energy performance.	See Table 602.1 and Section 302.1	
602.3.2.3	Total CO2e emissions limits and reporting	☐ Yes	☐ No
613.2	Post C. of O. *zEPI*, energy demand, and *CO2e* emissions reporting	☐ Yes	☐ No
CH 7. WATER RESOURCE CONSERVATION AND EFFICIENCY			
702.1.2	Enhanced plumbing fixture and fitting flow rate tier .	☐ Tier 1 ☐ Tier 2	
702.7	Municipal reclaimed water.	☐ Yes	☐ No
CH 9. COMMISSIONING, OPERATION AND MAINTENANCE			
904.1.1.1	Periodic reporting	☐ Yes	☐ No
CH 10. EXISTING BUILDINGS			
1006.4	Evaluation of existing buildings	☐ Yes	☐ No

Section	Section Title or Description and Directives	Jurisdictional Requirements	
APPENDICES			
Appendix B	*Greenhouse gas* reduction in existing buildings	☐ Yes	☐ No
B103.1	Compliance level – The *jurisdiction* to select phases only where "Yes" is selected in the previous row.	☐ Phase 1 ☐ Phase 2 ☐ Phase 3 ☐ Phase 4	
B103.2	Where "Phase 1" is selected under Section B103.1 – *jurisdiction* to indicate the number of months to be used in association with Section B103.2.	_____ months	
B103.3	Where "Phase 2" is selected under Section B103.1 – *jurisdiction* to indicate the number of years and the percentage to be used in association with Section B103.3.	_____ years _____ %	
B103.4	Where "Phase 3" is selected under Section B103.1 – *jurisdiction* to indicate the number of years to be used in association with Section B103.4.	_____ years	
B103.5	Where " Phase 4" is selected above – *jurisdiction* to indicate the number of years and the percentage to be used in association with Section B103.5.	_____ years _____ %	
Appendix C	Sustainability measures	☐ Yes	☐ No
Appendix D	Enforcement procedures	☐ Yes	☐ No

ANSI/ASHRAE/USGBC/IES Standard 189.1 – Standard for High-Performance, Green Buildings Except Low-Rise Residential Buildings.

Of particular significance in Section 302.1 and Table 302.1 is the option which allows the jurisdiction to select ASHRAE Standard 189.1 as an alternate compliance path (see the row that references Section 302.1 at the left). When this path is selected, the remainder of the code, meaning the remainder of Chapter 3 through Chapter 11 of the IGCC, is replaced by ASHRAE Standard 189.1. This is much different than the way in which the International Energy Conservation Code references ASHRAE Standard 90.1, where the choice is made by the designer. The decision to leave the choice to the jurisdiction rather than the designer and to make that choice applicable to all buildings in the jurisdiction was made to ensure that code officials and building departments were not overburdened. If both the IGCC and ASHRAE 189.1 were available as options to the designer, then code officials would be responsible for enforcing two completely sets of requirements. That would be like making two building codes available in a jurisdiction. For energy, code officials typically do not do in depth peer reviews. But for the IGCC and ASHRAE 189.1, they would be responsible to do both in depth plan r4eviews and field inspections. Becoming familiar with one code is difficult enough. This extra burden might mean that some jurisdictions would simply not adopt the IGCC in any form.

Point of Entry and the Private Sector

Because the IGCC is intended to be adopted on a mandatory basis, it is poised to deliver significant environmental benefits even where a jurisdiction selects only "No" boxes in Table 302.1, does not select any of the enhanced performance options, and selects "1" as the minimum number of project electives that must be complied with. Thus, where the jurisdiction does not feel that they have the background or expertise to make all of the choices required by Table 302.1, they can take comfort in the fact that, even in is base minimum form, the IGCC will be an effective tool to drive sustainable building practices. Jurisdictions need no longer fear that mandatory green building requirements may be too restrictive for the private sector. They no longer need to limit the application of green and sustainable requirements to government buildings. The IGCC is not

an elitist code intended only for large or high budget projects. It is intended for all projects and budgets. And in future years, as the jurisdiction, as well as the private sector, gain familiarity with its application, the jurisdiction has the ability to ramp up the enhanced performance requirements at whatever level and pace that they feel is appropriate. Although it is the mandatory application of the IGCC to the private sector that has the most potential to reduce the environmental impact of the built environment on the natural environment, voluntary adoptions, where the only realistic option, are certainly better than no green and sustainable building requirements at all. Voluntary adoptions of the IGCC may pave the way for future mandatory adoptions, just as voluntary LEED based programs have paved the way for the IGCC.. The IGCC is a green code to begin with, and to grow with.

Table 303.1 – PROJECT ELECTIVES CHECKLIST:

Although the sections referenced by number in the far left column of Table 302.1 become mandatory for all buildings in the jurisdiction only where the jurisdiction indicates so in Table 302.1, the *project electives* listed in Table 303.1, the Project Electives Checklist, are a different animal. They become mandatory only where they are selected or chosen by the owner or registered design professional for a specific project and indicated in the *Project Elective Checklist*. Also note that the far right column allows the jurisdiction to disallow any provisions that they feel are not suitable or effective in their jurisdiction, or may be difficult or burdensome to enforce.

The primary functions of the *Project Elective Checklist* are to:

- Give guidance to owners and design professionals as to what *project electives* are available to choose from,
- Inform the code official as to which *project electives* have been selected or chosen by the design professional and must, therefore, be complied with and enforced as if they were mandatory requirements, and
- Encourage environmental performance that exceeds the minimum requirements of the IGCC, including performance beyond the minimum levels determined by the jurisdiction in Table 302.1.

Provisions of the IGCC have typically been designated as *project electives* where mandatory compliance with that provision was determined to be unduly restrictive in certain cases, but where that provision was, nonetheless, important to encourage from an environmental perspective. For example, it would be unreasonable to mandate that all buildings be constructed on a brownfield site, as that would preclude the construction of buildings on all sites that were not brownfields. However, it is quite reasonable to encourage the practice. Therefore, Section 407.2.5, which regulates brownfield sites, is designated as a *project elective*.

Some project electives are designed to encourage, but not require, the construction of buildings with higher energy performance than indicated by the jurisdiction in Table 302.1. Thus project electives encourage the construction of higher performance buildings than would be produced by conformance with the minimum requirements of the code, just like rating systems do.

Where a specific building project does not trigger the application of a particular mandatory provision, or where the jurisdiction has not selected a provision in Table 302.1 for enforcement in their jurisdiction, related *project electives* have been created to encourage, but not require, the implementation of the practice in those scenarios. For example, since Section 403.4.1, high occupancy vehicle parking, is only mandatory for buildings with a total building area that is *greater* than 10,000 square feet, a related *project elective*, Section 407.3.3, is written in an inverse manner: it *encourages,* but does not require, the application of the provision to smaller structures by allowing, *but not requiring*, the design professional in responsible charge to select the provision as a *project elective* for buildings with an area of *less* than 10,000 square feet.

