

### INTERNATIONAL GREEN CONSTRUCTION CODE<sup>-</sup>

A Member of the International Code Family®





This is a preview. Click here to purchase the full publication.







## Become a **Building Safety Professional Member** and Learn More about the Code Council

**GO TO WWW.ICCSAFE.ORG** for All Your Technical and Professional Needs Including:

- > Codes, Standards and Guidelines
- > Membership Benefits
- > Education and Certification
- > Communications on Industry News

This is a preview. Click here to purchase the full publication.

2012 International Green Construction Code™

First Printing: March 2012

ISBN: 978-1-60983-059-5

COPYRIGHT © 2012 by INTERNATIONAL CODE COUNCIL, INC.

With the cooperating sponsorships of the American Institute of Architects, ASTM International, Amercian Society of Heating, Refrigerating and Air-Conditioning Engineers, United States Green Building Council and the Illuminating Engineering Society.

ALL RIGHTS RESERVED. This 2012 International Green Construction  $Code^{TM}$  is a copyrighted work owned by the International Code Council, Inc. Without advance written permission from the copyright owner, no part of this book may be reproduced, distributed or transmitted in any form or by any means, including, without limitation, electronic, optical or mechanical means (by way of example, and not limitation, photocopying, or recording by or in an information storage retrieval system). For information on permission to copy material exceeding fair use, please contact: Publications, 4051 West Flossmoor Road, Country Club Hills, IL 60478. Phone 1-888-ICC-SAFE (422-7233).

Trademarks: "International Code Council," the "International Code Council" logo and the "International Green Construction Code" are trademarks of the International Code Council, Inc.

PRINTED IN THE U.S.A.

This is a preview. Click here to purchase the full publication.

# PREFACE

#### Introduction

Internationally, code officials recognize the need for a modern, up-to-date code governing the impact of buildings and structures on the environment. This first edition, the 2012 edition, of the *International Green Construction Code*<sup>™</sup> (IgCC<sup>™</sup>), is designed to meet this need through model code regulations that contain clear and specific requirements with provisions that promote safe and sustainable construction in an integrated fashion with the ICC Family of Codes.

This comprehensive green code establishes minimum regulations for building systems and site considerations using prescriptive and performance-related provisions. It is intended to be an overlay code to be used with, and is fully compatible with, all of the *International Codes*<sup>®</sup> (I-Codes<sup>®</sup>) published by the International Code Council (ICC)<sup>®</sup>, including the *International Building Code*<sup>®</sup>, *International Energy Conservation Code*<sup>®</sup>, *International Existing Building Code*<sup>®</sup>, *International Fuel Gas Code*<sup>®</sup>, *International Mechanical Code*<sup>®</sup>, ICC Performance Code<sup>®</sup>, *International Plumbing Code*<sup>®</sup>, *International Private Sewage Disposal Code*<sup>®</sup>, *International Property Maintenance Code*<sup>®</sup>, *International Residential Code*<sup>®</sup>, *International Swimming Pool and Spa Code*<sup>™</sup>, *International Wildland-Urban Interface Code*<sup>®</sup> and *International Zoning Code*<sup>®</sup>.

The International Green Construction Code<sup>™</sup> provisions provide many benefits, among which is the model code development process that offers an international forum for building professionals to discuss performance and prescriptive code requirements. This forum provides an excellent arena to debate proposed revisions. This model code also encourages international consistency in the application of provisions.

This code has been developed in collaboration with the following Cooperating Sponsors: The American Institute of Architects (AIA); ASTM International; the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), the Illuminating Engineering Society (IES); and the U.S. Green Building Council (USGBC). ICC wishes to thank these Cooperating Sponsors for recognizing the need for the development of a comprehensive set of green regulations that are enforceable, usable and adoptable.

#### Development

This first edition of the 2012 International Green Construction Code is the culmination of an effort that started in 2010 with the drafting of Public Version 1.0 (PV 1.0) by the Sustainable Building Technology Committee (SBTC) established by the ICC Board of Directors. Following that, Public Version 2.0 was created, based upon public comments submitted to PV 1.0 and approved by the IgCC Public Comment Committee. Following the issuance of PV 2.0, a full cycle of code development in accordance with ICC's Code Development Procedures was held in 2011. This included the submission of code change proposals followed by a Code Development Hearing, the submission of public comments and a Final Action Hearing. A new edition of the code is promulgated every three years.

