



BUILDING CODES: BARRIERS TO GREEN INNOVATION

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Introduction

Many architects and contractors want to pursue green building design, technologies and construction. Green building promotes environmental stewardship through attention to building-site relationships, site management, energy and water efficiency, responsible material selection, minimization of CO₂ emissions, and indoor environmental quality. However, despite growing interest in changing the way that buildings are designed and built, a persistent barrier to green design and construction is getting innovative designs approved by building code officials.

Building codes ensure the health, safety and welfare of building users and the public. Unfortunately, many of today's codes are prescriptive and based on traditional industry standards, thereby precluding innovative approaches to environmentally responsible design. An additional problem is that design standards are evolving at a faster pace than building codes. Therefore it is critical to supplement existing building codes with provisions for innovation in order to create opportunities to introduce technological and other improvements more rapidly. This report explores the barriers to green building design approval and makes recommendations for streamlining approval processes. Two case studies illustrate the potential benefits. Additionally, this report looks into the International Green Construction Code (IgCC) as a model and structured process to support updating of building codes.

Background on Cities and Green Building

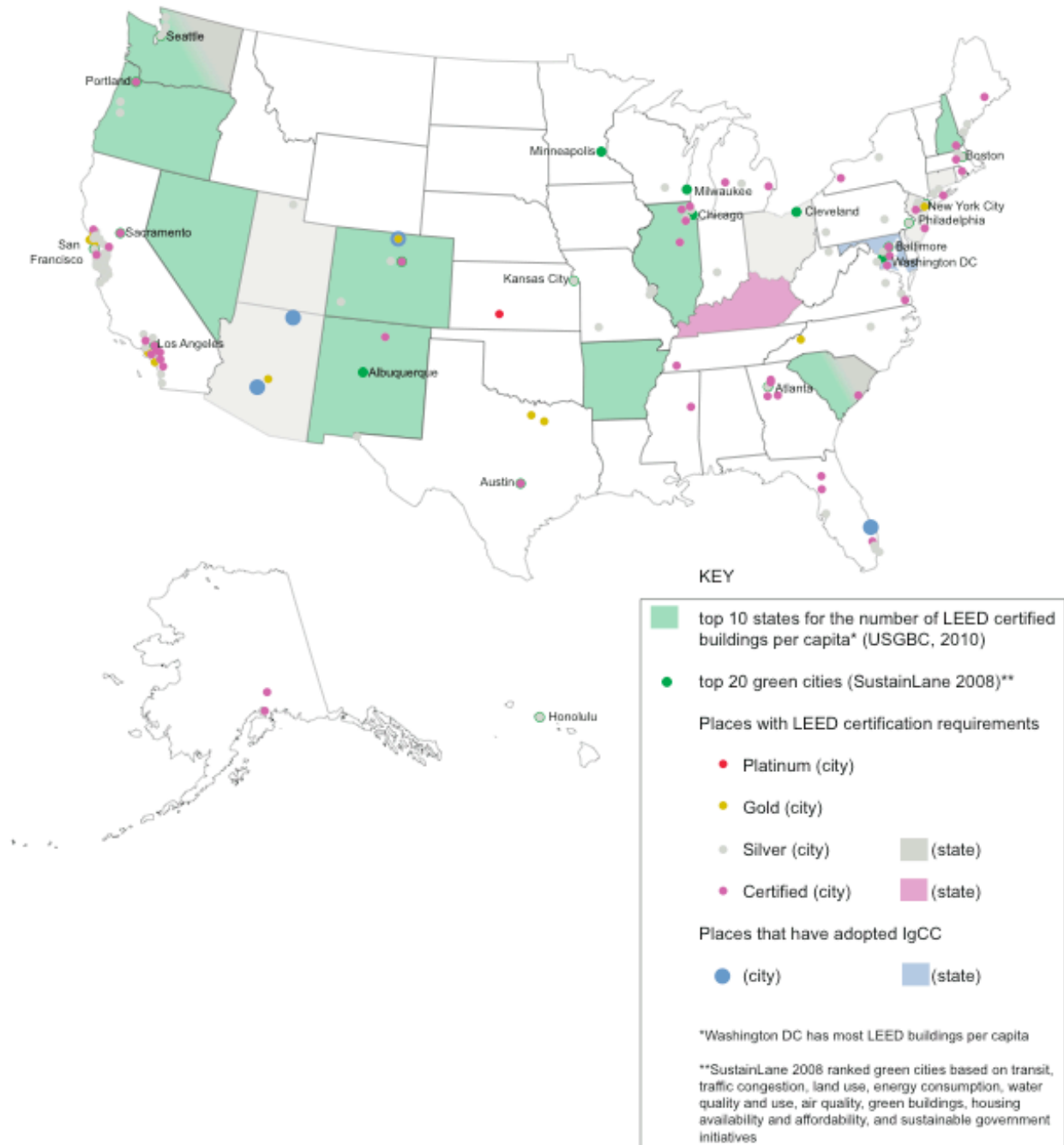
For many years, organizations and individuals have been actively promoting green building. Green building practices have been adopted at the state level in many regions, and a number of cities have implemented green building programs (Figure 1). For example, in 1995, New Pattonsburg, MO, drafted a *Declaration of Community Responsibility, Covenants, and Restrictions* to guide sustainable development and operations. The City of Santa Monica Building Guidelines, introduced in 1996, encouraged affordable sustainable design and construction practices. The Frisco, TX Green Building Ordinance of 2001 provides green building guidelines, including operations related to energy, water, and waste from residential buildings.