Provisions that are designated as *project electives* have been grouped in dedicated sections at the end of Chapters 4 through 9 so that they may be readily identified, and the Project Elective Checklist contained in Table 303.1 ties all *project elective* strategies from all chapters together in one location.

TABLE 303.1
PROJECT ELECTIVES CHECKLIST

Section	Description	Check the corresponding box to indicate each *project elective* selected.	Jurisdictional determination of availability
CH 3. JURISDICTIONAL REQUIREMENTS AND PROJECT ELECTIVES			
304.1	Whole Building Life Cycle Assessment	☐ (5 Electives[a])	☐
CH 4. SITE DEVELOPMENT AND LAND USE			
407.2.1	Flood hazard avoidance	☐	☐
407.2.2	Agricultural land	☐	☐
407.2.3	Wildlife corridor	☐	☐
407.2.4	Infill site	☐	☐
407.2.5	Brownfield site	☐	☐
407.2.6	Existing building reuse	☐	☐
407.2.7	Greenfield development	☐	☐
407.2.8	Greenfield proximity to development	☐	☐
407.2.9	Greenfield proximity to diverse uses	☐	☐
407.2.10	Native plant landscaping	☐	☐
407.2.11	Site restoration	☐	☐
407.3.1	Changing and shower facilities	☐	☐
407.3.2	Long term bicycle parking and storage	☐	☐
407.3.3	Preferred parking	☐	☐
407.4.1	Site hardscape 1	☐	☐
407.4.2	Site hardscape 2	☐	☐
407.4.3	Site hardscape 3	☐	☐
407.4.4	Roof covering	☐	☐
407.5	Light pollution	☐	☐
CH 5. MATERIAL RESOURCE CONSERVATION AND EFFICIENCY			
508.2	Waste management (502.1 + 20%)	☐	☐
508.3(1)	Reused, recycled content, recyclable, bio-based and indigenous materials (70%)	☐	☐
508.3(2)	Reused, recycled content, recyclable, bio-based and indigenous materials (85%)	☐ (2 Electives)	☐
508.4.1	Service life – 100 year design life category	☐	☐
508.4.1	Service life – 200 year design life category	☐ (2 Electives)	☐
508.6.2	Interior adaptability	☐	☐
CH 6. ENERGY CONSERVATION, EFFICIENCY AND EARTH ATMOSPHERIC QUALITY			
613.3	Project *zEPI* is at least 5 points lower than required by Table 302.1.	☐	☐
613.3	Project *zEPI* is at least 10 points lower than required by Table 302.1	☐ (2 Electives)	☐
613.3	Project *zEPI* is at least 15 points lower than required by Table 302.1	☐ (3 Electives)	☐
613.3	Project *zEPI* is at least 20 points lower than required by Table 302.1	☐ (4 Electives)	☐
613.3	Project *zEPI* is at least 25 points lower than	☐ (5 Electives)	☐

Section	Description	Check the corresponding box to indicate each *project elective* selected.	Jurisdictional determination of availability
	required by Table 302.1		
613.3	Project *zEPI* is at least 30 points lower than required by Table 302.1	☐ (6 Electives)	☐
613.3	Project *zEPI* is at least 35 points lower than required by Table 302.1	☐ (7 Electives)	☐
613.3	Project *zEPI* is at least 40 points lower than required by Table 302.1	☐ (8 Electives)	☐
613.3	Project *zEPI* is at least 45 points lower than required by Table 302.1	☐ (9 Electives)	☐
613.3	Project *zEPI* is at least 51 points lower than required by Table 302.1	☐ (10 Electives)	☐
613.4	Mechanical systems	☐	☐
613.5	Service water heating	☐	☐
613.6	Lighting systems	☐	☐
613.7	Passive design	☐	☐
CH 7. WATER RESOURCE CONSERVATION AND EFFICIENCY			
710.2.1	Fixture flow rates are one tier above that required by Table 302.1	☐	☐
710.2.1	Fixture flow rates are two tiers above that required by Table 302.1.	☐ (2 Electives)	☐
710.3	On-site wastewater treatment	☐	☐
710.4	Non-potable outdoor water supply	☐	☐
710.5	Non-potable water for plumbing fixture flushing	☐	☐
710.6	Automatic fire sprinkler system	☐	☐
710.7	Non-potable water supply to fire pumps	☐	☐
710.8	Non-potable water for industrial process makeup water	☐	☐
710.9	Efficient hot water distribution system	☐	☐
710.10	Non-potable water for cooling tower makeup water	☐	☐
710.11	Graywater collection	☐	☐
CH 8 INDOOR ENVIRONMENTAL QUALITY AND COMFORT			
809.2.1	VOC emissions - flooring	☐	☐
809.2.2	VOC emissions – ceiling systems	☐	☐
809.2.3	VOC emissions- wall systems	☐	☐
809.2.4	Total VOC limit	☐	☐
809.3	Views to building exterior	☐	☐
809.4	Interior plant density	☐	☐

a. Where multiple electives are shown in the table in the form "(x electives)" "x" indicates the number of credits to be applied for that elective to the total number of project electives required by the jurisdiction in Section 302.1(3) of Table 302.1


New Regulatory Framework
Administration & Enforcement
• The IgCC is an "overlay" code
• Its administrative requirements work in tand\em with the administrative requirements of other I-Codes
Baseline Requirements
Even where the jurisdiction does not enforce any of the provisions listed in Table 302.1, does not choose any of the enhanced performance options in the table, and indicates "1" as the number of project electives that must be complied with:
• The IgCC remains an effective tool which has the potential to significantly reduce the negative impact of buildings on the environment.
• The Zero Energy Performance Index (zEPI) compliance path requires building energy performance that is 49% better than the mean of all similar buildings which existed in the year 2000
• Plumbing fixture and fitting flow rates are reduced by 20% compared to the IPC
• The code contains a plethora of other minimum mandatory requirements: it is primarily composed of minimum mandatory requirements
• The IgCC can be applied to private sector buildings with confidence; it will not overburden that sector
• In this form is similar in administration and enforcement applications to all other I-Codes
Jurisdictional Requirements
Using Table 302.1, jurisdictions can ramp up or require enhanced performance in many areas, and at multiple levels, as required to suit their own environmental goals and geographic conditions, including:
• More stringent site, land use, material resource and indoor environmental quality provisions
• Enhanced energy and water performance
Project Electives
• The jurisdiction indicates a number between 1 and 14 as the minimum number of project electives that must be complied with for all projects built in the jurisdiction.
• The owner and designer select specific project electives from the list of 60 electives in Table 303.1. The total number of project electives selected and implemented must be at least the number that the jurisdiction has indicated in Table 302.1.