This code is founded on principles intended to establish provisions consistent with the scope of a green construction code that adequately protects public health, safety and welfare; provisions that do not unnecessarily increase construction costs; provisions that do not restrict the use of new materials, products or methods of construction; and provisions that do not give preferential treatment to particular types or classes of materials, products or methods of construction. This is achieved by comprehensive provisions which are enforceable, useable and adoptable.

#### Adoption

The International Green Construction Code is available for adoption and use by jurisdictions internationally. Its use within a governmental jurisdiction is intended to be accomplished through adoption by reference in accordance with proceedings established in the jurisdiction's laws. At the time of adoption, jurisdictions should insert the appropriate information in provisions requiring specific local information, such as the name of the adopting jurisdiction. These locations are shown in bracketed words in small capital letters in the code and in the sample ordinance. The sample adoption ordinance on page xiii addresses several key elements of a code adoption ordinance, including the information required for insertion into the code text.

#### Maintenance

The *International Green Construction Code* is kept up to date through the review of proposed changes submitted by code enforcing officials, industry representatives, design professionals and other interested parties. Proposed changes are carefully considered through an open code development process in which all interested and affected parties may participate.

The contents of this work are subject to change both through the Code Development Cycles and the governmental body that enacts the code into law. For more information regarding the code development process, contact the Codes and Standards Development Department of the International Code Council.

While the development procedure of the *International Green Construction Code* assures the highest degree of care, the ICC, AIA, ASHRAE, ASTM International, IES and the USGBC and their members and those participating in the development of this code do not accept any liability resulting from compliance or noncompliance with the provisions given herein, for any restrictions imposed on materials or processes, or for the completeness of the text. ICC, AIA, ASHRAE, ASTM International, IES and the USGBC do not have power or authority to police or enforce compliance with the contents of this code. Only the governmental body that enacts the code into law has such authority.

Note that, for the development of the 2015 edition of the I-Codes, there will be two groups of code development committees and they will meet in separate years. The groupings are as follows:

Group A Codes (Heard in 2012, Code Change Proposals Deadline: January 3, 2012)	Group B Codes (Heard in 2013, Code Change Proposals Deadline: January 3, 2013)
International Building Code	Administrative Provisions (Chapter 1 all codes except IRC and ICCPC, administrative updates to currently ref- erenced standards, and designated definitions)
International Fuel Gas Code	International Energy Conservation Code
International Mechanical Code	International Existing Building Code
International Plumbing Code	International Fire Code
International Private Sewage Disposal Code	International Green Construction Code
	ICC Performance Code
	International Property Maintenance Code
	International Residential Code
	International Swimming Pool and Spa Code
	International Wildland-Urban Interface Code
	International Zoning Code

#### **Italicized Terms**

Selected terms set forth in Chapter 2, Definitions, are italicized where they appear in code text. Such terms are not italicized where the definition set forth in Chapter 2 does not impart the intended meaning in the use of the term. The terms selected have definitions which the user should read carefully to facilitate better understanding of the code.

## **Effective Use of the International Green Construction Code**

The International Green Construction Code<sup>™</sup> (IgCC<sup>™</sup>) is a model code that provides minimum requirements to safeguard the environment, public health, safety and general welfare through the establishment of requirements that are intended to reduce the negative impacts and increase the positive impacts of the built environment on the natural environment and building occupants. The IgCC is fully compatible with the ICC family of codes, including the International Building Code<sup>®</sup> (IBC<sup>®</sup>), the International Code Council Performance Code<sup>®</sup> (ICCPC<sup>®</sup>), the International Energy Conservation Code<sup>®</sup> (IECC<sup>®</sup>), the International Existing Building Code<sup>®</sup> (IECC<sup>®</sup>), the International Fire Code<sup>®</sup> (IFC<sup>®</sup>), the International Fuel Gas Code<sup>®</sup> (IFGC<sup>®</sup>), the International Mechanical Code<sup>®</sup> (IMC<sup>®</sup>), the International Plumbing Code<sup>®</sup> (IPC<sup>®</sup>), the International Private Sewage Disposal Code<sup>®</sup> (IPSDC<sup>®</sup>), the International Swimming Pool and Spa Code<sup>™</sup> (ISPSC<sup>™</sup>), the International Wildland-Urban Interface Code<sup>®</sup> (IWUIC<sup>®</sup>), and the International Zoning Code<sup>®</sup> (IZC<sup>®</sup>).

