



THE AMERICAN
INSTITUTE
OF ARCHITECTS

The AIA Guide to the IgCC International Green Construction Code



The AIA Guide to the IgCC

Section 1

- Level 1 What is the International Green Construction Code?
- Level 2 Background: The IgCC and History of Environmental Advocacy by the AIA
- Level 3 Policy Mandates and Energy Codes and Standards—Understanding the Problem

Section 2

- Level 1 Implementation: Design
- Level 2 Design Impacts and Opportunities
- Level 3 A Closer Look: Energy and Energy Modeling
- Level 4 Appendix: Key Energy Definitions in the IgCC

Section 3

- Level 1 Implementation: Practice
- Level 2 Practice Impacts and Opportunities
- Level 3 Determining Your Path through the IgCC
- Level 4 A Closer Look: Post-occupancy, Commissioning and Compliance

Section 4

- Level 1 Chapter-by-Chapter Summary of the IgCC
- Level 2 Design and Practice Implications of the IgCC, Chapter-by-Chapter

Section 5

- Level 1 Advocacy: How to Discuss the IgCC with Others
- Level 2 Advocacy: Lobbying 101
- Level 3 Advocacy: Resources for Lobbying

Section 6

- Level 1 Resources
- Level 2 Credits

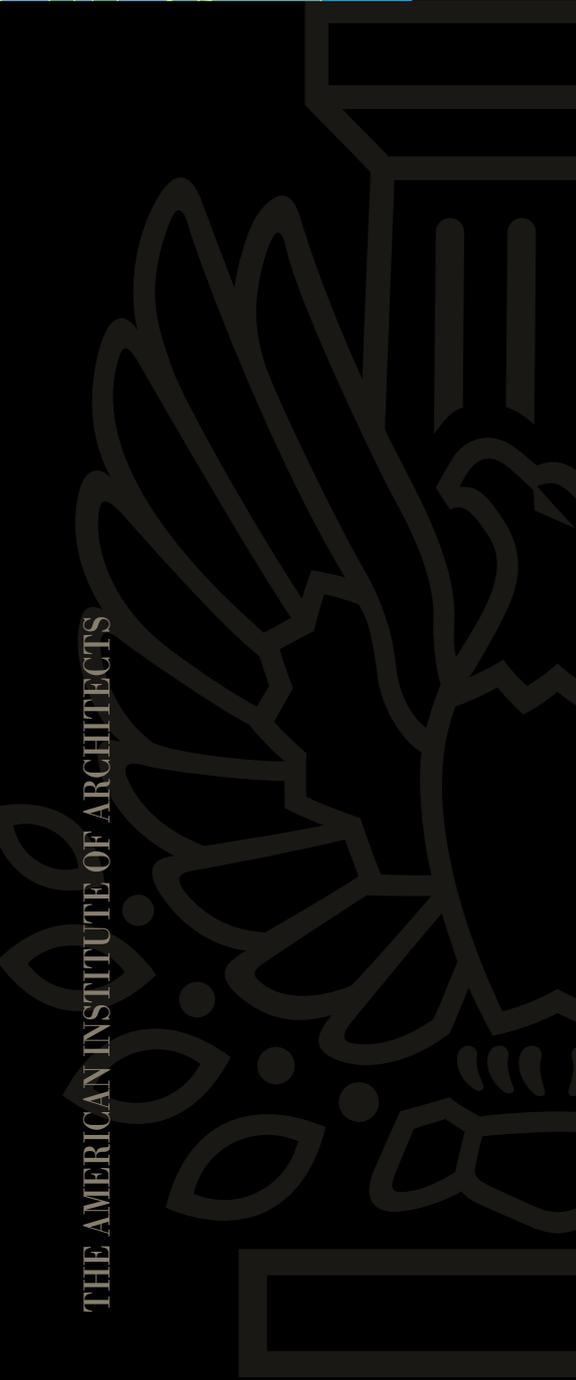
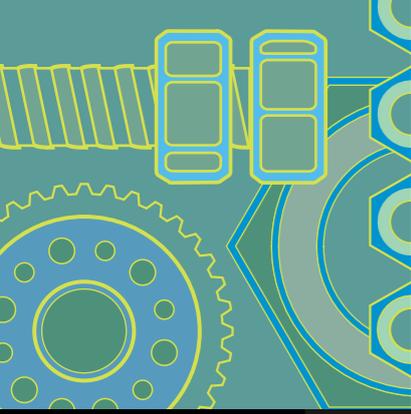


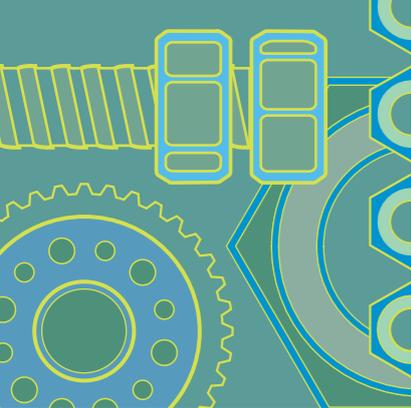
THE AMERICAN
INSTITUTE
OF ARCHITECTS

This guide takes a practical look at the IgCC from the perspective of the AIA member. It addresses both the process of advocating for the IgCC's adoption by a jurisdiction and that of implementing it within your own practice and projects. Start with the top-level summaries and drill down to get to deeper levels of understanding, using the interactive table of contents.

The AIA Guide to the IgCC

Table of Contents



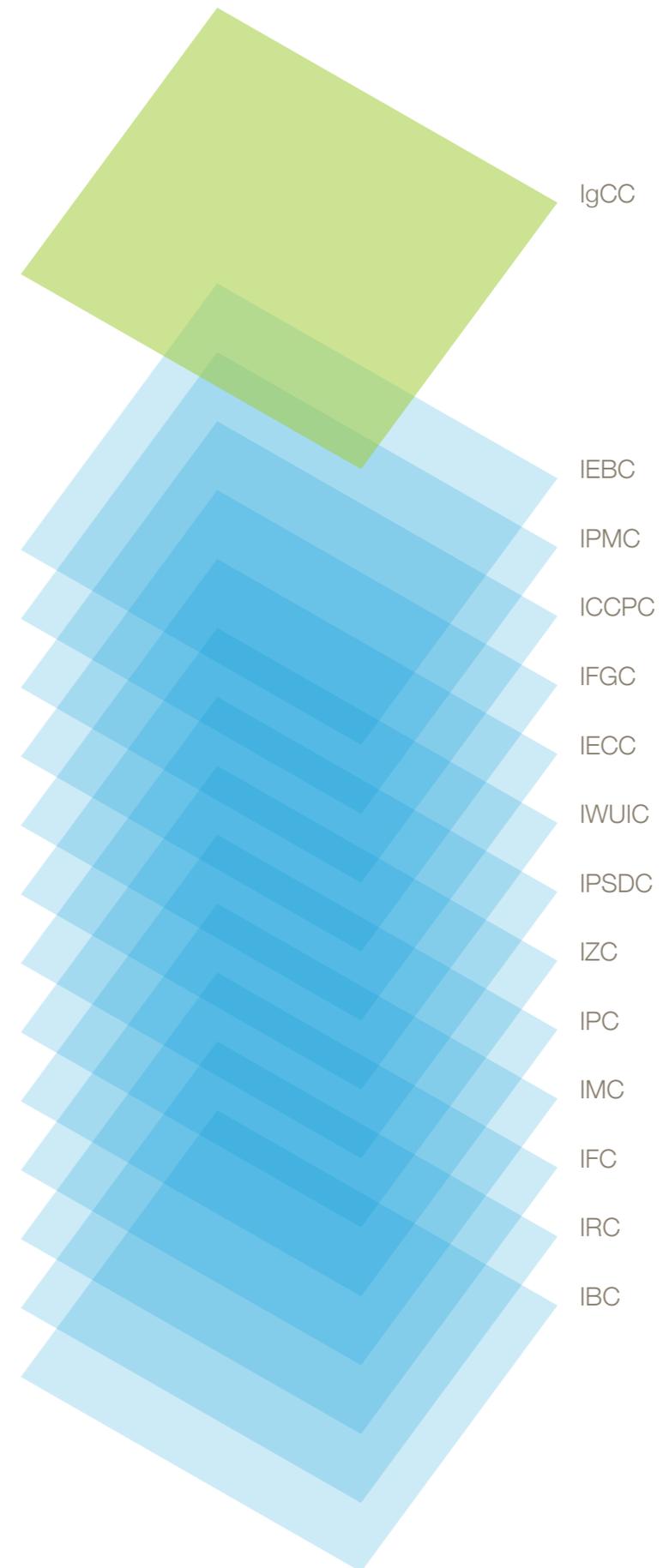


What is the International Green Construction Code?

Section 1, Level 1

The International Green Construction Code (IgCC) is the first national green model code. It is an “overlay” code, which means that it adds green provisions on top of existing codes, such as the International Building Code (IBC), International Energy Conservation Code (IECC) and the other “I-Codes.” It is flexible, enabling jurisdictions to choose additional requirements that make the code a deeper shade of green, while paying close attention to the local climate and local regulatory requirements.

Whether or not you are familiar with sustainable design or have ever worked with green rating systems or local green building ordinances, code mandated high-performance building design and construction requirements are beginning to shape the very fabric of the architecture profession. Strong market forces led in part by voluntary above-code ratings systems combined with strong leadership by architects and other design professionals (and their forward-thinking clients) over the past twenty years has resulted in the gradual mainstreaming of sustainability, leading inevitably to sustainability ordinances across the country, and now, a green model code. Examples of green regulations shown in the [AIA Local Leaders Reports](#), show us that green model codes are a natural evolution of the codes.



What is the International Green Construction Code?

Section 1, Level 1

What is in the IgCC?

The IgCC applies to all occupancy-types except low-rise residential buildings under the International Residential Code. The IgCC is not applicable to equipment or systems used primarily for industrial or manufacturing purposes. The new code is intended to provide “minimum requirements to safeguard the environment, public health, safety and general welfare” and reduce the negative impacts and increase positive impacts of the built environment on the natural environment and building occupants. As such, it covers natural resources, material water and energy conservation, operations and maintenance for new and existing buildings, building sites, building materials, and building components (including equipment and systems).

ANSI/ASHRAE/USGBC/IES Standard 189.1

A Project Elective Alternative Compliance Path to the IGCC

It is important to know that an exception to Section 101.3 of the IgCC, by reference to Section 301.1.1, allows ASHRAE 189.1 Standard for the Design of High Performance Green Buildings, to be used to comply with the IgCC. Where ASHRAE 189.1 is used, it replaces all but Chapter 1 of the IgCC.

ANSI/ASHRAE/USGBC/IES 189.1 (“Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings”) is a code-intended building standard under continuous maintenance. The aim of the standard is to provide minimum requirements for the siting, design, construction, and plan for operation of high-performance green buildings. Balancing environmental responsibility, resource efficiency, occupant comfort and well being, as well as community sensitivity; while supporting the current goals of development without compromising future generation’s ability to meet their own needs will remain a strength of Standard 189.1.



IgCC 2012 – Chapters

Chapters 1 & 2
Administration and Definitions

Chapter 3
Jurisdictional Requirements and Life Cycle Assessment

Chapter 4
Site Development & Land Use

Chapter 5
Material Resource Conservation and Efficiency

Chapter 6
Energy Conservation, Efficiency and CO2 Emission Reduction

Chapter 7
Water Resource Conservation, Quality and Efficiency

Chapter 8
Indoor Environmental Quality and Comfort

Chapter 9
Commissioning, Operations and Maintenance

Chapter 10
Existing Buildings

Chapter 11
Existing Building Site Development

Chapter 12
Referenced Standards

App A
Project Electives

App B
Radon Mitigation

App C
Optional Ordinance

App D
Enforcement procedures

What is the International Green Construction Code?

Section 1, Level 1

Standard 189.1 provides minimum criteria applying to new buildings and their systems; new portions of buildings and their systems; and new systems and equipment in existing buildings. In addition, the standard addresses site sustainability, water use efficiency, energy efficiency, indoor environmental quality (IEQ), and a building's impact on the atmosphere, materials, and resources.

In brief, Standard 189.1 addresses:

1. site sustainability (e.g., construction on appropriate sites; design guidelines for reducing heat island effects and light pollution);
2. water use efficiency (e.g., reducing, measuring, and managing indoor and outdoor water use);
3. energy efficiency (e.g., energy consumption reduction through conservation and on-site renewable generation – and management of use and generation);
4. indoor environmental quality (e.g., meeting or exceeding minimum ventilation and other requirements of ASHRAE Standard 62.1-2010; measurement of outdoor air delivery; thermal comfort [as outlined by ASHRAE Standard 55-2010]; acoustical and visual comfort)
5. construction waste management to increase recycling and/or re-use (e.g., prohibit use of CFC-based refrigerants and other ozone-depleting substances; collection and storage of recyclable and reusable goods and potentially hazardous waste; increase use of regional, bio-based materials; life-cycle assessments to demonstrate improvement in at least two impact categories by minimum target amounts); and
6. construction and plans for operation (e.g., building acceptance testing; commissioning, IAQ management; plans for building operation).