In addition to ordinances and initiatives, there is momentum to implement green building codes. California became the first state to adopt a mandatory green building code. This code is known as *CALGreen – the California Green Building Standards Code* and became effective January 1, 2011. CALGreen applies to all new construction, including residential, and the code includes mandatory baseline requirements for residential structures regarding site development, energy efficiency¹, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. Non-residential building criteria include planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency. CALGreen also has two voluntary tiers of higher efficiencies and more sustainable practices.

¹ The energy efficiency criteria of the CALGreen code recommends that buildings consume 15% less energy compared to California's mandatory energy standards. However, this is not required in the code, although it appears to be written in mandatory language.

When considering green building development, many cities and states have enacted existing environmentally responsible initiatives and standards, such as the U.S. Green Building Council's certification program, Leadership in Energy and Environmental Design (LEED). Cities and states requiring LEED certification for certain building types are shown in Figure 1. (See Appendix A for a detailed list of these requirements.)

Figure 1. Map of green cities, LEED requirements, and International Green Construction Code (IgCC) implementation



In addition to those states and cities that require LEED certification, 45 states have incorporated LEED guidelines to some degree into diverse legislation, ordinances, or incentives. The USGBC reports a total of 384 cities and 58 counties, 35 state governments, 14 federal agencies or departments making use of the LEED guidelines. For example, Arlington County, Virginia grants extra building area for developers that pursue LEED, which can be especially beneficial in dense urban areas; and Oakdale, Minnesota promotes green building projects by offering reduced permit fees for LEED-certified buildings.

In 2010, the USGBC released a list of the *Top 10 States for LEED-certified Green Buildings per capita*:

- | | |
|-------------------|-------------------|
| 1. Washington, DC | 6. South Carolina |
| 2. Nevada | 7. Washington |
| 3. New Mexico | 8. Illinois |
| 4. New Hampshire | 9. Arkansas |
| 5. Oregon | 10. Colorado |

Green building development aids in creating sustainable cities, but it is only one of the contributing factors. According to *SustainLane's 2008 US City Rankings*², the most sustainable US cities were:

- | | |
|----------------------|---------------------|
| 1. Portland, OR | 11. Denver, CO |
| 2. San Francisco, CA | 12. Milwaukee, WI |
| 3. Seattle, WA | 13. Austin, TX |
| 4. Chicago, IL | 14. Sacramento, CA |
| 5. New York City, NY | 15. Washington, DC |
| 6. Boston, MA | 16. Cleveland, OH |
| 7. Minneapolis, MN | 17. Honolulu, HI |
| 8. Philadelphia, PA | 18. Albuquerque, NM |
| 9. Los Angeles, CA | 19. Atlanta, GA |
| 10. Baltimore, MD | 20. Kansas City, KS |