The IgCC addresses natural resource, material, water and energy conservation, as well as indoor environmental quality and comfort, building commissioning, operations and maintenance for new and existing buildings, building sites and building materials, components, equipment and systems. The code will be promulgated on a 3-year cycle to allow for new construction methods and technologies to be incorporated into the code. Innovative approaches and alternative materials, designs, and methods not specifically addressed in the code can be approved by the code official where the proposed innovative approaches or materials, designs or methods comply with the intent of the provisions of the code (see Section 105.4).

The IgCC applies to all occupancies other than temporary structures approved under Section 3103 of the *International Building Code*, except that application to the following is subject to jurisdictional choices in Table 302.1: one- and two-family dwellings and townhouses that are within the scope of the *International Residential Code*; Group R-3 occupancies; and Group R-2 and R-4 residential occupancies that are four stories or less in height.

### Arrangement and Format of the 2012 IgCC

Before applying the requirements of the IgCC, it is beneficial to understand its arrangement and format.

Chapters	Subjects
1-2	Administration and definitions
3	Jurisdictional requirements and life cycle assessment
4	Site development and land use
5	Material resource conservation and efficiency
6	Energy conservation, efficiency and CO <sub>2</sub> e emission reduction
7	Water resource conservation, quality and efficiency
8	Indoor environmental quality and comfort
9	Commissioning, operation and maintenance
10	Existing buildings
11	Existing building site development
12	Referenced standards
Appendix A	Project electives
Appendix B	Radon mitigation
Appendix C	Optional ordinance
Appendix D	Enforcement procedures

The following is a chapter-by-chapter synopsis of the scope and intent of the provisions of the *International Green Construction Code*:

**Chapter 1 Scope and Administration.** Chapter 1 of the IgCC establishes the limits of applicability of the code and describes the manner in which the code is to be applied and enforced. Chapter 1 is divided into two parts: Part 1 – Scope and Application (Sections 101 and 102); and Part 2 – Administration and Enforcement (Sections 103 – 109).

Section 101 identifies which buildings and structures come under its purview and Section 102 references other ICC codes as applicable. Section 103 establishes the duties and powers of the code official, requires that compliance and enforcement be part of the enforcement of other ICC codes listed in Section 102.4, and grants authority to the code official to make inspections. Section 105 provides guidance to the code official in the approval of materials, methods of construction, designs, systems and innovative approaches where they are not specifically prescribed in the IgCC. Section 106, in conjunction with Section 101.2 as an overlay code, requires that permits be issued under other ICC codes.

The provisions of Chapter 1 also establish the rights and privileges of the design professional, contractor and property owner.

It is important to note that by reference to Section 301.1.1, Section 101.3 allows ASHRAE 189.1, *Standard for the Design of High-Performance Green Buildings*, to be used. In addition, Exception 1 to Section 101.3 notes that the code is not applicable to low-rise residential structures unless the jurisdiction selects ICC 700 in Table 302.1 for application to various types of residential buildings and occupancies. Further, ICC 700 is noted in Section 101.3.1 as being a "deemed to comply document" for mid- and high-rise R-2 and R-4 occupancies.

The green building code is intended to be adopted as a legally enforceable document and it cannot be effective without adequate provisions for its administration and enforcement.

**Chapter 2 Definitions.** All terms that are defined in the code are listed alphabetically in Chapter 2. Terms are defined in Chapter 2. Codes are technical documents and every word, term and punctuation mark can impact the meaning of the code text and the intended results. The code often uses terms that have a unique meaning in the code and that code meaning can differ substantially from the ordinarily understood meaning of the term as used outside of the code. Where understanding of a term's definition is especially key to or necessary for understanding a particular code provision, the term is shown in *italics* wherever it appears in the code. However, this is true only for those terms that have a meaning that is unique to the code. In other words, the generally understood meaning of a term or phrase might not be sufficient or consistent with the meaning prescribed by the code; therefore, it is essential that the code-defined meaning be known.