For additional information about Standard 189.1 see the Resources section 6.

AIA and the IgCC: architects at the center of the discussion

The AIA has actively engaged in the development of the IgCC since 2009, working with International Code Council (ICC) Staff, volunteers from the AIA, and numerous other organizations on committees and in the public hearings that form the basis for the ICC's model code development process. The creation of the IgCC supports [existing AIA Board position statements](#) on the value of a comprehensive code; sustainability; and sustainable codes, standards, and rating systems. The IgCC is designed to be a flexible document with provisions that facilitate establishment of appropriate levels of regulation within a community. Architects in each jurisdiction should play a key role in the adoption process, assisting the jurisdiction in considering local building stock, climate, local resources, and social and economic conditions.



What is the International Green Construction Code?

Section 1, Level 1

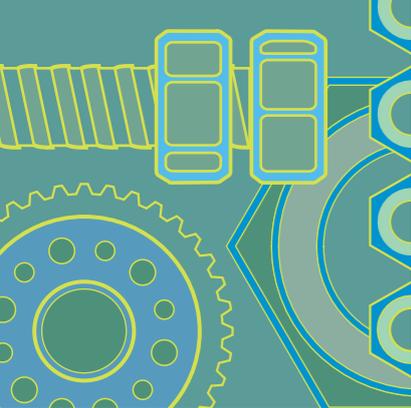
Why All This Matters to AIA Members and Components

Each jurisdiction should thoughtfully weigh a variety of factors when considering adoption of the IgCC. Therefore, it is critically important that AIA members and components understand the structure and content of the IgCC, the AIA's involvement in its development, and the resources available to assist members in understanding it and advocating for its adoption. The AIA provides education resources so that architects will be informed about the IgCC and ready to practice under it once it is adopted, as well as advocacy resources for code adoption in individual jurisdictions. The AIA will seek feedback on a continuous basis from all its members and components to understand what does and doesn't work about the IgCC so that it can be refined over time, like all the national model codes.

Participate in National Model Code Development

The 2012 IgCC is only the beginning. It is part of the same development process as the other "I-Codes"—the ICC family of codes—with revisions occurring every three years. The AIA will continue to represent the interests of our members at code development hearings, by proposing and advocating for changes that support architects in both design and practice. Check out www.aia.org/codesadvocacy and www.aia.org/igcc for more information and updates.





Background: The IgCC and History of Environmental Advocacy by the AIA

Section 1, Level 2

In support of its existing policies and in pursuit of carbon neutral buildings, the AIA firmly supports the continued development, adoption, use, and enforcement of the International Green Construction Code. While sustainability is everyone's concern, the IgCC is founded with an understanding that all of our communities possess local economic, regulatory, and climate-related issues, which must be addressed when adopting new regulations. The IgCC can be adapted and deployed in all of the places we live, work, and play. Since its founding, the AIA has worked to represent the interests of its members and the IgCC is no exception. The AIA has been instrumental in the development of the IgCC because it's a vital effort for design and practice today that will reap benefits for our communities tomorrow.

—Robert Ivy, FAIA, EVP, Chief Executive Officer and
Jeff Potter, FAIA, 2012 AIA President

The IgCC provides model code language for states and municipalities to establish baseline high performance building requirements for new and existing buildings. This new code, published for the first time in March of 2012 and designed to be used with the existing “I Codes,” includes provisions regarding energy and water use efficiency; materials and resource use; indoor environmental quality; building impacts on the environment; site design; and education of building owners and users about sustainable building management.

History of Environmental Advocacy by the AIA

A research committee had existed in the AIA since the 1950s, but the Institute's involvement in energy issues began in 1973 with the founding of the AIA Energy Committee. The Energy Committee prepared several papers, including A Nation of Energy Efficient Buildings, which became effective AIA tools for lobbying on Capitol Hill.

1973 saw, as well, the founding of the AIA Research Corporation, which engaged in an array of energy studies, including regional guidelines for passive solar design and building energy performance standards intended to become energy codes. The Research Corporation was credited with arguing effectively for the architectural focus of building science research and for critical federal funding support of building science related to energy. EPA funding drove the multidisciplinary development of the Environmental Resource Guide (ERG) in 1992.

In 1991, an AIA Convention resolution called on all AIA members to undertake environmental reforms within their practices, such as the immediate cessation of ozone-depleting refrigerants. The 1993 AIA National Convention focused on sustainable design, including the signing of the Declaration of Interdependence for a Sustainable Future, a document placing “environmental and social sustainability at the core of our practices and professional responsibilities.”

In May of 2007, the AIA, the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Architecture 2030, the Illuminating Engineering Society of North America (IESNA), and the U.S. Green Building Council, supported by representatives of the U.S. Department of Energy, established a common starting point and goal for carbon-neutral buildings.

In December 2009, the AIA Board of Directors approved the following position statement:

Sustainable Building Codes, Standards, and Rating Systems

The AIA supports the development, evaluation and use of codes, standards and evidence-based rating systems that promote the design, preservation, and construction of sustainable communities and high performance buildings.

Background: The IgCC and History of Environmental Advocacy by the AIA , *continued*

Section 1, Level 2

In 2009, the AIA started the 2030 Commitment program. The AIA 2030 Commitment is a growing national initiative that provides a consistent, national framework with simple metrics and a standardized reporting format to help firms evaluate the impact design decisions have on an individual project's energy performance. To truly rise to meet the energy reduction goals of 2030, we have to apply the principles of sustainable design to every project from its inception and early design through project completion and ongoing building operations—not just those projects in which our clients wish to pursue third party green building certification. The profession can't meet radical building energy use reduction targets one project at a time and architects are embracing the challenge at hand by thinking differently about sustainable design.

The International Code Council began the IgCC initiative in 2009, with the AIA and ASTM as Cooperating Sponsors. The initiative builds upon the good work of many organizations and advocates concerned with a more sustainable built environment. The timing of this activity is appropriate in the evolution of sustainability efforts in the U.S. and around the world. Now that various approaches have been tested and implemented, there is a clearer picture as to what is required in a code.



Meeting the 2030 Sustainability Objectives: Architects as Leaders

To achieve carbon neutral buildings by 2030, a goal championed by Architecture 2030 and endorsed and adopted by the AIA, architects, engineers, builders, and our clients must continue to respond to the evolving landscape of design process and products. We must delve deeply into high performance building sciences as a profession and across the building industry, including in our design school curricula. The new IgCC green building code requirements offer an historic opportunity for all of us to do just that.

The architect, as both project leader and industry leader, must step up to the task at hand. The future success of our profession demands that we lead the way to a truly sustainable built environment. We all need to prepare for—and to embrace—the sea change coming to the architecture and engineering communities with the adoption of high-performance building codes.

High-performance Building Design Meets Regulation

Over the last decade, architects have seen the increased use of high-performance design strategies and have begun to merge them into their daily practice. While voluntary in most jurisdictions, the USGBC's LEED Certification and similar programs have elevated the level of design for many building types across the country. Many local jurisdictions and even federal agencies have adopted LEED as a comprehensive green standard, though it was not written as a code or intended to perform the functions of one.

In 2011, California put into place CALGreen, the first set of statewide mandatory sustainable design measures in the U.S. CALGreen is distinguished by the fact that it is a state-wide mandate, whereas the IgCC could be adopted at different levels: state-wide, in states that

Background: The IgCC and History of Environmental Advocacy by the AIA , *continued*

Section 1, Level 2

require all jurisdictions to comply with a single set of codes, or jurisdiction by jurisdiction. The International Code Council (ICC) has been publishing the International Energy Conservation Code (IECC) since 2000. Designed to work in conjunction with the other ICC family of codes, various editions of the IECC have already been adopted in many jurisdictions.

Movement toward a model green code has been long in the making. Market demand for green construction and changes in corporate culture that began in the early 1990s ultimately have led to the prolific use of LEED and other rating systems, as well as the advent of green building regulations. A shift has occurred, starting with the market, owner demand and recognition by the building industry and local, state and federal regulations thence leading to the creation of the IgCC. The IgCC in this sense is not itself a game changer, but further evidence that the game has changed.

The ICC—in collaboration with the AIA, USGBC, IES, ASHRAE, and ASTM—has launched the IgCC for adoption by local and state building code jurisdictions. The publication of such a model code is a milestone, of which every architect must take note. It will fundamentally change the architect's practice and the standard of care for building design. This process can open up new opportunities for architects to embrace as we strive to improve the performance of the projects we design.

Architects as Leaders

Architects are unique in that they can be generalists, translating complex concepts into language that most can understand. The emergence of the IgCC affords architects many opportunities, among them leadership in a community's process for adoption, continued influence on the development of the IgCC, and new areas of practice, including energy modeling and commissioning.

The more you know about the IgCC, the more you can be a resource for clients and the community at large. When you educate and market yourself as a technical resource for your community, you are more likely to be asked by lawmakers to participate in creating better laws and ordinances for the built environment, and more likely to be sought by clients for your expertise.

The IgCC should be seen as an umbrella or overlay set of new requirements that supplements the package of regulations that is adopted by a jurisdiction. It offers options that are intended to address specific community needs. Architects can provide decision makers with a comprehensive understanding of the appropriateness of these options.

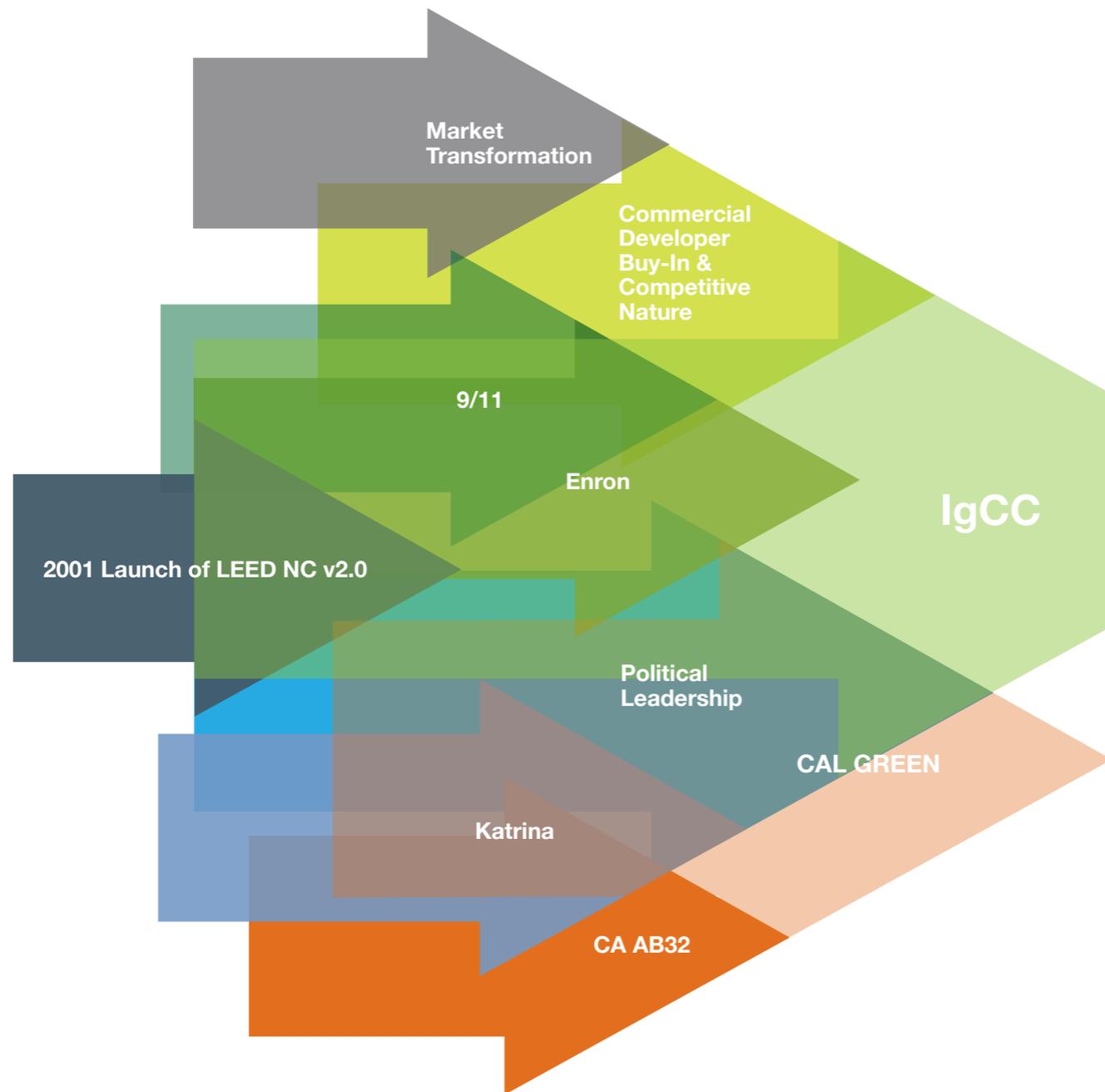
How to Use the IgCC

Architects can engage in every aspect of the IgCC, as advocate, educator, and user. Because of the uniqueness of the IgCC and its integration into the fabric of each community's regulatory framework, architects can provide technical knowledge and act as resources for local building officials. For architects highly knowledgeable in sustainable design, there is an opportunity to guide the implementation of what will amount to new concepts for many jurisdictions. Finally, architects can seize the opportunity to serve clients and our communities with superior projects that achieve ever-higher levels of performance.