Barriers to Green Development

Green building still represents a small percentage of total construction.³ One reason for this is that existing codes and code officials often pose barriers to changes in construction practices. Another is anticipation of resistance from code officials. The Development Center for Appropriate Technology (DCAT) conducted research on barriers to green innovation within building codes. Eisenberg, Done, and Ishida (2002) surveyed 198 code users (architects, contractors, etc. who interact with code officials pursuing the approval of green building permits) and 56 code officials (building department officials who determine the fate of a green building project) in order to understand the barriers to the approval of green building design and construction.

² Rankings based on evaluation of transit, traffic congestion, land use, energy consumption, water quality and use, air quality, green buildings, housing availability and affordability, and sustainable government initiatives.

³ The National Association of Home Builders estimated green building was 2% of the market in 2006 and would climb to 10% in 2010. http://money.cnn.com/2006/05/31/real_estate/green_goes_large_scale/

According to Eisenberg et al (2002), there are several reasons to adapt building regulations to encourage and accommodate green building. First, in general, buildings have negative environmental impacts, including energy use, substantial CO₂ emissions, raw material use, site and water pollution, and are associated as well with potential human health concerns. The study found current building regulators are unaware of the “risks and unintended consequences inherent in current practice”. Additionally, most building departments lack the time and resources to educate building officials about these issues and essential elements of green building. The researchers found a surprising 65% of surveyed code users intentionally left out green building elements because they anticipated that code officials would deny the design. Based on the study, Eisenberg et al (2002) developed strategies to increase the chances of getting green building designs approved, and created a list of deficiencies within building departments that should be addressed in order to facilitate a wider acceptance and knowledge of green building practice.

Strategies for increasing the potential for code approval:

1. Present sufficient information to the building official pertaining to the green building technology (technical, engineered tests, precedents)
2. When applicable, include contact information of code official in other jurisdiction where similar green building technology was approved
3. Collaborate with code officials early in the design process, and begin the approval process early

Steps that can be taken to improve the compatibility of building regulations and green building:

1. Organize research committees within building department to inform code officials of green alternatives
2. Fund research initiatives in research universities and national laboratories in order to provide the needed technical information regarding green building technologies
3. Provide training for code users to better understand code requirements to facilitate approval
4. Provide training for code officials on green building alternatives (such as materials and systems) and how they uphold the intent of code requirements.

A key tool for incorporating green building practices is the use of “variances”. Variances are an exception to the existing building code. In many cases, gaining approval for a variance is the means of obtaining a permit when other than standard practice is proposed. Variances are generally approved as long as the alternative design follows the intent of the code and other legal stipulations are met.⁴ For every project that requires a variance, the workload of the code official and the code user increases. Forms have to be completed, signed, notarized, and supporting design documents submitted, along with paying any applicable fees. Providing a streamlined process for variance requests can help support innovations in green building.

⁴ For example, the variance must not be contrary to the public interest and must not diminish the value of surrounding properties.

Case Studies

To illustrate the nature of barriers to innovative design, two brief case studies are presented. Both show how barriers were overcome in order to create environmentally improved structures.



Image source: <http://tyson.wustl.edu/lc/index.php>

Tyson Living Learning Center

Washington University in St. Louis

Eureka, MO

Hellmuth + Bicknese Architects

Constructed 2008-2009;

Occupied May 2009

This building was designed for the Living Building Challenge, which includes additional social and economic considerations of sustainable design. The Challenge is based on seven pillars: site, water, energy, health, materials, equity, and beauty.

The site of the Tyson Living Learning Center is located in Unincorporated St. Louis County, Missouri where building project approval is known “for its inflexibility and highly tedious and bureaucratic process” (Tyson Living Learning Center, 2010). Upon being told that several of the proposed systems, such as composting toilets and greywater systems, were not going to be accepted in the County, the designers decided to collaborate with the County during the early stages of the design process. The involved parties partook in initial meetings. As a result of these meetings, County officials were supportive of the concepts and recommended that the design team consult with the building inspectors early in the process as well.