Section 304: Whole Building Life Cycle Assessment

Section 304.1 is a *project elective* which encourages, but does not require, whole building life cycle assessment. There was much in depth discussion of life cycle assessment by the Sustainable Building Technology Committee (SBTC - the committee responsible for drafting the IGCC). In the end, the committee decided that, because life cycle assessment is an extremely complex issue with roots in scientific and technical issues which are only beginning to be explored, it was not ready for inclusion as a mandatory provision in the IGCC at this time. Nonetheless, the committee also felt that there was great potential for life cycle assessment in the future and, therefore, decided to encourage its development by including a whole building life cycle assessment *project elective* in the code. To further encourage whole building life cycle assessment, it is awarded 5 project electives in Table 303.1.

IGCC CHAPTER 4 OVERVIEW: SITE DEVELOPMENT AND LAND USE

Chapter 4 contains requirements for the development and maintenance of buildings and building sites that are intended to promote natural resource conservation and environmentally responsible land use and development.

Section 402 contains provisions designed to limit the impact of construction on site natural resources.

- Prohibits construction in floodplains. (Section 402.2.1)
- Prohibits construction within 50 feet of bodies of water and wetlands, with exceptions. (Section 402.2.2)
- Prohibits construction within 50 feet of community designated "conservation areas" where indicated by the jurisdiction in Table 302.1. (Section 402.2.3)
- Prohibits construction on park land and agricultural land unless the building serves a related purpose. (Sections 402.2.4 and 402.2.5)
- Restricts construction on park land, agricultural land and greenfield sites where indicated by the jurisdiction in Table 302.1, with exceptions. (Sections 402.2.5 and 402.2.6)
- Requires an inventory of site natural resources. (Section 402.3.1)
- Contains requirements for stormwater management systems that are enforceable only where indicated by the jurisdiction in Table 302.1. (Section 403.3.2)
- Limits potable water use for landscape irrigation systems. (Section 402.3.3)
- Requires that municipally reclaimed water, where available, or collected rainwater be used for outdoor fountains and water features. (Section 402.3.4)
- Requires management of vegetation and soils and erosion control during construction. (Section 402.3.5)
- Requires that at least 75 percent of land-clearing debris and excavated soils be recycled or salvaged. (Section 402.3.6)

SECTION 403: TRANSPORTATION IMPACT

- Requires that walkways and bicycle paths connect streets or other paths to the building main entrance. (Section 403.1)

- Requires changing and shower facilities for buildings over 10,000 square feet in area where the building is also required to be provided with long term bicycle parking and storage in accordance with Section 403.3. (Section 403.2)

- Requires short term bicycle parking and long term bicycle parking and storage based on the use and occupancy of the building and the application of Table 403.3. (Section 403.3)

- Where indicated by the jurisdiction in Table 302.1, and where buildings have an aggregate area of over 10,000 square feet and an occupant load greater than 100, parking in preferred locations is required for high occupancy, low emission, hybrid and electric vehicles. (Section 403.4)

SECTION 404: HEAT ISLAND MITIGATION

- Projects located in Climate Zones 1 through 6 must implement heat island mitigation practices for at least 50 percent of site hardscape. (Section 404.2)

- Projects located in Climate Zones 1 through 3 must implement heat island mitigation practices for at least 75 percent of roof surfaces. (Section 404.3)

SECTION 405: SITE LIGHTING

- Where indicated by the jurisdiction in Table 302.1, site light pollution control must be provided, with exceptions.

SECTION 406: DETAILED SITE DEVELOPMENT REQUIREMENTS

Section 406 provides detailed requirements for practices that are triggered by other sections in this chapter. Detailed requirements are provided for:

- Subsurface graywater irrigation systems (Section 406.2, which also references various portions of Chapter 7, and Section 406.3),

- Vegetation and soil protection (Section 406.4),

- Soil use and restoration (Section 406.5),

- Landscape, soil and water quality protection (Section 406.6) and

- Vegetative roofs (Section 406.7).

SECTION 407: PROJECT ELECTIVES

See the portion of Table 303.1 under Chapter 4 for *project electives* related to site development and land use.

IGCC CHAPTER 5 OVERVIEW: MATERIAL RESOURCE CONSERVATION AND EFFICIENCY

Chapter 5 contains provisions that require and encourage building material conservation, resource efficiency and environmental performance.

SECTION 502: MATERIAL AND WASTE MANAGEMENT

- Requires that at least 50 percent of construction phase waste materials be diverted from landfills, and allows the jurisdiction to increase the materials required to be diverted to 65 percent or 75 percent in Table 302.1. (Section 502.1)

- Requires that areas be provided in buildings for the storage of recyclable post construction phase waste materials. (Section 502.2)
- Requires that space be provided in buildings for the storage of discarded lamps, batteries, electronics and other items that require special disposal practices in the jurisdiction. (Section 502.3)

SECTION 503: MATERIAL SELECTION

- At least 55 percent of the total materials in each building project must be any combination of the following (Section 503.2):
    - Used materials,
    - Recycled content materials (must contain at least 25 percent combined post-consumer and pre-consumer recovered material, and must be recyclable),
    - Recyclable materials (with a minimum recovery rate of 30 percent),
    - Bio-based materials (with at least 50 percent bio-based content), or
    - Indigenous materials (materials recovered, harvested, extracted and manufactured within 500 miles of the site, with special provisions for materials transported by water or rail).

SECTION 504: LAMPS

Section 504 sets maximum limits on the amount of mercury permitted in fluorescent lamps.

SECTION 505: SERVICE LIFE

Section 505 requires that a Building Service Life Plan be included in the construction documents for the project and provides detailed requirements for the plan.

SECTION 506: MOISTURE CONTROL AND MATERIAL STORAGE AND HANDLING

Materials stored on site during the construction phase must comply with the manufacturer's recommendations for storage and handling. Porous and fibrous materials must be protected from moisture during the construction phase. (Section 506.2)

Inspections tied to Chapter 9 must be provided relative to various measures that are intended to mitigate moisture intrusion in buildings. (Section 506.3)

IGCC SECTION 507: STRAWBALE CONSTRUCTION

Detailed prescriptive and performance based requirements are provided for construction that utilizes strawbale as a building material.

IGCC SECTION 508: PROJECT ELECTIVES

See the portion of Table 303.1 under Chapter 5 for *project electives* related to material resource conservation and efficiency.