The first step toward aiding your jurisdiction in the adoption process is careful review of Chapter 3, the Jurisdictional Requirements. One size does not fit all in the IgCC, and both architects and building officials should understand how each jurisdictional elective would be applied in their location. Adoption of the IgCC assumes that the family of I-Codes has been adopted; this is particularly important with respect to the International Energy Conservation Code (IECC), the performance levels of which are tied directly to implementation of the IgCC in the 2012 edition.

Background: The IgCC and History of Environmental Advocacy by the AIA, *continued*

Section 1, Level 2



The IgCC: Not Just Another Code

The International Green Construction Code is uniquely structured to engage architects. Input from the entire design team is necessary for the application of this code. The IgCC addresses the effects of construction on communities and the environment. It integrates disparate elements of regulation for development, planning, services, and control beyond the “building code” or even the full package of typical codes that focus merely on the building itself. The structure and process of the IgCC are also novel by not including a permit for compliance. There will be no “green permit” under the IgCC; rather, the provisions of the IgCC will be applied by the jurisdiction as they find appropriate, using the normally required permits.

The Origins and Purpose of the IgCC

The IgCC was developed as an overlay code that works with the existing ICC family of codes, or “I-Codes.” It was created for several reasons. First, sustainable design has become increasingly important. Sustainable design principles have moved from the narrow focus of a few specialty practitioners to being squarely in the mainstream of architectural practice.

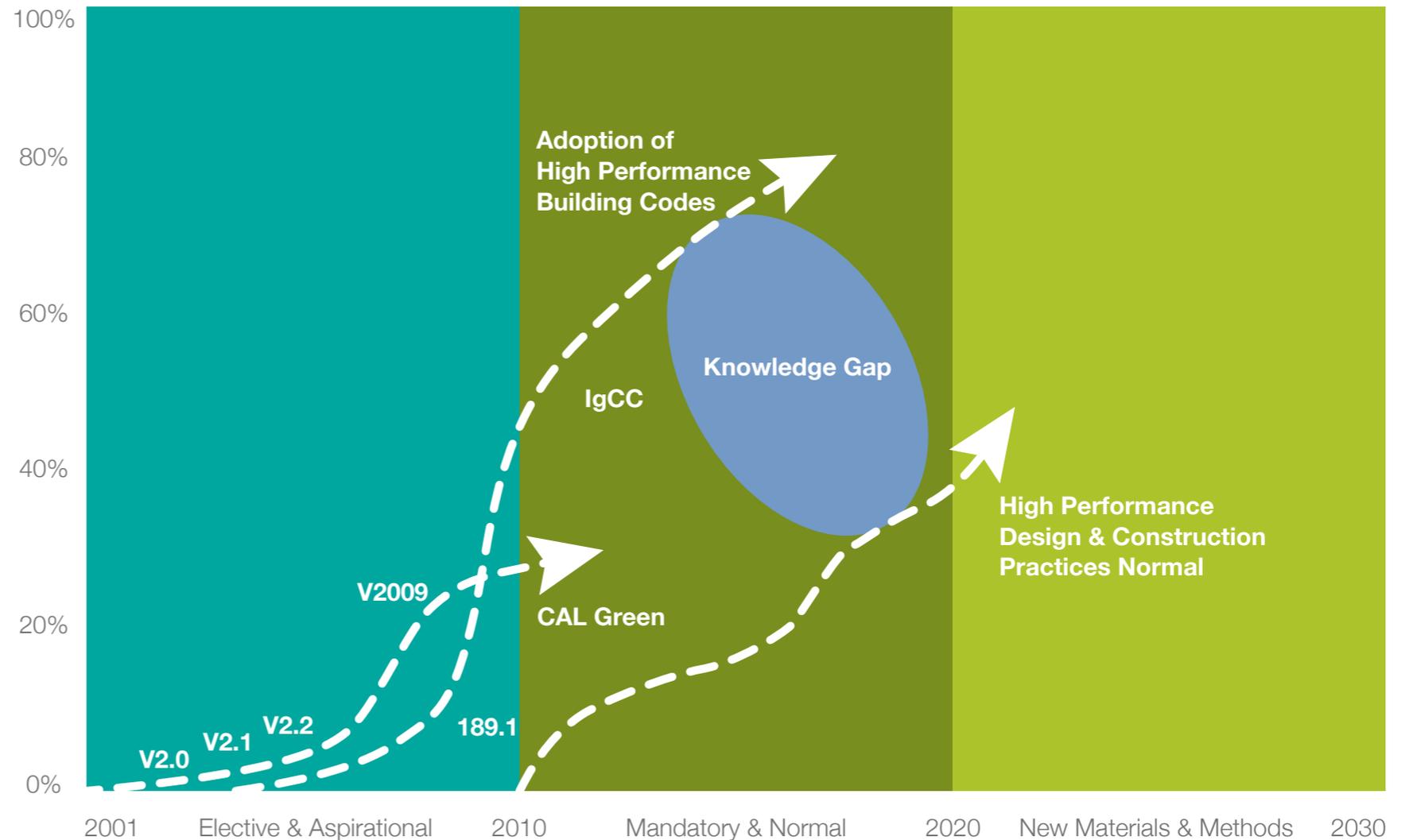
Background: The IgCC and History of Environmental Advocacy by the AIA , *continued*

Section 1, Level 2

Second was the need to translate aspirations into enforceable regulations. As there were no existing codes that specifically addressed issues of sustainable design, a number of governmental agencies, jurisdictions, and private sector clients adopted above-code green building guidelines such as LEED, as a *de facto* code. There are, however, several challenges associated with this approach, foremost of which is that programs such as LEED are not written in the imperative, as model

codes typically are. Rather than stating “shall” or “shall not,” previous guidelines were couched in the language of “may want to consider.” Because of this, any entity wanting to adopt a green building guideline as a code had to tinker with the requirements and had to negotiate a common understanding among end users, design team members, contractors, and code officials. As the USGBC itself recognized, the aspirational guidelines were being asked to be something they were not intended to be.

U.S. Overview— Path Towards Full Integration



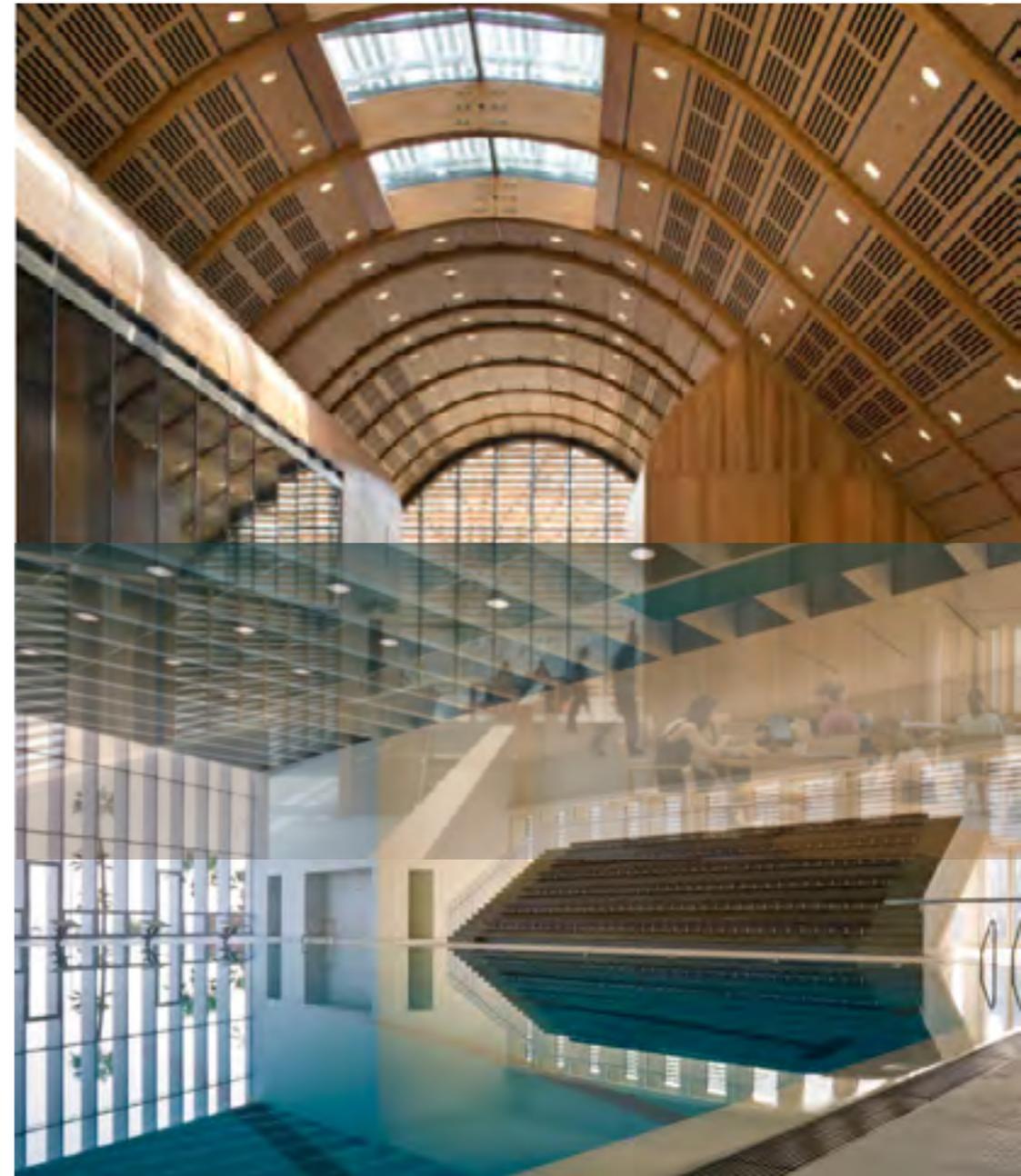
Background: The IgCC and History of Environmental Advocacy by the AIA , *continued*

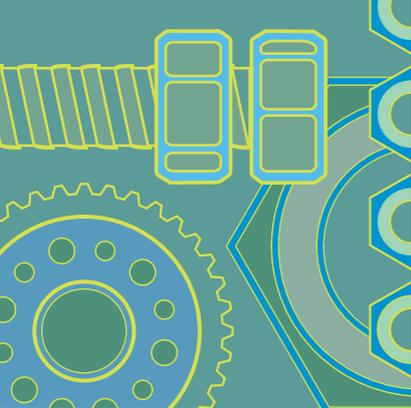
Section 1, Level 2

Third was the need for consistency across jurisdictions. Coupled with the fundamental differences between aspirational, voluntary guidelines and a model code was the fact that different jurisdictions applied different interpretations and requirements. There was no comprehensive training program available for local code officials to interpret and apply the guidelines, as there is for an enforceable model code. The USGBC uses technical committees coupled with one or more public comment periods and a member voting process to create, revise, vet and approve their rating systems. This process of development and revision is fundamentally different from that of a model code, making it difficult for a jurisdiction to adopt such guidelines by reference. The resulting code would either be static, pegged to a particular version of the guidelines and unable to evolve along with sustainable design practices; or it would be subject to unforeseen changes in the separately evolving guidelines.

The IgCC addresses all three of these needs. It recognizes the centrality of sustainability in design and construction; it provides readily adoptable and enforceable language; and it allows for greater consistency in both its current application and its evolution. The IgCC is coordinated with the other I-codes, especially the IECC, providing the clarity and consistency of interpretation that all parties seek when designing, constructing, and inspecting a building. It will be included in the ICC's three-year code review cycle, and therefore will be able to evolve as our understanding of green buildings grows and evolves.

Finally, the IgCC is important to architects because it takes a holistic and integrated approach to the design and construction process, which is how we work. As architects, we coordinate and integrate our own design work with the work of other disciplines within a project. As an overlay code coordinating with the underlying codes (Building, Electrical, Mechanical, Fire, etc.) the IgCC acts in a similar way.





Policy Mandates and Energy Codes and Standards— Understanding the Problem

Section 1, Level 3

On the positive side, policy mandates are driving increased stringency in energy codes (IECC) and standards (ASHRAE 90.1 and 189.1), as well as in the IgCC. And architects practicing under these codes and standards will need to engage energy performance as a deliberate part of the design process. Under the IgCC, all commercial projects will need to incorporate energy performance criteria as a prominent focus of the design process.