Designers submitted the green systems in “an alternate compliance path, which allowed for consideration of many of the systems that on the face of it did not meet code” (Tyson Living Learning Center, 2010). This approach facilitated a productive conversation regarding proposed alternative systems, and ultimately resulted in the approval of the systems. Thus, action on the part of the design team early in the approval process led to approval of alternative technologies that had been historically rejected.



Image source: Coen + Partners

Jackson Meadow

Marine on St. Croix, MN

Salmela Architect

Coen + Partners

Construction began: 1997

Jackson Meadow is an environmentally and socially progressive community development in Marine on St. Croix, Minnesota. In this project, the design team of Salmela Architect and Coen + Partners landscape architects challenged the existing building code in the design of Jackson Meadow. The new development proposals included a community wetland septic system, narrower street widths, and inverted crown roadways.

The process of reaching agreement on the vision and goals of the Jackson Meadow design required over 40 public review meetings, working with community and building code officials to compromise on a design. The result was a revision of many building codes.

Developer Harold Teasdale encourages “You just have to be willing to get a whole series of 'No's,' and keep asking the question, and asking the question, ask 'why not, why not, why not?' until you can finally bust through and get someone to say, 'well maybe if this is done this way,' then suddenly, 'yeah, I guess it would work if you did it that way'” (Helms, 2003).

International Green Construction Code as a Model

One of the new tools available to help integrate green building innovations into codes is the International Green Construction code that can serve as a model for addressing sustainability in commercial and high-performance buildings. The International Green Construction Code (IgCC) is an overlay code that is designed to supplement other International Codes.

The IgCC was created by the International Code Council (ICC) and promoted by ASTM International and the American Institute of Architects (AIA). The IgCC promotes high performance green building for new and existing commercial buildings. It expands the intent of existing building codes to “safeguard the environment, public health, safety, and general welfare through the establishment of requirements related to sustainability” (International Green Construction Code Public Version 2.0, 2010).

As stated, the goal of the IgCC is:

“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” (*International Green Construction Code Public Version 2.0, 2010*).

Criteria of the IgCC include:

- Site development and land use;
- Material resource conservation and efficiency;
- Energy conservation, efficiency, and earth atmospheric quality;
- Water resource conservation and efficiency;
- Indoor environmental quality;
- Building operation, maintenance, and owner education

The IgCC is written in mandatory language, meaning that all buildings must comply with the standards. As designed the intent is that basic requirements of the IgCC will be determined by each jurisdiction, with project electives added in addition to baseline requirements (see Appendices B and C for more information). Each jurisdiction can choose to require a certain number of project electives, from 1 to 14, for buildings in their jurisdiction.⁵ Although the IgCC is not a green building rating system, it works in a similar way to prescriptive point-based systems.

The IgCC was developed in 2010, and IgCC public version 2.0 was released in November 2010. The final 2012 International Green Construction Code will be published in March 2012. Beginning in 2012, the IgCC will provide a voluntary overlay to the existing building code, potentially making approval of non-standard designs more efficient.

Richland, Washington, became the first city to adopt the IgCC v1.0 in August, 2010, as a non-mandatory code for commercial buildings. Rhode Island was the first state to adopt IgCC v1.0 effective October 2010 for public buildings. Maryland was the first state to adopt the IgCC v2.0. Other cities that have adopted or modeled IgCC regulations during 2011 include Fort Collins, Colorado; Phoenix, Arizona; Kayenta Township, Arizona; and Boynton Beach, Florida.

⁵ Provisions also allow jurisdictions to adopt ASHRAE 189.1 *Standard for the Design of High-Performance Green Buildings* to replace IgCC chapters 3-11 requirements. For more information, see: <http://www.ashrae.org/publications/page/927>

Implementing the IgCC

The IgCC can be adopted as a non-mandatory code and provides a model for promoting sustainable innovations through design and construction. Its structure is flexible and compliments existing building codes, allowing for a smooth transition to sustainable construction or eventual mandatory adoption. Many of the barriers to green building can be reduced or eliminated with the implementation of the IgCC.