IGCC CHAPTER 6 OVERVIEW: ENERGY CONSERVATION, EFFICIENCY AND ATMOSPHERIC QUALITY

Chapter 6 requires that buildings and building sites be designed, constructed, commissioned and operated for the effective use of energy. (Section 601.1)

In accordance with Section 601.3, all buildings and building sites must comply with the following requirements of the IECC regardless of the compliance path chosen:

- Building envelope air leakage (Section 502.4)
- Building mechanical systems (Section 503.2)
- Service water heating equipment and piping insulation (Section 504)
- Electrical power and lighting systems (Section 505)

Compliance Paths (602.2)

1) For new, small buildings (≤ 25,000 ft^2) seeking a prescriptive-based solution is available (Section 602.2.1);
2) For new, large buildings (over 25,000 ft^2) and small buildings seeking credit for unique energy parametrics the following energy compliance paths are available:
    a) Performance-based (zEPI, Section 602.2.2);
    b) Outcome-based (Annual Net Energy Performance, Section 602.2.3); or
    c) Energy Use Intensity-based (EUI, Section 602.2.4).
3) For *additions* to existing buildings, two paths are available based on building size or approach (Section 602.3); and
4) For *alterations* to existing buildings, energy used after the alteration must not exceed the energy used prior to alterations (Section 602.3).

Compliance Paths in Detail (602.2, 602.3)

1) Prescriptive. This path is available for new, small buildings (≤ 25,000 ft^2). These buildings and sites:

- Are deemed to have, a zEPI of 51, meaning that they are exempt from the lower zEPI values (higher energy performance thresholds) which may be required by the jurisdiction in Table 302.1 and in Table 602.1 under the "zEPI of Jurisdictional Choice" column. (Table 302.1, Section 602.1 and Table 602.1)
- Must demonstrate compliance with Sections 604 through 612. (Sections 602.1 and 602.2.1)

2a) Performance-based (zEPI). This path is available for new, large buildings (over 25,000 ft^2) and small buildings seeking credit for unique energy parametrics.

Throughout Chapter 6, the Zero Energy Performance Index (zEPI) scalar is a central theme. In fact, the zEPI is used in association with Tables 302.1 and 303.1 to provide jurisdictions with a mechanism to establish a benchmark scalar for prescriptive designs and a performance scalar for large buildings (over 25,000 ft^2) and smaller building designs seeking credit for unique energy parametrics. Thereby, the jurisdiction can elect to leave the values for energy performance at the default zEPI "point of entry" value of 51, or may specify lower zEPI values (higher energy performance) specific to building occupancy

type. Note here that buildings complying with the 2006 *International Energy Conservation Code* (IECC) are deemed to have a zEPI of 73.

For large buildings and performance-based designs, Section 613.2 allows the jurisdiction to indicate whether the zEPI scalar, the peak energy demand for the building, and *carbon dioxide equivalent* (CO_2e) emissions must be periodically *reported* to the jurisdiction.

Though there are other factors that affect the value of zEPI, it is essentially calculated in accordance with Equation 6-3 as follows:

zEPI = 57 x (PD - RE - WE) / RD (**Equation 6-3**)

Where:

PD = Total annual energy delivered to the *proposed design* and consumed on site, as determined in accordance with Section 603

RE = Total annual energy savings from renewable energy derived on site

RD = Total annual energy used by a *standard reference design*, determined in accordance with Section 603

WE= Total annual energy savings from *waste energy recovery*

PD, RE, RD and WE must be expressed in consistent units of energy in accordance with Section 603.1.1.

Table 602.1

MAXIMUM ZERO ENERGY PERFORMANCE INDEX

Building Occupancy Types	**zEPI Point of Entry** [a]	**zEPI** of Jurisdictional Choice [b]
Assembly: Groups A-1, A-2, A-3, A-4, A-5	*[[51?]]*	--
Business: Group B		--
Educational: Group E		--
Factory and Industrial: Groups F-1, F-2		--
High Hazard: Groups H-1, H-2, H-3, H-4, H-5		--
Institutional: Groups I-1, I-2, I-3, I-4		--
Mercantile: Group M		--
Residential: Groups R-1, R-2, R-3, R-4 [c]		--
Storage: Groups S-1, S-2		--
Utility and Miscellaneous: Group U		--

a. Minimum acceptable performance for all *building* types and sizes.

b. Where the jurisdiction elects to adopt a greater threshold for energy efficiency, a 'zEPI of Jurisdictional Choice' shall only apply to *buildings* pursuing performance-based compliance in accordance with Section 602.2.2.

c. Residential occupancies as regulated by this code in accordance with Section 101.2.

A zEPI of 100 is intended to be indicative of the median energy use for similar commercial buildings constructed in the year 2000. Because studies have indicated that buildings constructed in accordance with the 2006 IECC consume approximately 27 percent less energy than buildings constructed and operated circa 2000, Section 602.2.1 deems buildings constructed in accordance with the 2006 IECC to have a zEPI of 73 (27 percent less than 100). As IGCC Public Version 2.0 is intended to require energy performance that is at least 30 percent better than buildings constructed in accordance with the *2006 IECC*, a zEPI of 51 (30 percent less than 73) is deemed the "point of entry" to the provisions of IGCC Chapter 6 as indicated in Table 602.1.

Thus, for new, large buildings (over 25,000 ft^2) and sites and small buildings and sites seeking credit for unique energy parametrics, such buildings and sites must:

- Achieve a zEPI scalar no greater than the "zEPI Point of Entry" applicable to the building occupancy type, or that which the jurisdiction indicates as its "zEPI of Jurisdictional Choice," whichever is more stringent (less). (Table 602.1 and Section602.2.2.1)
    - This requires the building and building site meet the minimum requirements of an IGCC-compliant *standard reference design building* constructed and operated circa 2000 without regard to technology choice in the *proposed design*. (Sections 202-ZERO ENERGY PERFORMANCE INDEX and 603.6)
- Address peak energy demand in accordance with Section 506.4 of the IECC (Section 602.2.2.2) Achieve reduced annual CO_2e (ACO_2e) emissions in accordance with Section 602.2.2.3 ACO_2e emissions criteria for electric power de$_l$ivered to the building at the utility meter make use of $eGRI_D$ sub-regional grid loss factors; and for fuels such as natural gas, fuel oil, and propane, a U.S. a*verag*e fuel energy conversion factor applicable to fuel type.
- Comply with IGCC Sections 604, 605, 609.6, 610, 611 and 612. (Sections 602.2.2, 602.2.2.2 and 603.1.2)

2b) Outcome-based (Annual Net Energy Performance - ANEP). This path is available for new, large buildings (over 25,000 ft^2) and small buildings seeking credit for unique energy parametrics. Accordingly, such buildings and sites must:

- Achieve an ANEP no greater than the ANEP applicable to the building occupancy type, or that which the jurisdiction determines is applicable whichever is more stringent (lower) as indicated in Table 603.2(1). (602.2.3.1 and Table 603.2(1))
- Achieve a peak net energy demand (PNET) no greater than the PNET applicable to the building occupancy type, or that which the jurisdiction determines is applicable whichever is more stringent (lower) as indicated in Table 603.2(1). (602.2.3.2 and Table 603.2(2))
- Achieve reduced ACO_2e emissions in accordance with Section 603.2. ACO_2e emissions criteria for electric power delivered to the building at the utility meter make use of *eGRID* sub-regional grid loss factors; and for fuels such as natural gas, fuel oil, and propane, a U.S. average fuel energy conversion factor applicable to fuel type. (602.2.3.3 and Table 603.2(3))
- Be provided with a commissioning report is submitted to the jurisdiction as a condition of approval and as required by Section 612. (Sections 603.2.3 and 612)
- Be provided with annual operational reports submitted to the jurisdiction as a condition of approval and as required by Section 612. (Section 603.2.4 and 612)
- Demonstrate compliance with the following sections:
    - 604 (Energy metering monitoring and reporting)
    - 605 (Automated demand response infrastructure) and

- 612 (Energy systems commissioning and completion). (Section 602.2.3)

2c) Energy Use Intensity-based (EUI). This path is available for new, large buildings (over 25,000 ft^2) and small buildings seeking credit for unique energy parametrics. Accordingly, such buildings and sites must:

- Achieve an EUI that is in the top 10 percent of existing buildings in terms of energy performance. For building types that are eligible to a receive a score using the U.S. Environmental Protection Agency (EPA) Target Finder online tool, the building EUI must be less than or equal to the source energy use intensity needed to the building to achieve an EPA energy performance score of 90. For building types not covered by the Target Finder tool, the building must be designed to deliver an EUI that is at least 50 percent lower than the average EUI for a similar building as identified in the latest U.S. Department of Energy (DOE) Commercial Buildings Energy Consumption Survey (CBECS).

- EUI is determined as follows:

    - EUI = TAE/SF (where TAE = Total annual energy projected to be consumed on site, including renewable energy; and SF = building gross square footage) (Section 602.2.4.1)

3) Additions. For *additions* to existing buildings, select path 1) or 2) based on building size or approach (Section 602.3). (Section 602.3)

4) Alterations. For *alterations* to existing buildings, energy used after the alterations must not exceed the energy used prior to the alterations. Documentation of energy performance for alterations shall be provided by one of the following means (Section 602.3):

- Comparison of the actual energy used for a 12-month period prior to, and a 12-month period after the alteration is complete. (Section 602.3.1)

- Measurement-based documentation by an approved agency that the energy use and demand patterns of the building after alteration do not exceed those prior to alteration. (Section 602.3.2)

- Certification-based compliance by an approved agency by reason of measurement, simulation or comparative studies demonstrating that the building does not consume more energy than it did prior to alterations. (Section 602.3.3)

Section 604, Energy Metering, Monitoring and Reporting, requires all buildings that consume energy, regardless of compliance path, have capabilities for *energy measuring, monitoring and reporting*, or incorporate features that readily facilitate those capabilities in the future. The intent is to provide building owners, operation and maintenance staff with information which they can use to verify that buildings perform, and continue to perform in accordance with the IGCC. It contains requirements pertaining to the following:

- Energy distribution design and load type isolation to facilitate separate data collection for (Section 604.3):

    - HVAC system total energy use (Section 604.3.1)

    - Lighting system total energy use (Section 604.3.2)

    - Building operations, including elevators, escalators, automatic doors, motorized shading systems, fountains, fireplaces, swimming pools and snow-melt systems (Section 604.3.3)

    - Plug loads (Section 604.3.4)

    - Process loads (Section 604.3.5)

- Distinct energy metering for (Section 604.4):

- Gaseous fuels
- Liquid fuels
- Solid fuels
- Electric power
- District heating and cooling
- Combined heat and power
- Renewable and waste energy

- Energy sub-metering for buildings > 25,000 ft^2 in gross floor area
- Buildings ≤25,000 ft^2 in gross floor area must provide for future energy sub-metering
- All required meters and sub-meters must be capable of being connected to a data acquisition system
- An energy display must be provided that is capable of showing the current energy demand for the whole building, updated for each fuel type at specified intervals, and the total energy use for the previous 18 months

Section 605, Automated Demand Response (AUTO-DR) Infrastructure, requires *building energy, HVAC and lighting systems and specific building energy-using components* be provided with controls that respond to changes in energy demand by means of automated preprogrammed strategies. Software clients must be provided with the capability to communicate with a *demand response automation server (DRAS).*

Section 606, Building Envelope Systems, establishes building envelope provisions specific to buildings following the prescriptive based compliance path. It contains requirements pertaining to the following:

- The provisions of IECC Tables 502.1.2, 502.2(1) and 502.3 must be exceeded by at least 10 percent based on building location and Climate Zone, except that maximum skylight area in roofs in Sky Type 'C' locations must not exceed 5 percent. (Section 606.1.1)
- Shading devices for fenestration (Section 606.1.1.1)
- Building envelope sealing and testing (Section 606.1.2.1)
- Outdoor air intakes and exhaust openings to comply with Section 502.4.5 of the IECC.
- Fireplaces to be provided with combustion air ducts and a means to tightly close-off the chimney flue and air outlets when the fireplace is not in use. (606.1.2.4)
- Vestibules to separate conditioned spaces from exterior space. (Section 606.1.2.5)

Section 607, Building Mechanical Systems, establishes building mechanical system provisions specific to buildings following the prescriptive-based compliance path. It contains requirements pertaining to the following:

- HVAC equipment performance
- Ventilation
- Duct and plenum insulation, sealing and testing

- HVAC piping insulation
- Economizers
- Variable air volume (VAV) fan control
- Kitchen exhaust systems
- Laboratory exhaust systems
- Control of HVAC in hotel/motel guest rooms

Section 608, Building Service Water Heating (SWH) Systems, establishes building SWH system provisions specific to buildings following the prescriptive-based compliance path. It contains requirements pertaining to the following:

- Service water heating equipment performance
- Pools, hot tubs and spas
- Snowmelt systems
- Rough-ins for future solar hot water pre-heat (required)
- Drain water energy recovery
- Service water heating piping insulation
- Circulation hot water systems

Section 609, Building Service Water Heating (SWH) Systems, establishes building SWH system provisions for buildings following the prescriptive based compliance path. Buildings following the performance-based zEPI compliance path are required to comply with Section 609.6 only. It contains requirements pertaining to the following:

- Sleeping unit controls
- Interior light reduction controls
- Exterior light reduction controls
- Automatic daylight controls
- Plug load controls
- Fuel gas lighting systems
- Electrical system efficiency
- Exterior lighting
- Verification of lamps and ballast installation

Section 610, Specific Appliances and Equipment, establishes appliance and equipment provisions for all buildings and all compliance paths. It provides requirements related to the following:

- Elevators

- Escalators and moving walkways
- Interior light reduction controls
- Commercial food service equipment
- Conveyors
- ENERGY STAR appliances and equipment

Section 611, Building Renewable Energy Systems, establishes minimum renewable energy source requirements for all buildings. It is applicable to all buildings that consume energy, regardless of compliance path. It requires that buildings use renewable energy sources to provide one of the following:

- Two percent of total calculated annual energy use is provided by means of solar photovoltaic or wind.
- Ten percent of annual estimated how water energy is provided by means of solar hot water heating

Renewable energy systems must be monitored and metered in accordance with Sections 611.5 and 604.