It is also vital that policymakers work collaboratively with the design and construction industry to provide the tools and resources needed to meet the aggressive energy goals they require. Without such support, it is increasingly difficult for designers to deliver better performing buildings that policymakers demand. For example, the U.S. Department of Energy (DOE), among others, plays a vital role in the development, assessment and dissemination of cost-effective, usable energy modeling software that facilitates the delivery of energy efficient buildings. These efforts will help bring to the marketplace software that makes the energy targets in the IgCC and other codes and standards achievable. Even at a time of challenging budget choices, small investments in such tools pay large dividends in terms of better performing, cost-effective buildings.

History of IECC/IgCC Changes

- CBECS
- 2006
- 2009
- 2012
- zEPI



Laying the Groundwork for Outcome-based Design and Codes

To fully appreciate the position of the IgCC in the advancement of building performance, it is important to understand the distinction among three modes of regulation: *prescriptive*, *performance-based*, and *outcome-based*. Prescriptive codes, as the term suggests, prescribe specific materials, systems, or configurations, such as the R-value of insulation or the percentage of exterior surface that may be glazed. Performance-based codes establish performance expectations, such as a maximum amount of anticipated energy use, and proposed building designs demonstrate compliance with these expectations through computer modeling. The IgCC offers both prescriptive and performance-based paths to compliance. The third, emerging mode is outcome-based. While performance-based methods predict but do not absolutely ensure a level of performance, an outcome-based code would require that a building actually perform to expectations, as determined through the monitoring of the completed building in operation.

Policy Mandates and Energy Codes and Standards— Understanding the Problem, *continued*

Section 1, Level 3

More and more codes, standards, and legislation will be focusing on the performance- and outcome-based design of buildings. The commissioning, metering, and monitoring requirements of IgCC are one of the first (baby) steps in the transition of the design and construction industry to outcome-based practices affording designers, building operators, and owners a better understanding between design and the operation outcome while not yet requiring an outcome-based code compliance path.

In an outcome-based world, the architect and contractor will no longer be able to hand a project over to the owner and walk away, nor will the owner be able to simply demand a “set of plans” without regard to the larger oversight and management of the performance goals of a project. So, what can and should architects be doing to be ready for outcome-based design?

In order to design with outcomes in mind, it is vital to pay careful attention to the projected performance of buildings being designed and to go back and compare the actual measured performance to that which was expected during the design process. The best way to get better at predicting how design expectations will play out in actual building performance is to learn from past projects.

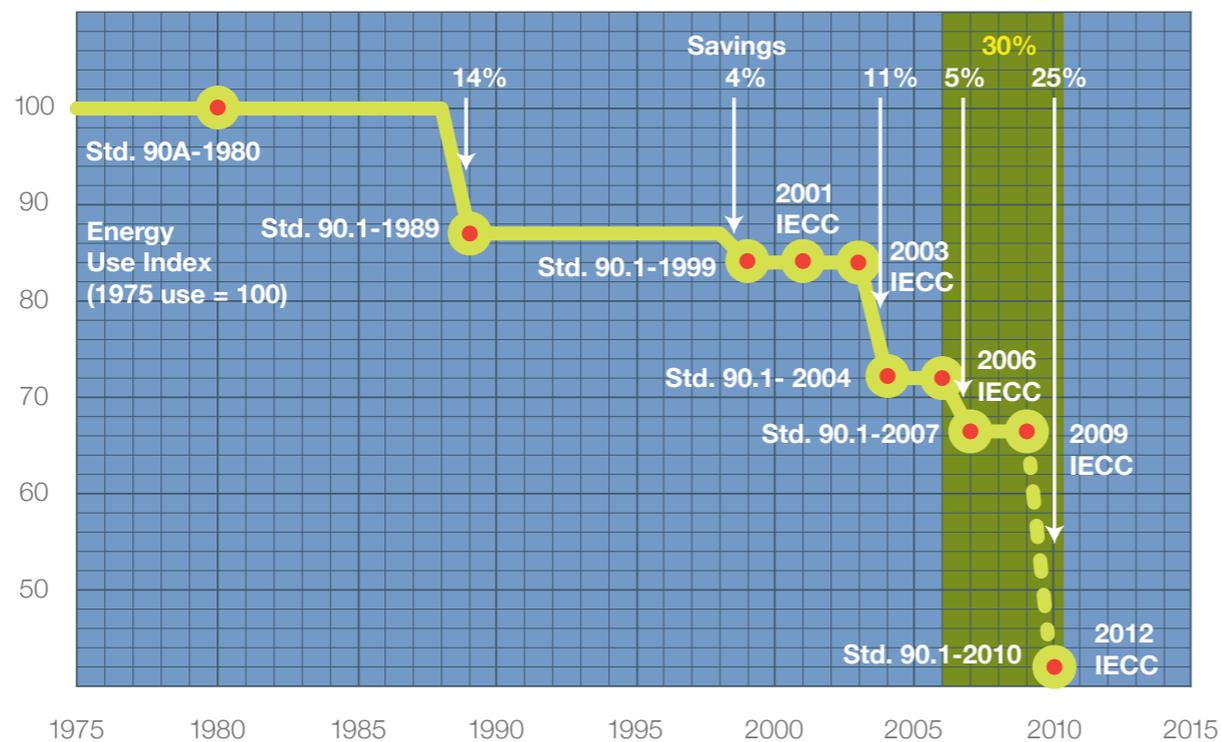
Feedback loops are a critical part of this learning process, and the IgCC’s metering and monitoring requirements are a good first step in gathering the information needed for this feedback.

Architects will need to develop their own successful techniques and methodologies to communicate the performance expectations of a design, so that clients are comfortable with the expectations and the obligations commensurate with those expectations.

Architects will need a working comprehension of the limits of the information that they’re working with; for example, the output of early-design energy modeling should not be a single number, but rather a range of predicted performance that offers a point of departure to discuss design progress against the goals of the project, as well as to manage expectations.

Architects and clients need to start getting comfortable with a willingness to share energy performance information of projects. While the current fear that disclosing this information will mean exposure to greater risk, collaborative disclosure in the design process is necessary to make progress in reducing the resource consumption of our nation’s building stock. To be able to deal with outcome-based design requirements, we will need to understand how our design goals, strategies, and efforts fit into a much broader context.

**U.S. Commercial Energy Codes and Standards—
A History of Efficiency Improvements**



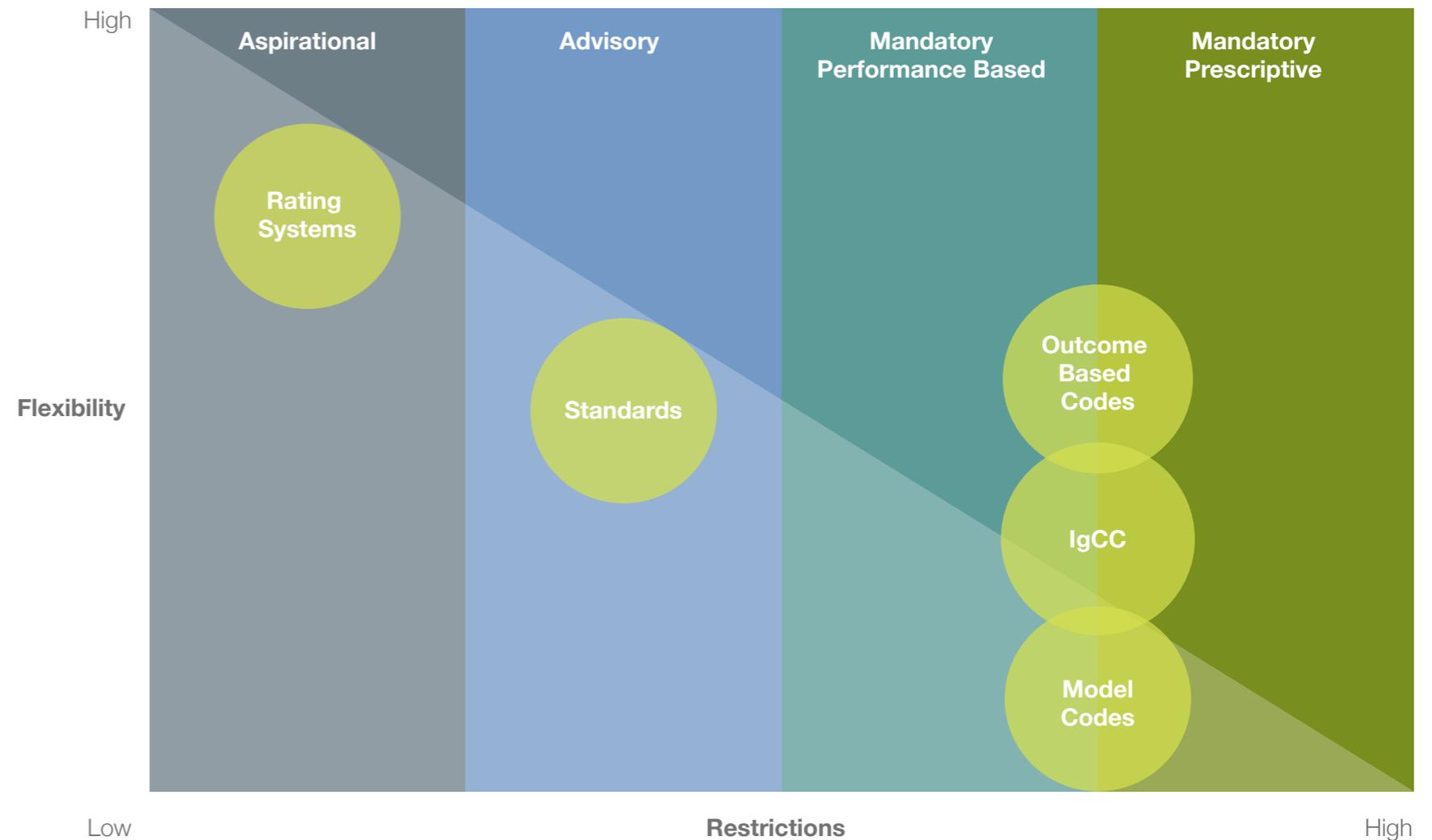
Policy Mandates and Energy Codes and Standards— Understanding the Problem, *continued*

Section 1, Level 3

The bottom line is that getting better at anticipating the actual energy performance of our designs (the outcome) will help architects deliver better buildings to their clients and community. And this path towards outcome-based design will help us all to get there.

The IgCC 2012 does not have an outcome path, but it's being planned for in the code development community and will happen in the near future. So what can we do now to prepare for it? The AIA and its partners can:

- Continue to work on the language for future code cycles, so that it reflects the best interest of the design community;
- Provide resources for architectural practice under outcome-based codes;
- Support building resource-use data gathering that is easily available and in a format that is understandable and useful for the tasks for which the design team (and others) need it; and
- Support further tool development and use-education now to facilitate easy transition to outcome-based design and codes in the future.



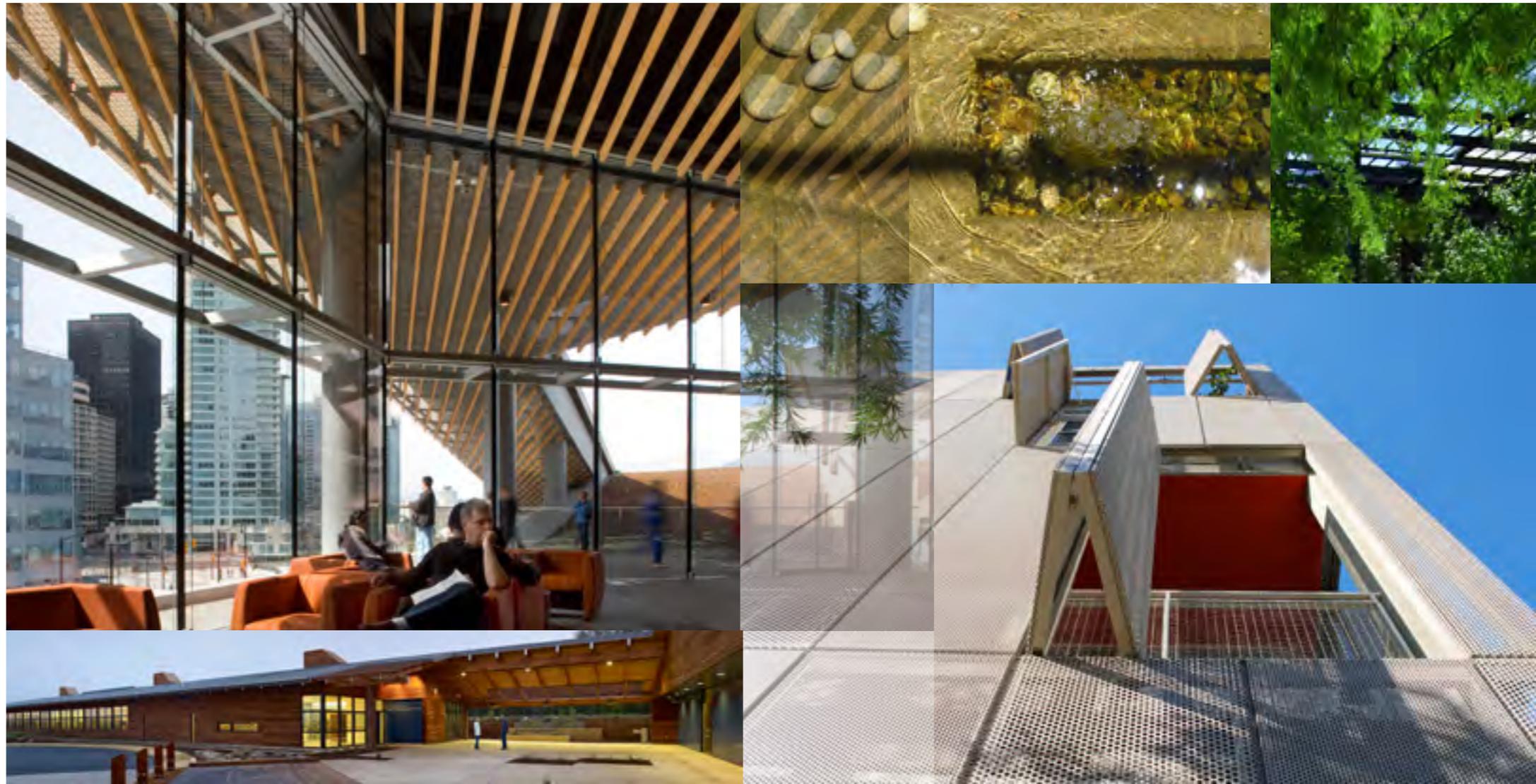
Policy Mandates and Energy Codes and Standards— Understanding the Problem, *continued*

Section 1, Level 3

In Conclusion: What Is Unique about the IgCC?