Steps for implementing the IGCC:

1. Engage key constituents early on
2. Ensure compliance with federal preemption⁶
3. Tailor the code to your jurisdiction
4. Provide training to code officials
5. Provide outreach and education about new codes once they're implemented

Source: Cheatham, 2011

According to Kobet (2010), “the IgCC is designed to be modified, adopted, customized...and has embedded in it standard language from which a municipality can depart...and move forward with the task of greening their existing codes to fit what they want to.” For example, Chapters 3 and 4 allow a jurisdiction to select what specific items they want to incorporate into their building codes.

Although the IgCC provides a foundation for widespread development of green buildings, it is also limiting in some aspects. The project electives focus on a limited number of strategies that have been well studied and proven. So, while the IgCC is likely to greatly advance green construction, it will be important that the IgCC evolve to keep pace with the rate of research and development. Thus, research as well as educational training continues to be important.

The IgCC provides an opportunity for jurisdictions to determine how best to encourage green building, either through a voluntary or mandatory process. Large-scale implementation of the IgCC could result in a larger knowledge base regarding green building practices among building department officials. Whether jurisdictions adopt the IgCC, create their own green building code, or continue to address green building through variances, it remained critical that project developers collaborate with building officials early in the design process.

Conclusion

Architects, design firms, green building programs, and communities are all contributing to diverse and creative approaches to environmental stewardship in our building practices. Yet, increased flexibility and support in the building code system are necessary to allow green building practices to be more fully integrated. The International Green Construction Code provides a structured overlay to be easily incorporated into existing codes. It is a flexible framework that allows for each jurisdiction to determine which components to enforce. However, in the meantime, experience suggests that patience and collaboration may be the key to resolving obstacles created by existing building codes and associated approval processes.

⁶ Which can prevent green codes related to appliances.

APPENDIX A_Places with LEED certification requirements

APPENDIX A_Places with LEED Requirements				
Source: USGBC. www.usgbc.org/DisplayPage.aspx?CMSPageID=1852				
*This list does not include places that accept a LEED equivalent certification				
PLACE	CERTIFIED	SILVER	GOLD	PLATINUM
<i>Alabama</i>				
<i>Alaska</i>				
Anchorage	new municipal projects built before July 1, 2012	new municipal projects built starting July 1, 2012		
Matanuska-Susitna Borough		new construction and additions over 10k sf		
<i>Arizona</i>		state-funded projects		
Chandler		new municipal projects over 5k sf		
Flagstaff		new municipal projects		
Oro Valley		new and renovated projects		
Phoenix		new municipal projects funded with 2006 Bond Funds		
Pima County		new and renovated county projects over 5k sf		
Queen Creek	new public projects			
Scottsdale			new public projects	
Tucson		new and renovated public projects over 5k sf		
<i>Arkansas</i>				
<i>California</i>				
Alameda	public projects over \$3 million construction costs			
Alameda County		county projects		
Albany			city and commercial projects over 5k sf	
Anaheim	new municipal over 10k sf			
Belmont		new and renovated commercial projects over 10k sf		
Berkeley		new municipal projects over 5k sf		
Brisbane		new municipal projects over 5k sf		
Calabasas	new city and privately-owned non-residential projects between 500-5k sf	projects over 5k sf		
Campbell		new and renovated municipal projects over 5k sf		