Section 612, Energy Systems Commissioning and Completion, establishes *energy systems commissioning and completion* requirements for all buildings that consume energy. These requirements must be met within 60 days of inspection and approval of the mechanical system. Measures include:

- Mechanical systems commissioning and completion, including (Section 612.1):
    - Commissioning plan
    - Systems adjusting and balancing
    - Functional performance testing
    - Preliminary commissioning report
    - Completion requirements that must be included in the construction documents
- Sequence of operation must be finalized upon commissioning. (Section 612.2)
- Lighting and electrical systems commissioning and completion, including (Section 612.3):
    - Lighting pre-construction documentation
    - Verification of installation
    - Commissioning
    - Post-commissioning documentation
    - Post occupancy commissioning
- Building envelope systems commissioning and completion requirements, including (Section 612.4):
    - Pre-construction documentation, building thermal envelope
    - Verification of installation

Section 613.2 contains *requirements determined by the jurisdiction* and *project electives*. It contains provisions for the reporting of zEPI, energy demand and CO_2e emissions. Reporting is required only where the jurisdiction has indicated so in Table 302.1. The remainder of Section 613 contains project electives related to energy conservation, efficiency and atmospheric quality. See the portion of Table 303.1 under Chapter 6 for a list and description of these *project electives*.

IGCC CHAPTER 7 OVEVIEW: WATER RESOURCE CONSERVATION AND EFFICIENCY

Chapter 7 requires and encourages the conservation of water used indoors, outdoors and in wastewater conveyance. It begins by providing *prescriptive* maximum flow rates for fittings and fixtures in Table 702.1, some of which are reduced as compared to those in the International Plumbing Code (IPC). It then requires compliance with a two step *performance*-based method for determining fixture and fitting flow rates.

Step 1 of the performance-based method requires that the designer use Table 702.1.1(1) to determine an approximation of total daily water use in gallons per day, as calculated based on the occupant load of the building and using fixture flow rates that are identical to those in the IPC. Step 2 then requires the designer to enter reduced fixture flow rates/volumes in Table 702.1.1(2) so that the total design water use is at least 20 percent less than the total reference water use determined by Table 702.1.1(1). This means that the fitting and fixture flow rates in the IGCC are a reduction of at least 20 percent as compared to the IPC.

Section 702.1.2 allows the jurisdiction to require additional fitting and fixture flow rate reductions to either 30 percent (Tier 1) or 40 percent (Tier 2), based on the performance based method described above, by indicating so in Table 302.1.

Section 702 also contains specific requirements for:

- Combination tub/shower valves
- Food establishment pre-rinse spray heads
- Drinking fountain controls
- Non-water urinal connections
- Appliances (clothes washers, ice makers, food steamers and dishwashers)
- Municipal-reclaimed water
- Efficient hot water distribution systems
- Makeup water supply
- Water powered pumps
- Food service handwashing faucets
- Dipper Wells
- Automated and self-service vehicle wash facilities
- Spa covers
- Swimming pool covers and splash troughs

- Food water disposers
- Combination ovens
- Autoclaves and sterilizers
- Liquid ring vacuum pumps
- Film processors

Section 703 regulates water in:

- Hydronic closed systems
- Humidification systems
- Condensate coolers (tempering)
- Condensate drains (recovery)
- Heat exchangers
- Humidifier discharge
- Cooling towers, evaporative condensers and fluid coolers
- Wet-hood exhaust scrubber systems

Section 704 regulates water softeners and reverse osmosis water treatment systems.

Section 705 contains specific requirements for indoor ornamental fountains, water features and water metering.

Section 706 contains signage and water quality requirements for non-potable water systems.

Sections 707, 708 and 709 contain detailed requirements for the construction of:

- Rainwater collection and distribution systems,
- Graywater systems and
- Reclaimed water systems, respectively.

Section 710 contains *project electives* related to water resource conservation and efficiency. See the portion of Table 303.1 under Chapter 7 for *project electives* related to water resource conservation and efficiency.

IGCC CHAPTER 8 OVERVIEW: INDOOR ENVIRONMENTAL QUALITY AND COMFORT

The provisions of Chapter 8 are intended to reduce the quantity of building indoor air contaminants and other pollutants, including those that are odorous, irritating, or harmful, and to provide an interior environment that is healthy and conducive to the well-being of building occupants, neighbors and construction personnel. Section 801.2 requires that an indoor air quality management plan be developed to address methods intended to be used to comply with Sections 802 through 805.

Section 802, Building Construction Features, Operations and Maintenance Facilitation, contains requirements for the following:

- Air handling system access,
- Durability and cleanability of air handling and airstream surfaces and
- Air handling system filters.

Section 803, HVAC Systems, contains requirements for:

- Construction phase duct openings, indoor air quality and ductless systems or filters;
- Temperature and humidity (must comply with ASHRAE 55);
- Prohibition of smoking in all buildings regulated by the IGCC;
- Isolation of pollutant sources in print, copy and janitorial rooms and garages; and
- Ductless system filters.

Section 804 contains indoor air quality and pollutant control requirements for

- Fireplaces and appliances,
- Radon mitigation and
- Building flush out.
- Entry mat systems

Section 805 prohibits the use of asbestos in building construction.

Section 806 contains material emissions and pollutant control requirements for:

- Interior pressed wood (formaldehyde emissions limits)
- Adhesives and sealants
- Architectural paints and coatings
- Flooring
- Acoustical ceiling tiles and wall systems
- Insulation

Section 807 regulates the following in buildings and tenant spaces:

- Exterior sound transmission
- Interior sound transmission
- Mechanical and emergency generator equipment and systems sound transmission and background sound
- Special inspections for sound transmission

Section 808 contains requirements for the daylighting of interior spaces, including both prescriptive and performance based methods.

Section 809 contains *project electives* related to indoor air quality and environmental comfort. See the portion of Table 303.1 under Chapter 8 for a list these *project electives*.