Elements such as commissioning and training for building operation and maintenance, water quality requirements, air quality and emissions standards, site development and planning have not been a traditional part of model codes. “Model codes” are crafted as silos of disparate systems and services that are not coordinated except by reference from one to the other. Architects have been required to integrate these disparate systems into coherent solutions. The IgCC takes this aspect of regulation to the next step, formalizing a process that architects recognize as critical to the success of any project.

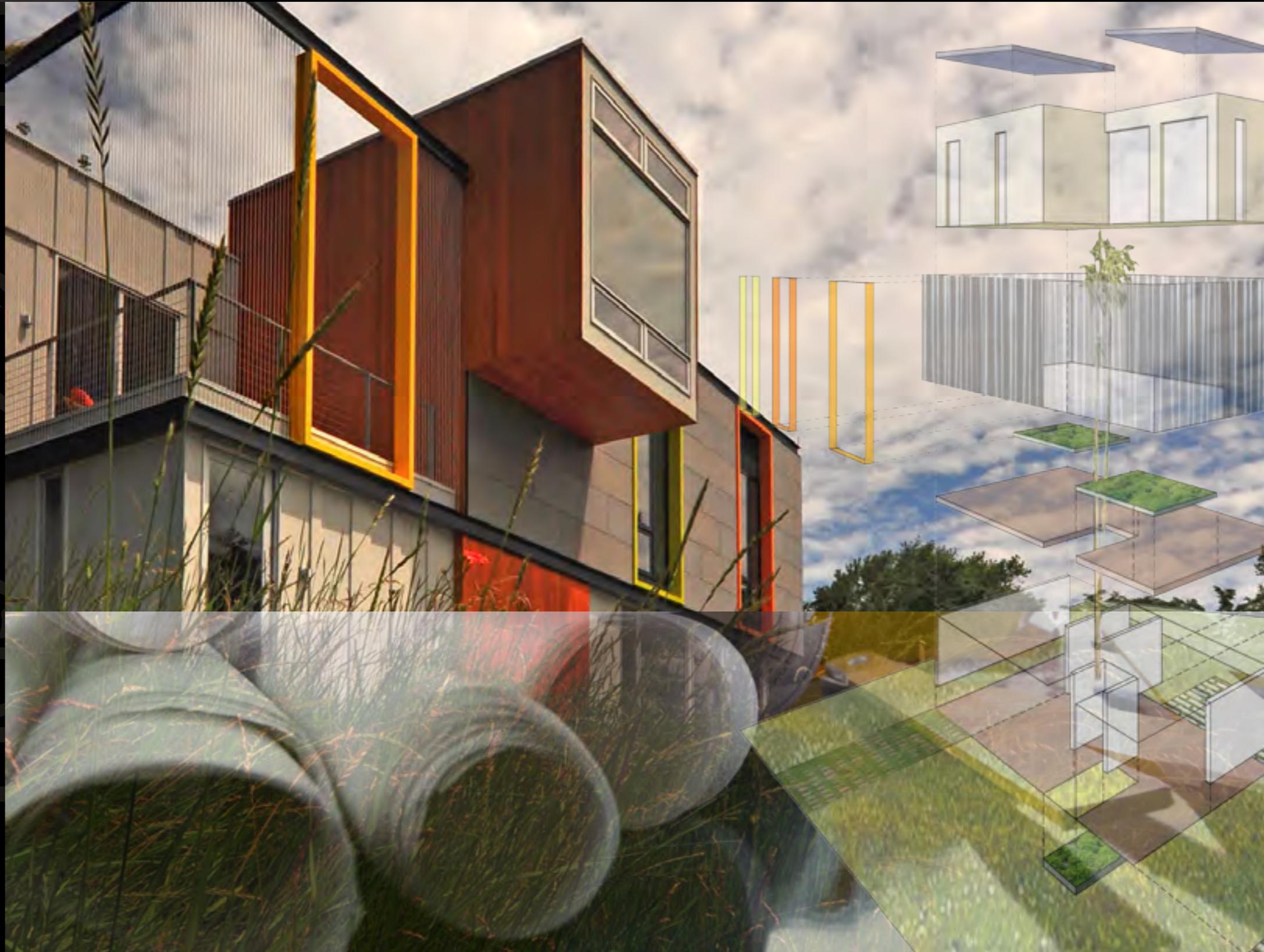
Photo credits, clockwise from top left:
© Nic Lehoux
© Lake|Flato Architects, Casey Dunn
© Lake|Flato Architects, Casey Dunn
© Brooks + Scarpa, John Linden
© WRNS Studio LLP, Architects, Bruce Damonte

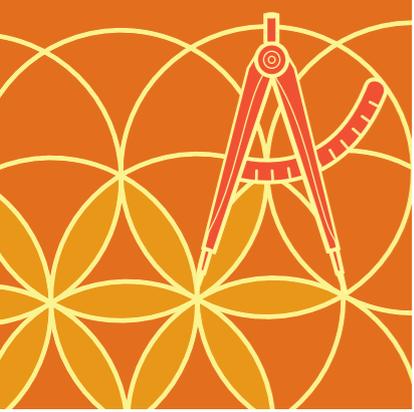




Section 2

Photo © Brooks + Scarpa, John Linden





Implementation: Design

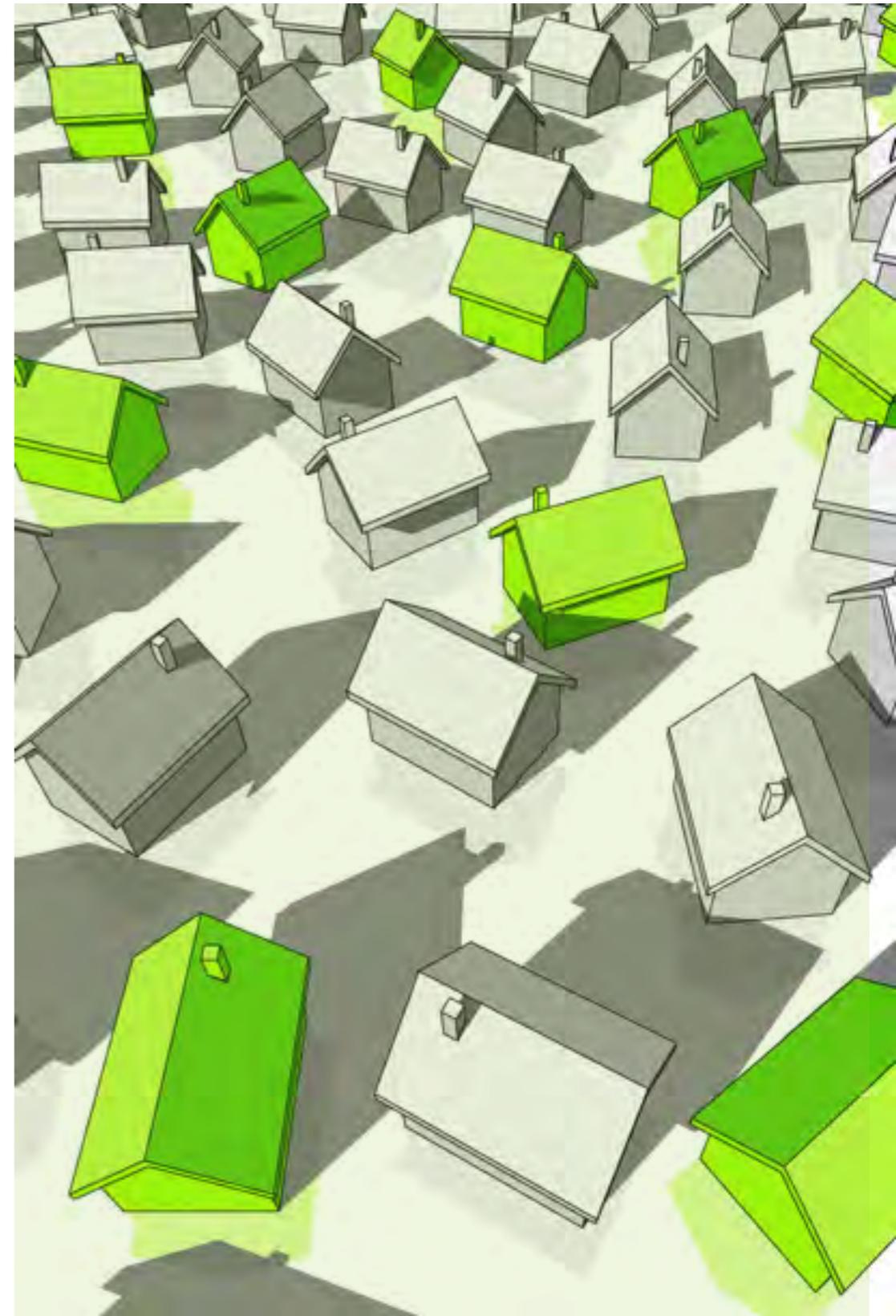
Section 2, Level 1

As the market demands higher and higher performing buildings, architects are expected to stay ahead of the curve and deliver projects that meet sustainable design criteria, whether or not a green code is in place. While the IgCC represents a new approach to implementing sustainable design in the regulatory environment, it is not the first green code. That honor goes to Title 24 in California, or “CalGreen” as it is known. Buildings that are designed to comply with CalGreen or LEED or another locally grown green code are already a step ahead of the rest of the country and represent a growing population of buildings.

If you already have a deep understanding of sustainable design and have worked on a number of green projects, you may find the IgCC somewhat rudimentary in its treatment of sustainable design. If you don't, the IgCC will be challenging. In that case, you will need to undertake focused study to bring yourself up to speed, or you may need to hire consultants to perform certain design functions.

First, get an overview of the IgCC for your firm, either through AIA continuing education or by forming a study group within your firm or with other architects. Consider the specific challenges and opportunities for your firm: Do you already offer energy modeling services? Are you an expert in site water management issues? Look for any gaps in your understanding and fill them. Seek out collaborative partnerships with fellow professionals. When starting a new project, outline what code compliance will look like; outline your own standards for success, as well. Doing so will help you understand the provisions and, more importantly, enable you to explain the requirements to your client.

Depending on a number of factors, including whether your jurisdiction already requires compliance with LEED or another green ordinance; whether you routinely engage in collaborative delivery models for your projects; or whether you are new to the concept of integrated project



Implementation: Design, *continued*

Section 2, Level 1

delivery, the IgCC may represent a number of changes (or reinforcements) to design phases and processes.

Two significant design impacts of the IgCC are the requirement for energy performance modeling and the inclusion of commissioning, metering, and monitoring requirements. This guide offers a closer look at the provisions for energy and energy modeling and an overview of the commissioning concepts included in the IgCC.

The IgCC all but requires architects to have discussions about the energy efficiency of projects with owners, facility managers, and initial users of the building in the earliest stages of design dialogue, as a part of the programming and even the pre-programming phases.



For those who wish to follow the performance path, energy modeling is required. Architects will need to understand the fundamentals of energy modeling and, if it is not possible to perform in-house energy modeling services, will need to engage capable consultants to perform those services.