PLACE	CERTIFIED	SILVER	GOLD	PLATINUM
Costa Mesa			new municipal projects	
Cupertino		new municipal projects		
Dublin		municipal projects over \$3 million construction costs		
El Segundo		new municipal projects		
Emeryville		new municipal projects		
Gilroy		new and renovated municipal projects over 5k sf		
Hayward		new and renovated municipal projects over 5k sf		
Healdsburg	new and renovated non-residential projects over 10k sf			
Irvine	new and renovated municipal projects over 5k sf			
Larkspur	new commercial projects under 5k sf	new construction over 5k sf		
Long Beach	new municipal projects over 7,500 sf			
Los Altos		new public projects over 7,500 sf		
Los Altos Hills	new municipal projects over 1k sf; new residential and major renovations			
Los Angeles	city projects over 7,500 sf			
Los Angeles County	new county projects over 10k sf			
Manhattan Beach		new and renovated non-residential commercial projects over 10k sf	new and renovated municipal projects over 5k sf	
Marin County		new commercial over 5k sf	new commercial over 50k sf	
Mill Valley		new non-residential commercial		
Milpitas	new commercial 25,000 - 49,999 sf	new commercial over 50k sf; new and renovated municipal projects over 25k sf		
Monte Sereno		new and renovated municipal projects over 5k sf		
Monterey		new municipal projects		
Morgan Hill		new commercial over 5k sf		
Newark		new and renovated city projects over 5k sf		
Oakland		new and renovated projects over \$3 million construction costs		

PLACE	CERTIFIED	SILVER	GOLD	PLATINUM
Palo Alto	renovated commercial over 5k sf	new commercial over 5k sf		
Pasadena		new and renovated municipal over 15k sf; new commercial over 50k sf		
Piedmont	new and renovated city projects over \$3 million construction costs			
Portola Valley	new commercial between 2,000-3,000 sf	new commercial between 3,000-5,000 sf	new commercial over 5,000 sf	
Richmond		municipal and city-funded commercial projects over 5k sf		
Riverside County	new county projects over 5k sf			
Rohnert Park		new commercial over 50k sf; city-owned and funded projects over 20k sf		
Sacramento	city projects under 5k sf	city projects over 5k sf		
San Anselmo		new commercial between 5,000-49,999 sf	new commercial over 50,000 sf	
San Bernadino County		new and renovated county projects		
San Diego		municipal projects		
San Francisco		municipal projects over 5k sf		
San Jose	new residential over 75' tall	new commercial and industrial over 25k sf		
San Leandro		new and renovated city-owned or occupied projects over \$3 million construction costs		
San Mateo	new commercial between 1k - 10k sf	new and renovated commercial over 10k sf		
San Mateo County	new and renovated commercial and industrial over 3k sf			
San Rafael		new and renovated commercial over 30k sf		
Santa Clara		new public projects over 5k sf		
Santa Clarita		new municipal projects		
Saratoga		new public projects over 5k sf		
Solana Beach		new municipal projects		
Sunny Vale	new municipal projects between 5k-25k sf; non-residential projects between 5k-50k sf	new municipal projects over 25k sf; new non-residential over 50k sf		

PLACE	CERTIFIED	SILVER	GOLD	PLATINUM
Temecula	new and renovated municipal projects			
Tiburon		new commercial projects between 3,000-19,999 sf	new commercial over 20,000 sf	
West Hollywood	new and renovated public projects over 10k sf			
<i>Colorado</i>				
Denver	new and 25% renovated municipal projects over 5k sf			
Fort Collins			new municipal projects over 5k sf	
Golden		new municipal projects over 5k sf		
Mountain Village		new commercial over 5k sf		
<i>Connecticut</i>		new private projects of \$5 million construction costs built after Jan 1, 2009; renovated projects of \$2 million construction costs after Jan 1, 2010 (excludes multi-family residential projects with fewer than 5 units)		
Greenwich		new and renovated town projects		
Stamford		city-owned and at least 50% city-leased projects over 5k sf		
<i>Delaware</i>				
<i>District of Columbus</i>				
<i>Florida</i>				
Broward County	new county projects			
Dunnellon	new commercial over 80k sf			
Gainesville	city government projects			
Margate	new and renovated city projects			
Miami Beach		new municipal projects		
Miami-Dade County		new county-owned projects		
North Miami		new and renovated city-owned projects		
Pembroke Pines		new and renovated city-owned projects		
Sarasota County	county projects			
Tampa		new municipal projects over 5k sf		
<i>Georgia</i>				
Athens-Clarke County	new municipal projects			