Definitions are deemed to be of prime importance in establishing the meaning and intent of the code text that uses code-defined terms. The user of the code should be familiar with and consult this chapter because the definitions are essential to the correct interpretation of the code and because the user may not be aware that a term is defined in a manner that is not commonly understood.

**Chapter 3 Jurisdictional Requirements and Life Cycle Assessment.** As indicated earlier, Section 301.1.1 allows ASHRAE 189.1, *Standard for the Design of High-Performance Green Buildings*, to be used. Similarly, ICC 700 may be applicable to specific types of residential construction in accordance with the decisions made by the jurisdiction in the portions of Table 302.1 related to Section 101.3.

The jurisdictional requirements contained in Section 302 are formatted to afford jurisdictions the flexibility to adapt the code in a manner that is best suited to meet their unique environmental and regional goals and needs. The section numbers and optional enhanced performance features listed in Table 302.1 do not become enforceable unless they are specifically selected in the table by the jurisdiction and the appropriate "Yes" box is checked or otherwise specifically indicated in the jurisdiction's adopting ordinance. Those provisions selected by the jurisdiction in Table 302.1 become enforceable for all buildings constructed in the jurisdiction. The text of all section numbers listed in Table 302.1 also contains a reference to Table 302.1, reinforcing the fact that they are not enforceable unless they are specifically adopted. Furthermore, the sample ordinance provided in the IgCC references Table 302.1 and requires that the jurisdiction indicate those provisions from the list that it intends to enforce.

Jurisdictions must take great care when making their choices in Table 302.1. While various requirements listed in Table 302.1 may be environmentally beneficial in many jurisdictions, some may be inappropriate in other jurisdictions. If these practices were appropriate for all jurisdictions, they would have been included in the baseline requirements of the IgCC, not in Table 302.1.

Where jurisdictions find the concept of jurisdictional requirements to be unnecessary, they are able to opt out by simply checking the "No" boxes for all provisions listed in Table 302.1. Because relatively few of the code's provisions are listed in Table 302.1, even where jurisdictions do not choose any of the provisions or enhanced performance options listed in Table 302.1, the IgCC remains a strong and effective green and sustainable building tool. That said, many jurisdictions will appreciate the flexibility that the jurisdictional requirements provide in their efforts to address specific green and sustainable building concerns. Where jurisdictions begin to specifically adopt more of the items listed in Table 302.1 in future years, they will also appreciate the opportunities that the IgCC provides to grow and to produce a more sustainable built environment with each future adoption of the IgCC.

Section 303 contains provisions for whole building life cycle assessment. The IgCC does not require that whole building life cycle assessment be performed. However, where these provisions are complied with, compliance with the material selection provisions of Section 505 is not required. In this manner, whole building life cycle assessment is encouraged, though not required.

**Chapter 4 Site Development and Land Use.** Chapter 4 is intended to minimize the negative environmental impacts on and protect, restore and enhance the natural features and environmental quality of building sites.

Section 401.2 requires predesign site inventory and assessment. Where indicated by the jurisdiction in Table 302.1, Section 402 limits building construction near surface water, in conservation and flood hazard areas and on greenfield sites, park land or agricultural land. Section 403 requires stormwater management. Section 404 limits potable water uses related to landscape irrigation and outdoor fountains. Section 405 addresses vegetation, soil and water quality protection.

Section 406 requires that a plan be developed to ensure that least 75 percent of land-clearing debris and excavated soils is diverted from disposal.

Section 407.1 requires that at least one walkway or bicycle path connect building entrances to streets or other paths. Buildings with a total floor area of over 10,000 square feet (929 m<sup>2</sup>) must also provide changing and shower facilities. Bicycle parking and storage requirements are contained in Sections 407.3 through 407.3.2 and Table 407.3.

Where indicated by the jurisdiction in Table 302.1, and where the total building floor area is greater than 10,000 square feet (929 m<sup>2</sup>), preferred parking is required for high-occupancy and low-emission, hybrid and electric vehicles. These requirements, however, do not take precedence over the accessible parking requirements of the *International Building Code*.