IGCC CHAPTER 9 OVERVIEW: COMMISSIONING, OPERATION AND MAINTENTANCE

Chapter 9 is intended to facilitate the pre- and post- occupancy commissioning, operation and maintenance of buildings constructed in accordance with the IGCC. (Section 901.1)

Section 902, Approved Agency, and Section 903, Commissioning, are modeled after special inspections criteria in Chapter 17 of the IBC and commissioning criteria found in the IECC, respectively. Table 903.1 includes an extensive list of items for which commissioning is required. The table contains columns that distinguish between pre- and post-occupancy commissioning. IGCC commissioning requirements extend well beyond the energy realm and include, but are not limited to, requirements related to site, materials and water.

Table 903.1, Commissioning Plan, requires commissioning regarding various aspects of the following:

- Site/land use (Chapter 4):
    - Natural resources and baseline conditions of the building site (Section 402.3.1)
    - Landscape irrigation systems (Sections 402.3.3 and 406.6)
    - Topsoil and vegetation protection measures (Section 402.3)
    - Imported soils (Section 402.3.5.5)
    - Soil restoration and reuse (402.3.5.4)
    - Soil percolation test (Section 406.2.2)
    - Stormwater management system operation (Section 402.3.2)
    - Erosion and sediment control (Section 402.3.6)
    - Hardscape and shading (Section 404.2)
    - Vegetative roofs and terraces (Section 404.3.2)
    - Site lighting (Section 405)
- Materials (Chapter 5):
    - Foundation sub-soil drainage system (Section 506.3 and IBC Ch 18)
    - Foundation damp-proofing and water-proofing (Section 506.3 and IBC Chapter 18)
    - Flashing at windows, exterior doors, skylights, walls and drainage systems (Section 506.3 and IBC Chapter 14)
    - Exterior wall coverings (Section 506.3 and IBC Chapter 14)

- Energy (Chapter 6):
    - Energy consumption, monitoring, targeting and reporting (Sections 604 and 611)
    - HVAC system balancing (Section 612.1.2.1)
    - Hydronic system balancing (Section 612.1.2.2)
    - Duct system testing (Section 613.5.3)
    - Mechanical system manuals (Section 612.1.5.2)
    - Mechanical system commissioning noted on plans, outcomes documented, prepared and available (Sections 612.1, 612.1.1 and 612.1.2)
    - Functional performance testing of HVAC equipment (Sections 612.1.3 and 612.1.3.2)
    - Preliminary commissioning report (Section 612.1.4)
    - Acceptance of HVAC systems and equipment/system verification report (Section 612.1.4)
    - Preparation and distribution of final HVAC completion documentation (Section 612.1.5)
- Lighting (Chapter 6):
    - Functional testing of lighting auto demand reduction system and plug load controls (Section 605.4 and 609.6)
    - Visual inspection of the connection of appliances to switched receptacles (Section 608.8.3)
    - Verification that transformer nameplate efficiency ratings are as specified (Section 609.8.1)
    - Verification of lamps and ballast (Section 609.10)
    - Calculations revised to represent the building as constructed (Sections 602 and 603)
    - Occupant sensor, automatic daylight, time switch, dimming systems and multi-level scene controls (Section 608.12)
    - Captive key control devices (Section 608.12)
- Water (Chapter 7):
    - Water quality tests for rainwater and graywater systems (Sections 707.16.1 and 708.13.8)
- Indoor Environmental Quality and Comfort (Chapter 8):
    - Airhandling system access and filters (Sections 802.2 and 802.4)
    - Temperature and Humidity (Section 803.2)
    - Fireplaces and combustion appliances (804.1)
    - Radon mitigation system (804.2)
    - Mechanical and emergency generator equipment located outside of buildings (807.5.1)

- HVAC background sound (807.5.2)

Section 904.3 requires that building operations and maintenance documents, consisting 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, be included in the construction documents for the project. In addition, a copy must also be in the possession of the owner or occupant, and a copy must remain in the building throughout its life. Operations and maintenance information related to Chapters 4, 5, 6, 7 and 8 is outlined and required to be included in the documents. In addition, Section 904.4 requires that a building owner education manual be created to inform the building owner and maintenance and operation staff as to the performance goals and reasoning behind the buildings features and systems design. A copy of the building owner education manual must also be in the possession of the owner and an additional copy must remain in the building throughout its life.

Where the jurisdiction indicates so in Table 302.1, a periodic report confirming that the building is maintained and operated at the level of performance required by the approved construction documents is required.

IGCC CHAPTER 10 OVERVIEW: EXISTING BUILDINGS

Section 1002.1 of the IGCC prohibits the construction of additions to buildings that are located in flood hazard areas, except where all habitable space is located at least 1 foot above flood elevation.

Many of the provisions for existing buildings in the IGCC are loosely based on the provisions of the *International Building Code* (IBC). In essence, whatever is altered must be brought into conformance with the requirements of the current code, as applicable to that component, assembly or system. Whatever is not changed or altered is permitted to remain as is. Additions are treated much like new construction: the applicable requirements of the code must be satisfied.

The IGCC, however, takes additional steps. First, the IGCC requires that any existing building that undergoes alterations or additions, even if they are of a minor nature, comply with the basic minimum energy and HVAC requirements listed in Sections 1003.2.1, 1003.2.2 and 1003.2.3, except where the code official determines that they are technically infeasible, where materials or systems are concealed, or where a tenant does not have control over complete systems. Section 1004.1 also requires compliance with these provisions for any change of occupancy, including to a "less hazardous" occupancy and Section 1006.3 requires compliance within 1 year of the sale of a building or portion thereof. The following is a summary of these mandatory requirements:

- Non-functioning thermostats must be repaired or replaced
- Leaking accessible air supply and return ducts must be sealed with *approved* sealants
- Outdoor air dampers, damper controls and linkages controlled by HVAC units must be in good repair and adjustment
- Hot water and steam leaks, defective steam traps and radiator control, relief, and vent valves are not permitted in any accessible piping
- Leaking accessible chilled water lines and equipment must be repaired or replaced
- Defective hot and cold service water system piping and equipment must be repaired or replaced.
- There must be no leaks in any accessible hot and cold water pipes.
- There must be no leaks in compressed air or pumped water systems.