PLACE	CERTIFIED	SILVER	GOLD	PLATINUM
Atlanta		city-funded projects over 5k sf		
Chamblee	new public projects; new commercial over 20k sf			
Conyers	new residential and municipal projects over 5k sf			
Doraville	new municipal, commercial, industrial, multi-family residential over 20k sf			
<i>Hawaii</i>				
Honolulu		new city projects over 5k sf		
<i>Idaho</i>				
<i>Illinois</i>				
Bartlett	new public projects			
Evanston		city-owned, multi-family, and commercial projects over 10k sf		
Normal	new construction over 7,500 sf			
Northbrook	new municipal projects			
Yorkville	new municipal projects over 5k sf			
<i>Indiana</i>				
Bloomington		new and renovated municipal projects		
<i>Iowa</i>				
<i>Kansas</i>				
Greensburg				city-owned projects over 4k sf
<i>Kentucky</i>	new and renovated public projects			
<i>Louisiana</i>				
<i>Maine</i>				
Bangor	new and renovated city projects			
Portland		new and renovated municipal projects over 5k sf; new and renovated city-funded projects over 10k sf		
York		municipal projects over 5k sf		
<i>Maryland</i>				
Annapolis	commercial, mixed-use projects over 7,500 sf; 5+ single family houses on one lot or single family house over 3,250 sf			
Anne Arundel County		county-owned projects over 10k sf		

PLACE	CERTIFIED	SILVER	GOLD	PLATINUM
Baltimore	city-owned and funded projects over 10k sf			
Brookeville				
Gaithersburg	commercial and residential projects over 4 stories between 10,000-99,999 sf	commercial and residential projects over 4 stories and over 100k sf		
Howard County	private projects over 50k sf	new county projects		
La Plata	town-owned and funded projects over 5k sf			
Montgomery County	commercial, industrial, multi-family projects over 10k sf	new county projects over 10k sf		
<i>Massachusetts</i>				
Arlington		new and renovated projects		
Boston		city projects		
Cambridge	projects between 25k-50k sf	projects over 50k sf		
Medford	new municipal projects			
<i>Michigan</i>				
East Lansing		new and renovated municipal projects over 5k sf		
Grand Rapids	new municipal projects over 10k sf			
Rochester Hills	new and renovated municipal projects			
<i>Minnesota</i>				
<i>Mississippi</i>				
Starkville	new municipal projects over 3k sf			
<i>Missouri</i>				
Clayton		new and renovated city-owned and funded projects		
Ferguson		new and renovated city-funded projects		
Kansas City		new city projects over 5k sf		
Springfield		new city-owned projects		
St. Louis		new and renovated municipal projects over 5k sf		
<i>Montana</i>				
<i>Nebraska</i>				
<i>Nevada</i>				
<i>New Hampshire</i>				
Derry	new and renovated town-owned and funded projects			
<i>New Jersey</i>		new state-owned projects over 15k sf		

PLACE	CERTIFIED	SILVER	GOLD	PLATINUM
Cranford		new town-funded and owned projects		
Hillsborough	new and renovated mixed-use projects			
Jersey City		new and renovated municipal projects		
Kearny		new municipal projects		
Stafford Township	new projects part of major site plan or subdivision			
<i>New Mexico</i>				
Taos	commercial projects over 6k sf			
<i>New York</i>				
Battery Park City			residential developers	
East Aurora	new government-owned projects			
Erie County		new and renovated county projects		
NYC		new and renovated municipal projects		
Niagara County		new and renovated county-owned projects		
Riverhead	new and renovated town-owned projects			
Rockland County		new major projects		
Suffolk County	new and renovated Department of Public Works projects			
Syracuse		new and renovated municipal projects		
<i>North Carolina</i>				
Asheville			new city-owned projects over 5k sf	
Chapel Hill		new municipal projects over 5k sf		
Durham County		new county projects between 4k-10k sf	new county projects over 10k sf	
<i>North Dakota</i>				
<i>Ohio</i>		new public schools		
<i>Oklahoma</i>				
<i>Oregon</i>				
Corvallis		new city projects		
Eugene		new municipal projects over 10k sf		
Multnomah County			new county-owned projects	
Portland	new and renovated public projects			
<i>Pennsylvania</i>				
Philadelphia		new municipal projects over 10k sf		
Pittsburgh		new municipal projects over 10k sf		
West Hanover		new retail projects over 75k sf		