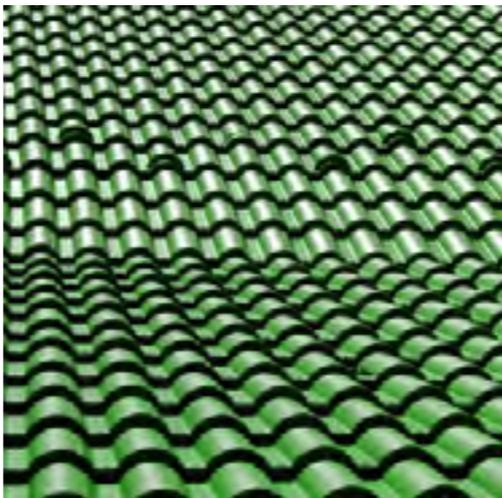
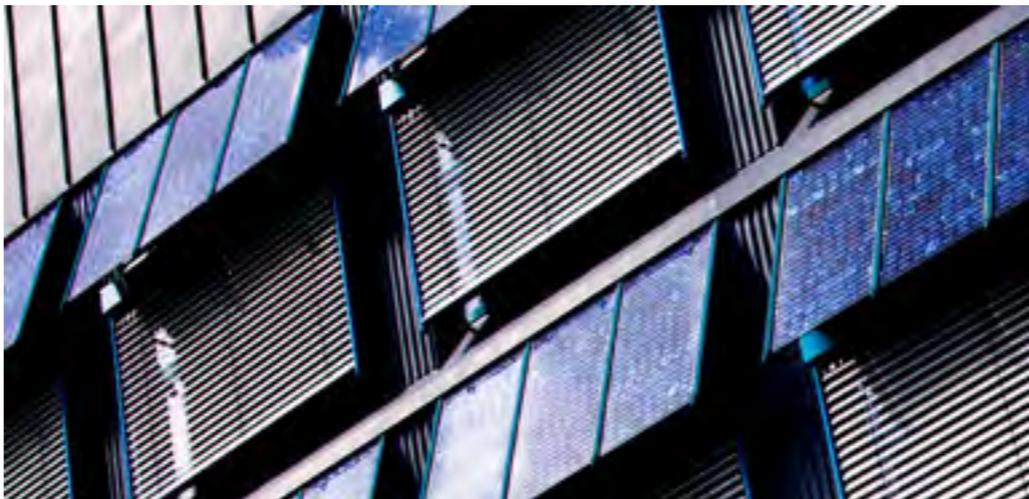
In the IgCC, the architect has the opportunity to oversee or provide building commissioning services and to advise on the commissioning of aspects of projects significantly related to energy efficiency, such as the building envelope, that are not typically undertaken by mechanical/electrical engineers.

No matter your firm size, the IgCC once adopted may require you to deepen your practice with additional skills and gives you a means to achieve higher and better results, by code. If you have struggled over the years with green provisions being “value engineered” out of projects, the IgCC offers the opportunity for mandated design minimums. Your knowledge of the IgCC will be an expanded value to your clients and to the community in which you practice.

A More Direct Link between Design and Performance

The IgCC makes a stronger link between design and performance than previous codes. As such, the design team has added responsibility for considering performance in every design decision. The way in which projects have traditionally set their performance goals has been partially blind to the operational realities of buildings. By contrast, the IgCC identifies goals and responsibilities for meeting energy efficiency early in the design process, and measures to track whether they have been met during building operation. Setting a regulatory environment that clearly focuses on the building operations life cycle will require design teams to focus on the operational performance of buildings, and not simply design completion or certificate of occupancy.

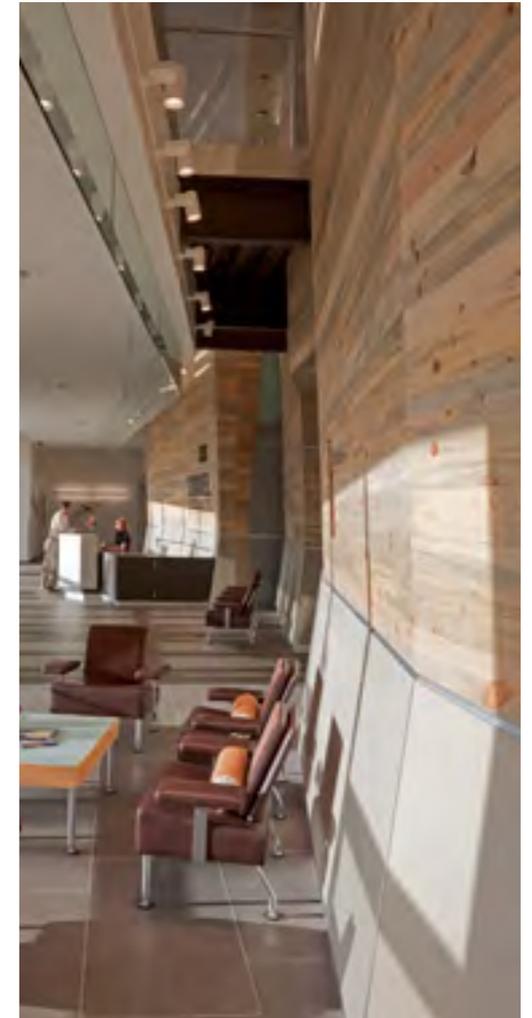
It's not about "gizmos!"



Photo, bottom left: © designLAB architects

Photo credits, clockwise from top left:
© Nic Lehoux
© Frank Ooms, courtesy of RNL
© Lake|Flato Architects, Casey Dunn
© Brooks + Scarpa, John Linden
© Brooks + Scarpa, John Linden

It's about design!



Design Impacts and Opportunities

Section 2, Level 2

If you are new to sustainable design or lack significant experience with its practices, you are likely to encounter at least two principal challenges in designing to comply with the IgCC. The first, getting technically up to speed on sustainability, will be different for different firms. Everyone is not in the same place on sustainability.

The second likely challenge is the fear of something new and what it means to our business and how we practice. It is important to remember that, in a jurisdiction that has adopted the IgCC, everyone is in the same situation, which levels the playing field. Those green provisions are no longer a niche for specialty firms or only the biggest firms; now they are everyone's challenge and opportunity. Once you realize you're all in it together, you can reach out to others, start to get educated, test the waters, and jump in.

When the Americans with Disabilities act (ADA) was first implemented, there were very real changes to practice, but there was also much nervousness in the industry. Accessibility accommodations that are now second nature, architects learned in the midst of projects—and in the midst of uncertainty. The IgCC is a first step in a longer term raising of the bar for green provisions in codes; unlike the ADA, as an industry we have time to adapt and actually influence improvements to the code over time. The same will be true of the IgCC. Rumors (“Green roofs everywhere!” “We can only use composting toilets now!”) may obscure or even stand in for the facts, if we don't do something to dispel them early on. We have to articulate what the IgCC actually requires, in order to control the fear and take it one a step at a time.



Design Impacts and Opportunities, *continued*

Section 2, Level 2

Here is a roadmap:

- Get an overview of the code for your firm. Use the summary in this guide, seek out an overview webinar, or break up the code piece by piece with the folks in your firm and explain it to each other. Highlight unknown terms and major principles. Create a narrative of the code that mirrors your own design process. Look for the intent in code sections, catalogue the background materials on sustainable design that you will need, and understand compliance in your jurisdiction.
- Read the code in detail. Mark what you don't understand and list the concepts that are completely new to your practice. Some chapters are only several pages, others are longer and more complex: divide and conquer.
- If you cannot absorb these new things on your own, consider with whom you might partner.
- Even if you are able to grasp the code on your own, seek out collaborative relationships with consultants, building officials, and owners, and offer to be the facilitator. Being at the center of the conversation is the best way to learn, as well as to lead.
- Look for education to fill the gaps. If you can't find it, ask for it at your AIA component.
- Pay attention to your learning curve and let it guide the collaborations you form and the services you offer.
- When starting a new project, outline what code compliance – and success in your own terms – will look like. Each time you apply a code provision to a project, you will gain deeper understanding.
- Consider partnering with your more sustainability-experienced clients and their project managers and facilities staff.



Design Impacts and Opportunities, *continued*

Section 2, Level 2

You will need to start looking at energy and water related code requirements earlier than you are accustomed to, at the beginning of conceptual design. These IgCC requirements will have a substantive impact on site planning, form, and many other design decisions that should be considered up front.

Similarly, you will need to undertake energy performance modeling from the beginning of the design process; it cannot be an afterthought. If you perform modeling early, you can interrogate the design and make intelligent, money-saving choices, which you can highlight for your client. You can find out where the best value lies, respecting the economics of the situation, and present the best-case scenarios to your client within a range of options. Such a service offers both greater value to your client and greater potential reward for your firm if you provide the services in-house.

You should recognize that a design that merely complies with prescriptive requirements may not be appropriate on large, complex projects, and you may find that it limits design flexibility. Carefully consider the performance options available to you, so that you can take the path that is appropriate for the project. Regardless of the path you choose, as a best practice, start with passive design strategies that reduce loads and ultimately reduce long term operating costs.

Some provisions of the IgCC will affect different regions differently. In states like Arizona or Nevada, water conservation is an important issue, so it is important for architects to work with savvy MEP engineers to resolve water issues up front. Addressing the particularly challenging jurisdictional electives and any project electives that have been adopted up front, before design even begins, is important for success.

Addressing these fundamental decisions early on in the project establishes a real dialogue with the owner regarding expectations, allowing the design team to respond to and manage those expectations. In the process, it offers a valuable opportunity for architects to educate clients about high performance buildings.

Think Locally:

Understanding Jurisdictional and Project Electives

The IgCC provides a platform for a sustainable design and construction code that can be adopted on a nationwide basis, thereby creating the opportunity for a unified base set of standards and requirements as an overlay to the “i-Codes.” The IgCC does, however, allow for customization on a jurisdiction-by-jurisdiction basis. This raises several issues for consideration. First, each jurisdiction must take care to fully review and understand the Code and to make required selections when it comes to things like jurisdictional electives and project electives (see commentary in Section 4 on Chapter 3 and Appendix A).

Because there will be some variation in terms from jurisdiction to jurisdiction, practitioners will need to be sure they have the precise version of the IgCC as adopted by the jurisdiction in which a project is located. In addition, Chapter 1 of the code suggests that adoption of the code might result in the provisions of the IgCC overriding the provisions of existing regulations in an adopting jurisdiction, at least to the extent that the IgCC addresses matters covered by the existing regulations. This may be an unintended consequence for the adopting jurisdiction. Therefore, it will be important that each jurisdiction consider if clarification of the scope of the IgCC is warranted at the time of adoption. Architects need to understand what their jurisdiction requires so that they can effectively design to the code requirements of that jurisdiction.

Design Impacts and Opportunities, *continued*

Section 2, Level 2

Collaboration and Delivery

The AIA believes that project delivery processes must enhance the quality, cost-effectiveness, and sustainability of our built environment. This can best be achieved through industry-wide adoption of approaches to project delivery characterized by early and regular involvement of owners, architects, constructors, fabricators and end user/operators in an environment of effective collaboration, mutually defined goals and open information sharing. The AIA also believes that the architect is most qualified to lead design of a project and can lead a project team throughout the project delivery process.

—AIA Position Statement on Project Delivery

The IgCC offers an opportunity to engage in the sorts of collaborative delivery models that are driving the industry forward. This may mean a re-thinking of traditional design phases.

A [National Renewable Energy Laboratory study](#) has shown that collaborative delivery models are essential to the creation of large-scale, high performance buildings. Smaller projects may benefit, as well, from collaborative approaches. Importantly, any firm can enjoy an enhanced relationship between architect and owner, generated around the new sustainable design code requirements. The AIA understood early on that changes in delivery models were on the horizon, and in collaboration with industry partners created a [guide to Integrated Project Delivery](#).

Firms that are willing to embrace an integrated design process will find that they are more successful at IgCC compliance. You can't simply combine engineering documents with your documents after the fact. Rather, you will need good consultants who understand sustainable design and are brought to the table as early as possible. The design process will need to be iterative. It will be important to communicate with engineers early and often and, if something doesn't work, to discuss it as early as possible. Developing and fostering open and collaborative relationships among owner, architect, contractor, and building department will be key to getting projects successfully designed, reviewed, and constructed.

A Closer Look: Energy and Energy Modeling

Section 2, Level 3

The IgCC (International Green Construction Code) will drive integration of reduced energy consumption design strategies in a number of ways:

- It will require architects to discuss the energy efficiency of projects with owners, facility managers, and building occupants in the earliest stages of design dialogue, as a necessary part of the programming and even the pre-programming phases.
- It will require architects to engage energy modeling at a much deeper level than ever before. This means that architects will have to better understand the energy modeling process to effectively engage consultants; and, ideally, to start modeling themselves, particularly to inform design choices in the early stages of the design process.
- It will allow and encourage architects to oversee or provide building commissioning services and to advise on the commissioning of aspects of projects significantly related to energy efficiency, such as the building envelope, that are not typically undertaken by mechanical/electrical engineers.
- It will begin to afford the architecture profession a wider and deeper understanding of the actual energy performance outcomes of projects, as well as the relationship between actual and predicted energy performance.