Section 408 mitigates heat island effects through requirements related to site hardscape materials, shading and roof surfaces and coverings. Where indicated to be enforceable in the jurisdiction in Table 302.1, light pollution from building sites must be controlled in accordance with Section 409.

**Chapter 5 Material Resource Conservation and Efficiency.** Chapter 5 addresses material resource conservation and efficiency by means of provisions related to material selection, recycling, reuse, renewability, toxicity and durability, including resistance to damage caused by moisture.

Section 502 addresses material storage and handling during the construction phase. Section 503 requires that a construction material and waste management plan be prepared and allows the jurisdiction to increase the percentage of waste that must be recycled in Table 302.1. Section 504 requires areas be designed and constructed to facilitate the recycling of waste generated post certificate of occupancy.

Section 505 requires that at least 55 percent of constructed materials selected for each project be any combination of the following material types: used, recycled, recyclable, bio-based, or indigenous. However, where a whole building life cycle analysis is performed in accordance with Section 303, compliance with Section 505 is not required.

Section 506 regulates the mercury content of fluorescent lamps. Section 507 contains requirements for inspections that are tied to Table 903.1 and are intended to control moisture intrusion in the building envelope.

**Chapter 6 Energy Conservation, Efficiency and CO**<sub>2</sub>*e* **Emission Reduction.** Chapter 6 is intended to provide flexibility and permit the use of innovative approaches to achieve the effective use of energy.

All buildings that consume energy must comply with the requirements of Sections 603 (Energy Metering, Monitoring and Reporting), 609 (Specific Appliances and Equipment), 610 (Building Renewable Energy Systems), 611 (Energy Systems Commissioning and Completion) and, where indicated by the jurisdiction in Table 302.1, must also comply with Section 604 (Automated Demand Response Infrastructure).

In addition to the preceding, buildings designed on a performance basis must comply with Sections 602 (Modeled Performance Pathway Requirements) and 608.6 (Plug load controls), while buildings designed on a prescriptive basis must comply with the prescriptive requirements of Sections 605 (Building Envelope Systems), 606 (Building Mechanical Systems), 607 (Building Service Water Heating Systems) and 608 (Building Electrical Power and Lighting Systems).

Section 602.1.1 requires that performance based designs demonstrate a zEPI of not more than 51, as determined in accordance with Equation 6-1. This equation contains a reference to EUI (energy use index), which must be calculated in accordance Appendix G of ASHRAE 90.1, as modified by Sections 602.1.2.2 and 602.1.2.3 of the IgCC. Section 602.1.1 requires that performance based designs also demonstrate  $CO_2e$  emissions reduction in accordance with Section 602.2 and Equation 6-2.

Section 603 addresses energy metering, monitoring and reporting and is applicable to all buildings that consume energy. Section 603.2 requires that energy distribution systems be designed to provide separate metering of the energy use categories listed in Table 603.2. For buildings greater than 25,000 square feet in gross floor area, meters must be installed. For buildings less than 25,000 square feet in gross floor area, the system must be designed to accommodate the installation of future meters. Section 603.3 requires that building energy metering be capable of determining energy use and peak demand for the types of energy indicated in Sections 603.3.1 through 603.3.7.

Where the jurisdiction has indicated in Table 302.1 that Section 604.1 is enforceable, an automated demand-response infrastructure must be provided. This requires that 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.

Section 605 provides building envelope system requirements for buildings that are designed on a prescriptive basis. Section 605.1.1 requires that insulation and fenestration exceed the requirements of the *International Energy Conservation Code* by at least 10 percent. Section 605.1.2.2 requires testing of the building thermal envelope for air tightness.

Section 610 establishes minimum renewable energy source requirements for all buildings that consume energy. It requires that buildings use renewable energy sources to provide either 2 percent of total calculated annual energy use by means of solar photovoltaic or wind, or 10 percent of annual estimated hot water energy by means of solar hot water heating.

Section 611 is applicable to all buildings that consume energy. It requires the commissioning and completion of mechanical, lighting, electrical and building envelope systems. These systems are also listed in Table 903.1, Commissioning Plan.