PLACE	CERTIFIED	SILVER	GOLD	PLATINUM
<i>Rhode Island</i>				
Providence	new municipal projects			
<i>South Carolina</i>		new and renovated state owned and funded projects over 10k sf		
Charleston	new municipal projects			
<i>South Dakota</i>				
<i>Tennessee</i>				
Germantown	new municipal projects			
<i>Texas</i>				
Austin	new public projects over 5k sf			
Dallas			city projects over 10k sf	
El Paso		new municipal projects over 5k sf		
Flower Mound			residential projects in gated community	
<i>Utah</i>		new state projects		
Alta				
Logan City		new city projects over 10k sf		
<i>Vermont</i>				
<i>Virginia</i>				
Alexandria		new municipal and commercial projects		
Chesapeake	new municipal projects over 5k sf			
Fairfax County		new and renovated county projects over 10k sf		
Hampton		all development of public land		
Richmond		new and renovated municipal projects over 10k sf		
<i>Washington</i>		capital-funded projects over 5k sf; new schools		
Bellingham		new and renovated projects over 5k sf		
Edmonds		new city-owned projects over 5k sf		
Everett		new capital improvement projects over 5k sf		
King County	new public projects			
Seattle		city projects over 5k sf		
<i>West Virginia</i>				
Morgantown	new and renovated city-owned projects over 10k sf			
<i>Wisconsin</i>				
Madison		new municipal projects over 5k sf		
<i>Wyoming</i>				

APPENDIX B_IgCC Requirements

**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	<input type="checkbox"/> Yes	<input type="checkbox"/> No
302.1 (3)	Project Electives – The <i>jurisdiction</i> shall indicate a number between 1 and 14 to establish the minimum total number of <i>project electives</i> that must be satisfied.	_____	
CH 4. SITE DEVELOPMENT AND LAND USE			
402.2.3	Conservation area	<input type="checkbox"/> Yes	<input type="checkbox"/> No
402.2.5	Agricultural land	<input type="checkbox"/> Yes	<input type="checkbox"/> No
402.2.6	Greenfields	<input type="checkbox"/> Yes	<input type="checkbox"/> No
403.4.1	High occupancy vehicle parking	<input type="checkbox"/> Yes	<input type="checkbox"/> No
403.4.2	Low emission, hybrid and electric vehicle parking	<input type="checkbox"/> Yes	<input type="checkbox"/> No
405.1	Light pollution control	<input type="checkbox"/> Yes	<input type="checkbox"/> 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.	<input type="checkbox"/> 65%	<input type="checkbox"/> 75%
CH 6. ENERGY CONSERVATION AND EARTH ATMOSPHERIC QUALITY			
Table 602.1, 302.1, 302.1.1	<i>zEPI</i> of Jurisdictional Choice - The <i>jurisdiction</i> shall indicate a <i>zEPI</i> 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 CO ₂ e emissions limits and reporting	<input type="checkbox"/> Yes	<input type="checkbox"/> No
613.2	Post C. of O. <i>zEPI</i> , energy demand, and CO ₂ e emissions reporting	<input type="checkbox"/> Yes	<input type="checkbox"/> No
CH 7. WATER RESOURCE CONSERVATION AND EFFICIENCY			
702.1.2	Enhanced plumbing fixture and fitting flow rate tier .	<input type="checkbox"/> Tier 1 <input type="checkbox"/> Tier 2	
702.7	Municipal reclaimed water.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
CH 9. COMMISSIONING, OPERATION AND MAINTENANCE			
904.1.1.1	Periodic reporting	<input type="checkbox"/> Yes	<input type="checkbox"/> No
CH 10. EXISTING BUILDINGS			
1006.4	Evaluation of existing buildings	<input type="checkbox"/> Yes	<input type="checkbox"/> No

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

APPENDIX C_IgCC Project Electives Checklist

**TABLE 303.1
PROJECT ELECTIVES CHECKLIST**

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

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

- 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

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