As the latest versions of model energy and green codes are adopted by jurisdictions, higher performance outcomes will continue to be demanded of design teams, in addition to compliance with increasingly stringent code requirements. Energy modeling programs that help architects incorporate energy concerns in design must continue to develop to address these higher expectations for both designs and design teams.

Top photo: © Assassi



A Closer Look: Energy and Energy Modeling, *continued*

Section 2, Level 3

Energy Modeling Tools

While many energy-modeling tools currently exist, they don't yet address the architect's need to use them often and throughout the design process; nor is there a comprehensive set of tools that spells out compliance with the IgCC 2012. Therefore, in addition to being expected to learn how to design with the tools currently at hand, architects must also engage with software developers to further develop and improve existing tools, and perhaps create new tools. In response to a demand by its members for a better understanding of the tools that do exist, the AIA is developing the Energy Modeling Practice Guide: An Architect's Guide to Integrating Energy Modeling into the Design Process.

Standardized Input Criteria Improve Modeling Consistency

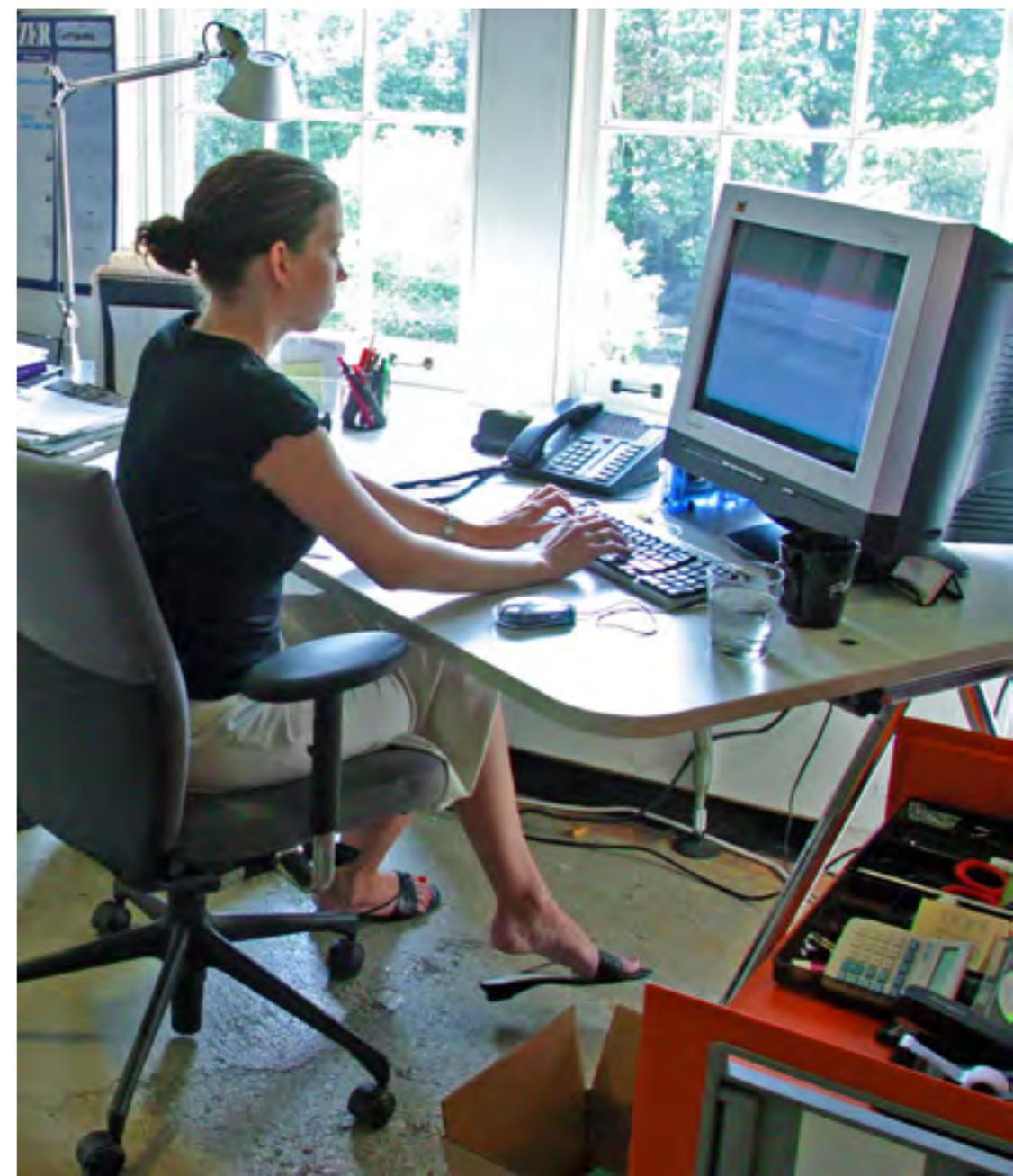
Results are more comparable if consistent and accurate input assumptions are used about building characteristics. Tools (such as Comnet) and standards (such as Appendix G of ASHRAE 90.1) should be used to guide modeling inputs to ensure more consistent results.

A Tool by Any Other Name

Non-software "tools," such as program, owner's project requirements (OPR), and basis of design (BOD), adapted from the commissioning world, help to inform the conversation about the inputs used to form the basis of an energy model. They are not just conversational tools but a way to move forward on projects collaboratively.

For more on energy modeling tools see [Section 6, Resources](#).

Technology is helpful— But it's not perfect.



Prescriptive vs. Performance Paths for Energy Compliance

The prescriptive path is a set of pre-determined, simple, and easy-to-follow guidelines and assembly performance values that address energy performance features in the design of a building. They do not require extensive analysis or technical support. Intended to be easily understood and applied, prescriptive requirements are basically a building assembly component checklist of required performance values that, when applied, will be accepted as having met the minimum code requirements.

The performance path defines a process by which an architect can design a building that will achieve energy code compliance with custom architectural assemblies, energy values, and features, instead of a set of prescribed values. On the performance path, energy modeling is required to demonstrate that the overall reduction in energy use of the proposed building is at least as good as the minimum code requirement.

The Flexibility of the Performance Path

In response to the need for greater energy conservation, prescriptive path elements continue to become ever more restrictive, to the point of significantly limiting design flexibility. And while relatively simple, the prescriptive path also doesn't provide the flexibility needed to respond to integrated passive design strategies such as maximizing daylight, strategic window placement, or evaluating trade-offs of view-glazing placement with higher thermal performance assemblies. Some examples of the limitations of the prescriptive path are:

- Mandatory values for solar heat gain coefficient (SHGC) and window performance may not necessarily be beneficial in all climate zones, where, in certain instances, solar gain coming into a building can offset heating needs. Restrictions on the amount of glass and SHGC requirements also severely limit daylight penetration that can afford reduction in electric lighting and associated cooling energy consumption.
- The prescriptive path of the IgCC mandates that solar shading devices be permanently attached on specified building orientations; however, successful design of solar shading is likely better suited to the flexibility in the performance path rather than the prescriptive path.
- The amount of glass on a building is restricted in the prescriptive path, so if a designer or client wants more transparency, or wishes to take advantage of views or unique site opportunities, the potential to compensate with higher performance in other building assemblies is only available using the performance path and energy-modeling.

The performance path affords much greater freedom of design choice. It affords the opportunity to offset different system efficiencies against others, so long as the overall energy efficiency goals are met. Thus, the performance path provides architects greater flexibility to develop concepts that meet project goals while also meeting energy-code requirements. In addition, the performance path allows one to improve upon the baseline of the prescriptive measures through creative architectural form, site orientation, use of materials, integration of systems, etc. Performance-based design also necessitates looking at a project in a holistic way and collaborating with building officials on approval of the construction documents and performance result.

A Closer Look: Energy and Energy Modeling, *continued*

Section 2, Level 3

More Extensive Requirements for Metering and Monitoring

The IgCC requires broader metering of resource consumption (water and energy) in order to provide the information needed to evaluate and understand actual building performance. Metered data is the link between design and actual building performance. These enhanced metering requirements will:

- Increase the design team’s motivation to understand exactly what they’re delivering and their knowledge of tools that will assist that understanding, which may not have been the case in the past;
- Provide the building team with the information to verify building performance and better understand assumptions made in the design and energy modeling processes that may need adjustment for the future;
- Provide the data needed to inform the adjustment of equipment to assist in commissioning the building to more closely match the intended performance; and
- Allow the building owner and operator to better understand how they’re using energy in their project, allowing them to make appropriate adjustments either to meet intended performance or to gain higher energy efficiency.

There will also be the opportunity for architects to offer additional value and service to a client who may not have the expertise to interpret the results of metering. Design, construction, and operation are all variables that affect the outcome indicated at the meter; informed interpretation is required to determine why individual goals are or are not being met. The architect’s provision of monitoring services may be an inroad to offering other facility management services after construction and occupancy.

Energy Efficiency is Everyone’s Responsibility

The IgCC highlights the fact that building energy use is not solely the responsibility of the design team. Building operation and tenant practices have direct impacts on building energy use. The owner has an important role in providing reasonably accurate use and operating assumptions and has the responsibility to operate the building as closely as possible to the intended design levels. Tenants also have greater responsibility in operating the controls of building systems as closely as possible to intended design criteria.

The architect must manage the information flow among multiple parties, throughout the design, construction, and start-up, to enable the successful operational performance of the building—working with the owner and owner’s operational team to gather and track data on actual use and building loads; delivering a building that can be realistically managed and operated to meet energy consumption goals; and possibly working with facility operators and tenants on operational strategies and training. {see “A Tool by Any Other Name”}

A Closer Look: Energy and Energy Modeling, *continued*

Section 2, Level 3

A Collaborative Process Improves Outcomes

There is great interdependency among the systems that make up a highly efficient building. The expertise of each of the team members designing these systems needs to be at the table early in the design process. It is impossible, for example, to entertain low energy engineering systems late in the design process without revisiting the design of the rest of the inter-related systems and significantly increasing the cost of a project. The design process also needs to include those who will be installing the systems, as well as those who will ultimately be operating them. System operators in particular contribute crucial knowledge of the practical nuances of system operations.

While collaboration during the design phases is crucial, it is also important to continue those collaborations into construction and post-occupancy phases of the project. Collaboration is the link between energy goals and actual building-energy performance.

An example of collaborative processes is the initial project design charrette, which is increasingly requested by clients. A charrette is a great process for efficiently and quickly developing consensus on overall project goals and establishing clear project communication, two key elements in the successful creation of high performance buildings.

Many architecture firms have developed their own collaborative design processes, and the AIA encourages such firms to share these best practices with their peers.

Process Improvements

A broader use of existing tools will generally improve project outcomes. Whether they be design guidelines (day lighting design guidelines, for instance), early-design component-performance-modeling software, climate analysis tools, or whole-building energy simulation programs, there are numerous tools currently available that can help architects track and understand the implications of design choices on the potential energy-efficiency of the final project. Whether these tools are employed directly by the architect or by consultants, the performance path in the IgCC in particular encourages more use of these tools. In addition, tools borrowed from the commissioning world, such as Owner's Project Requirements (OPR) and Basis Of Design (BOD) documents, can assist with process documentation and team communication.

Output Reports for Design Use

Translation of outputs from energy modeling into thoughtful design decisions takes time, an issue that must be recognized when addressing energy modeling in practice. When confronted with deadlines and project time and cost, it is easy to shelve modeling output reports and their potential impact on design system or component choices. This invariably will become painful later when design decisions have to be revisited and major system choices come unraveled. It is important to incorporate a prompt review and comprehensive understanding of the energy modeling output, both early and throughout the project.

Energy output reports can, however, be difficult to wade through. They contain a lot of numbers and minimal graphic output, and they require time to interpret. Only a very limited number of tools available at the moment provide output in a manner that is easily understood. This can often be a barrier to their frequent use. It is important for either the architect or the consultants to take the time to provide organized and

A Closer Look: Energy and Energy Modeling, *continued*

Section 2, Level 3

understandable output in a graphic form that will clearly communicate the implications of the results for the design and project objectives to fellow design team members and the owner. Clear communication and graphics will help explain the rationale for modifications recommended by the design team as the project is shaped to meet energy performance objectives.

While reports from energy-modeling simulation tools that address the IgCC requirements haven't yet been developed specifically, there are best practices for what this documentation looks like in a couple of local jurisdictions across the country. However, up to this point there has been little need to present a building official with energy modeling output to demonstrate code compliance. Most, if not all of the energy modeling output has been used for documentation to achieve certification for building rating systems. The IgCC changes this.