There are also provisions outside of Chapter 6 that have significant impacts on energy: Table 302.1 allows jurisdictions to require lower zEPI values, or require more stringent levels of efficiency, by occupancy; where indicated to be enforceable in Table 302.1, the project electives of Section A106 in Appendix A require additional energy conserving practices be implemented and recognize and encourage energy performance that exceeds the baseline minimum requirements of Chapters 3 and 6; Section 1003.2 addresses energy use where existing buildings are altered; and, where indicated to be enforceable in Table 302.1, Section 1007.2 requires that owners of existing buildings report post certificate of occupancy zEPI, energy demand and  $CO_2e$  emissions.

**Chapter 7 Water Resource Conservation, Quality and Efficiency.** Chapter 7 provides requirements that are intended to conserve water, protect water quality and provide for safe water consumption.

Section 702 regulates water consumption through limitations of fixture and fitting flow rates and by means of requirements related to specific equipment and appliances. It also requires that municipal reclaimed water, where available and required by the jurisdiction in Table 302.1, be supplied to water-supplied toilets, urinals, trap primers and applicable industrial systems. Hot water distribution systems must be designed to reduce the volume of water between fixtures and sources of hot or tempered water in accordance with Section 702.8.

Section 703 regulates water used in HVAC systems and equipment including hydronic closed systems, humidification systems, condensate coolers, condensate drainage recovery, once through heat exchangers, humidifier discharge, cooling towers, evaporative condensers, fluid cooers, wethood exhaust scrubber systems and evaporative cooling systems.

Section 704 regulates water treatment devices and equipment including water softeners, reverse osmosis water treatment systems and onsite reclaimed water treatment systems.

Section 705 contains specific water conservation measures for indoor ornamental fountains and other water features. It also requires the separate metering of water consumed from any source associated with the building or its site.

Section 706 contains signage and water quality requirements related to nonpotable water. Sections 707, 708 and 709 contain requirements related to rainwater collection and distribution systems, gray water systems, and reclaimed water systems, respectively. Section 710 contains provisions for other alternative onsite sources of nonpotable water.

**Chapter 8 Indoor Environmental Quality and Comfort.** Chapter 8 is intended to ensure that the building's interior environment is conducive to the health of building occupants.

Section 801.2.requires that an indoor air quality management plan be developed to ensure compliance with Sections 802 through 805. Section 802 addresses air-handling system access for cleaning and repair, as well as air-handling filter rack design. Section 803 contains requirements for the ventilation of buildings during the construction phase, prohibits smoking within buildings, limits pollutant sources in print, copy and janitorial rooms, and provides filters requirements for air-conditioning systems. Section 804 contains specific indoor air quality and pollutant control requirements for fireplaces, solid fuel-burning appliances, vented decorative gas appliances, vented gas fireplace heaters and decorative gas appliances. Where the jurisdiction has indicated in Table 302.1 that Section 804.2 is enforceable, baseline indoor air quality testing is required. Section 805 prohibits the use of urea-formaldehyde foam insulation and materials that contain asbestos.

Section 806 regulates emissions from wood products, adhesives, sealants, paints, coatings, flooring, acoustical ceiling tiles, wall systems and insulation.

Where the jurisdiction has indicated in Table 302.1 that Section 807.1 is to be enforceable, sound transmission levels must be limited in accordance with Sections 807.2 through 807.5.2.

Section 808 requires that fenestration be provided to ensure that interior spaces in the specified occupancies benefit from exposure to natural light.

**Chapter 9 Commissioning, Operation and Maintenance.** Chapter 9 addresses building commissioning, operation and maintenance. It requires inspections as specifically listed in Table 903.1. Chapter 9 also requires that construction documents contain information related to building operation and maintenance in accordance with Section 904.3.

Many of the provisions of Chapter 9, and in particular those in Sections 902 and 903, are essentially based on the requirements for special inspections contained in the *International Building Code*. Both Table 903.1 and Section 904 also contain ties to, and are coordinate with, various provisions in Chapters 4 through 8 of the IgCC. The building operation and maintenance documents required by Section 904.3 are intended to help and encourage building owners and facility management staff to operate and maintain buildings in a manner, and a performance level, as originally intended by design professionals as they strove to configure building systems in a manner that satisfied the requirements of the IgCC.