In addition to the mandatory requirements, the IGCC uses a scenario similar to that used for accessibility in the IBC, requiring that 10 percent of the cost of alterations be allocated toward the preparation of an energy audit report and energy and mechanical system improvements. The energy and mechanical system improvements are selected from the extensive list provided Sections 1003.3.1 through 1003.3.10. Listed mechanical system improvements include the following (compliance is not required for everything listed, but at least 10% of the cost of the alteration must be allocated to any combination of these items):

- The installation of a metering device for at least one system or piece of equipment, as selected from a list of 11 types of equipment and systems
- Heating, ventilation and air conditioning systems and equipment must be in accordance with the following:
    - HVAC time clock and time switch controls required under certain conditions
    - Functional outdoor air economizers required on cooling systems over certain capacity thresholds
    - HVAC piping and ducts insulated to R-values in accordance with the IGCC
    - Furnace combustion units, boilers and chiller systems cleaned and tuned within one year prior to alteration
    - Chillers equipped with an outdoor air lockout thermostat and chilled water reset control
    - Phase out plan required for CFC refrigerants
    - Building automation system required under specific conditions
- Water heater and hot water storage tanks insulation upgraded to at least R-16.
- Hot and cold water supply and *distribution pipes* insulated to R-values as specified in the IGCC.
- In Seismic Design Categories D, E and F, water heater and water storage tanks with a tank capacity of thirty gallons or greater strapped or otherwise secured to a wall, floor, ceiling, or other object that itself is adequately secured to a wall, floor, or ceiling.
- Water, gas and overflow pipes connected to water tanks must be secured similarly to above.
- Gas water heaters provided with a flexible gas line entering the appliance.
- Circulating pump systems for hot water supply purposes other than comfort heating controlled in accordance with Section 608.8.
- Showerhead, water closet, urinal and faucet flow rates in accordance with the IGCC, with consideration given for sanitary drainage requirements.
- Lighting systems and equipment upgraded in accordance with Sections 505.2.2.3 and 505.2.4 of the IECC
- Commercial refrigeration equipment cleaned and tuned for efficiency.
- Motor-driven equipment filters cleaned or replaced and belts and other coupling systems verified to be in good repair
- Swing pools and spas: equipped with covers; recirculation pumps under timeclock control; and heaters cleaned and tuned.
- Unconditioned attics insulated to the minimum R-value required by the IGCC.

- Asbestos-containing products identified and removed in accordance with ASTM E2356 and ASTM E 1268

Section 1006.2 requires at least 50 percent of waste materials resulting from the demolition of existing buildings, or portions of existing buildings, be diverted from landfills.

Section 1006.4 contains requirements and exceptions that are specifically designed to facilitate the evaluation of existing buildings in accordance with the requirements of the code in a comprehensive manner, similar to that which is applied to new buildings, and allows the jurisdiction to certify those buildings. Rather than simply taking the "if it isn't touched it doesn't have to be fixed" approach alluded to earlier, Section 1006.4 contains unique provisions designed to encourage the owners of existing buildings to bring their buildings into full compliance with the code, demonstrate such compliance, and be recognized and certified for doing so. By indicating their intent to enforce Section 1006.4 in Table 302.1, jurisdictions agree to offer the option to owners of existing buildings to have their building evaluated in accordance with the requirements of the IGCC. By means of this section, owners are not forced to have their existing buildings evaluated, they are simply encouraged to voluntarily do so. While it may seem strange that anyone would want to voluntarily subject their existing building to the requirements of a new code, it is beneficial to owners of existing buildings who wish to use their building's conformance with the green and sustainable requirements of the IGCC as a marketing tool. Wherever the IGCC is adopted, owners of existing buildings will often need to compete in the real estate marketplace against other recently constructed buildings which comply with a green or sustainable code or program and have the ability to advertise that fact in their marketing materials.

IGCC CHAPTER 11 OVERVIEW: EXISTING BUILDING SITE DEVELOPMENT

Chapter 11 covers much of the information already covered in Chapter 10, except that it covers the material with respect to existing building *sites,* as opposed to existing *buildings*. Chapter 11 addresses existing building landscaping, site hardscape and surface vehicle parking, as well as other items related to Chapter 4, *Site Development and Land Use*

IGCC CHAPTER 12 OVERVIEW: REFERENCED STANDARDS

Chapter 12 lists the standards that are referenced in various sections of the IGCC, including the agency that promulgated it, the standard's identification, effective date, full title and the sections or sections of the IGCC that reference it. Latest editions of all standards will be referenced, consistent with referenced standards in other I-Codes.

IGCC APPENDIX A OVERVIEW: OPTIONAL ORDINANCE

In addition to including key elements of a code adoption ordinance, including the information required for insertion into the code text, this optional ordinance is intended to open a dialogue among stakeholders and to give jurisdictions a place to start a fiscal and evidentiary-based adoption structure. It utilizes performance bonding requirements that are tied to the compliance verification process. The bonding requirement is designed to ensure that the project complies with the IGCC. Bond amounts are set as a percentage of total cost of the building, based on local economic and geo-centric requirements overseen by jurisdictional authorities, and the bond is held by the jurisdiction.

IGCC APPENDIX B OVERVIEW: GREENHOUSE GAS REDUCTIONS IN EXISTING BUILDINGS

Appendix B provides the basis and establishes targets that are intended to enable jurisdictions to reduce greenhouse gas (GHG) emissions in existing buildings. Note that, as is true of all appendices, Appendix B is enforceable only where specifically adopted.

The jurisdiction is directed to select Phase 1, 2, 3 or 4 as the required level of compliance. Where a higher phase is selected, all lower phases are also applicable.

Phase 1 requires that owners of existing buildings and tenant spaces greater than 5,000 square feet develop a greenhouse gas *inventory* to calculate the carbon footprint of the building or tenant space. This must be done within a specific time frame from the date of adoption of Appendix B, as specified by the jurisdiction. The carbon footprint must be calculated using the industry protocols listed, or other protocols approved by the code official.

Phase 2 requires that the owners of existing buildings *develop a plan* to reduce the carbon footprint of their buildings by an amount which the jurisdiction specifies. Note that there is no requirement to implement the plan, the requirement is simply to develop it.

Phase 3 requires that the owners of existing buildings actually implement the plan they developed in phase 2, and that semi-annual reports be filed by the owner to identify progress being made toward fulfillment of the plan.

Phase 4 requires that the owners of existing buildings continue to reduce GHG emissions each by an amount specified by the jurisdiction.

Section B104 lists GHG reduction methods, including energy efficiency measures and the use of renewable energy. (Appendices are enforceable only where specifically adopted.)

IGCC APPENDIX C OVERVIEW: SUSTAINABILITY MEASURES

Appendix C contains additional sustainability requirements for existing buildings. These requirements address water, energy and material conservation and indoor environmental quality. They are applicable only to non-residential buildings that exceed 5,000 square feet. (Appendices are enforceable only where specifically adopted.)

IGCC APPENDIX D OVERVIEW: ENFORCEMENT PROCEDURES

Appendix D supplements the provisions of Chapter 1. It contains enforcement procedures designed to ensure the continued compliance of *buildings*, structures and *building sites* constructed under the IGCC. It addresses public health, safety and welfare and protection of the environment insofar as they are affected by the continued occupancy and maintenance of *buildings* and *building sites.* Existing *buildings,* structures and *building site* improvements that do not comply with these provisions are required to be altered or repaired to restore compliance with the IGCC. (Appendices are enforceable only where specifically adopted.)