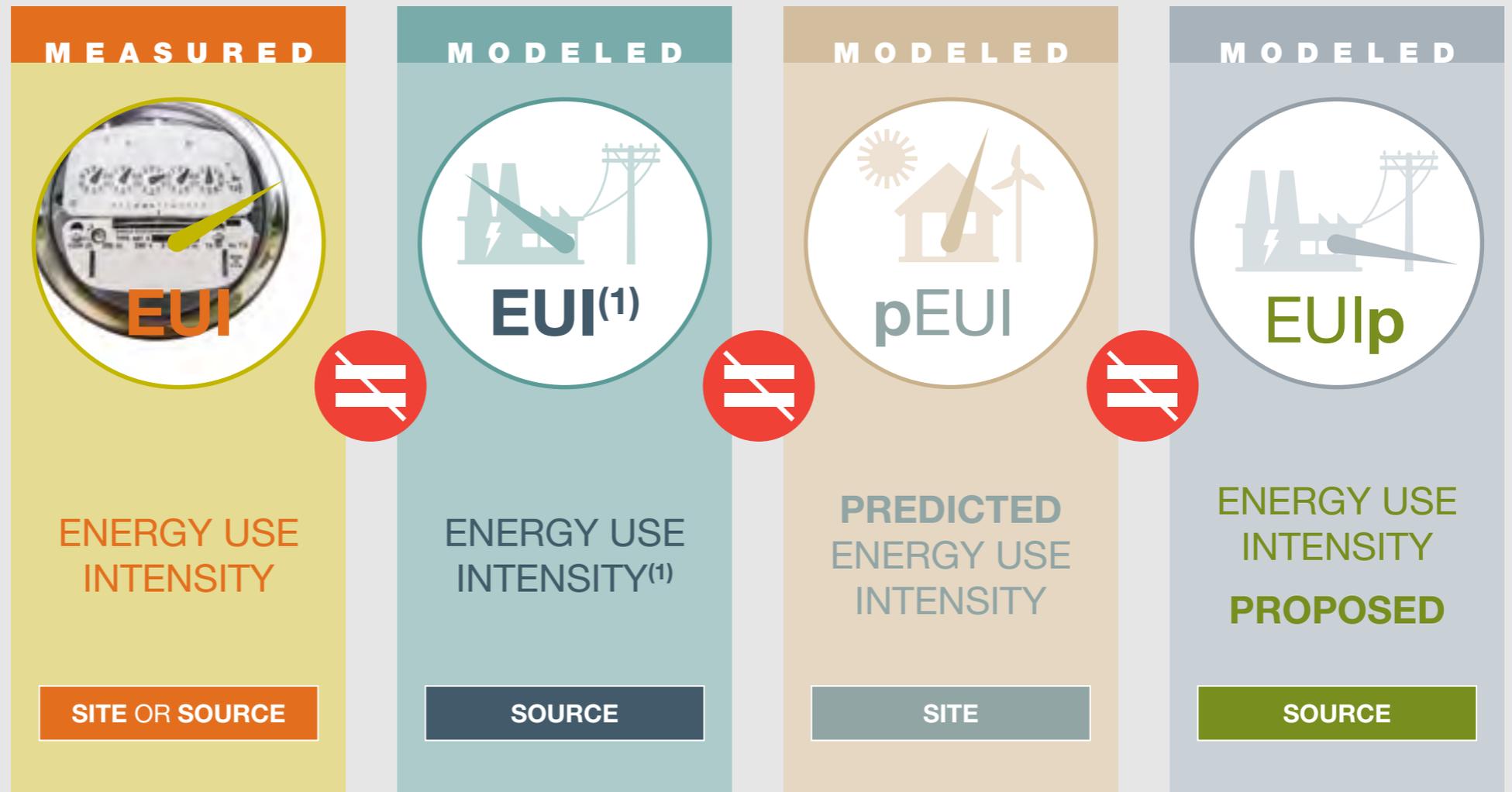
Architects now have a unique opportunity to work in collaboration with building officials to understand the procedures intended to demonstrate code compliance and to help formulate credible compliance output reports. Building officials are looking to the architectural community for guidance on this aspect of the code, especially as they don't have resources within their departments either to run energy modeling checks or to retain professionals to do peer reviews of output.

A Shift in Thinking

Those who are in the design role need to understand that energy consumption is a design problem and shift their thinking to automatically include it among their other skill sets. Energy performance under the IgCC is a factor in how design professionals and owners will evaluate the quality of projects.

Appendix: Key Definitions for Energy and Energy Modeling in the IgCC

Section 2, Level 4



EUI, EUI⁽¹⁾, pEUI and EUIp Are Not Equal

Appendix: Key Definitions for Energy and Energy Modeling in the IgCC, *continued*

Section 2, Level 4

EUI: Energy Use Intensity

Energy use intensity is a measurement that describes a building's annual energy consumption relative to the building's gross square footage. To date, this term is most often used as an expression of an existing building's actual metered, measured energy consumption, or as a comparative mean for a particular building use type in a specific location. Both of these uses of EUI are based on real, measured building energy use data.

An EUI number can be relative to either site or source energy.

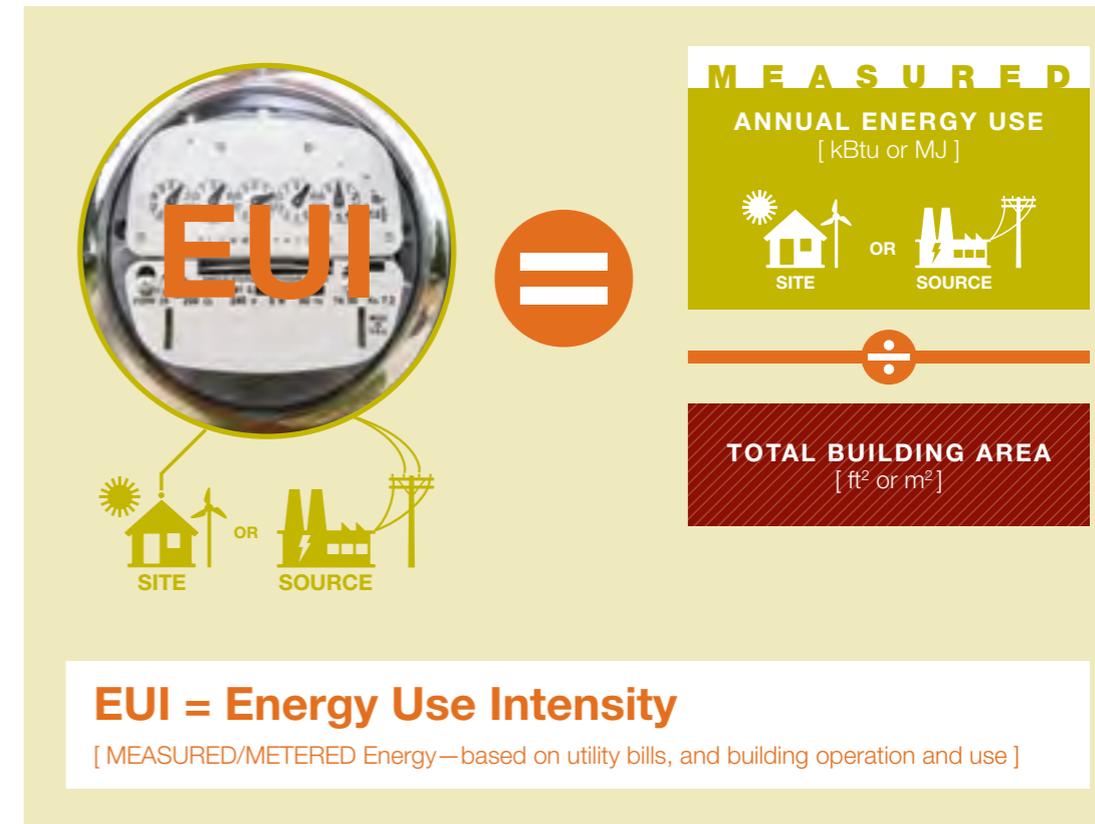
Site energy is the measure generally familiar to the design profession. This is the amount of energy consumed by a building and is reflected in utility bills paid by the building owner.

Source energy is a more accurate measure of a building's energy footprint, because it includes energy that is lost during production, transmission, and delivery to the building. Electricity is the prime example of this: what is consumed at the building is only a portion of the fuel energy fed into the power plant.

The baseline for reduction goals, stated in the AIA 2030 Commitment, is based on site EUI from the Commercial Building Energy Consumption Survey (CBECS) of 2003. While site EUI does not reflect the full impact of a building's energy use, it does represent more directly the scope of the architectural and engineering design services, and is a more familiar standard for the architectural profession.

The U.S. Department of Energy manages the data for CBECS which is also linked to the EPA's Energy Star programs. Energy Star is a widely used program by building owners and operators.

[EUI = annual energy use (kBtu) / building gross square footage]



Appendix: Key Definitions for Energy and Energy Modeling in the IgCC, *continued*

Section 2, Level 4

EUip: Energy Use Index proposed

EUip is a term used by the International Green Construction Code (IgCC) for the annual proposed Energy Use Index. EUip is a predicted number, based on energy modeling or other tools that evaluate the energy efficiency of the building as designed. This prediction seldom lines up directly with actual building energy use, since it cannot account for actual weather and building use patterns that also affect total building energy use. It is however a good indicator of relative performance compared to other potential building configurations under the same operating conditions. For the use of the IgCC, EUip represents source energy. This small letter 'p' is used to distinguish it from a measure of actual building energy consumption. EUip represents the total source energy used by a proposed design for a building (the modeled proposed building performance.)

[EUip = source kBtu/sf/year]

It is useful to understand the components of an EUip number. All of these are energy values, not the cost values that are used in the ASHRAE ECB protocol. These include:

Total annual energy delivered to the proposed design and consumed on site.

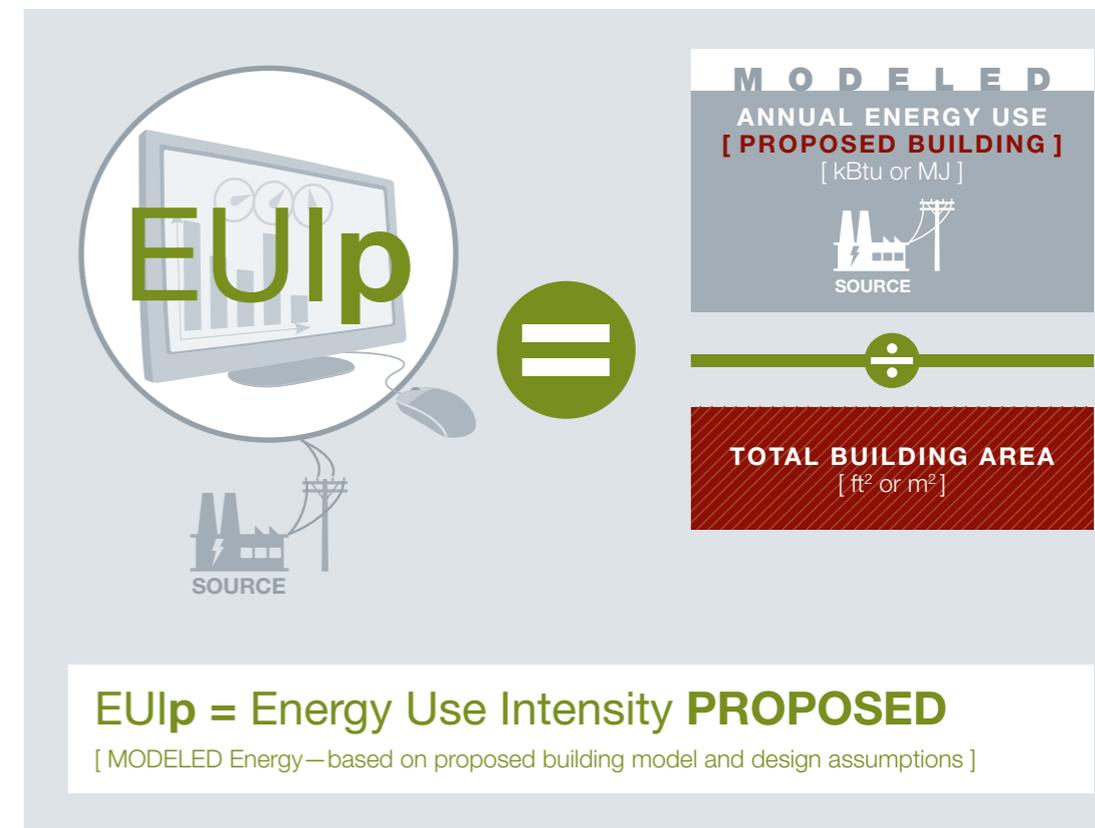
The egrid multiplier used to convert from site energy to local source energy.

[EUip = (proposed design * regional egrid multiplier)

NOTE: Currently, in the IgCC 2012, total annual energy savings from renewable energy derived on site and total annual energy savings from waste energy recovery on site are not included in the EUip calculation (as the ASHRAE 90.1 Appendix G calculation methodology specifically excludes them since an energy-cost for these variables cannot be defined.)

However, the AIA believes strongly that on-site renewable and recovered-waste energy should be included (and can be when calculating energy-use rather than energy-cost), and will advocate for the 2015 IgCC definition to be structured as:

[EUip = (proposed design energy x regional eGrid multiplier) – on site renewable energy – waste energy recovered]



Appendix: Key Definitions for Energy and Energy Modeling in the IgCC, *continued*

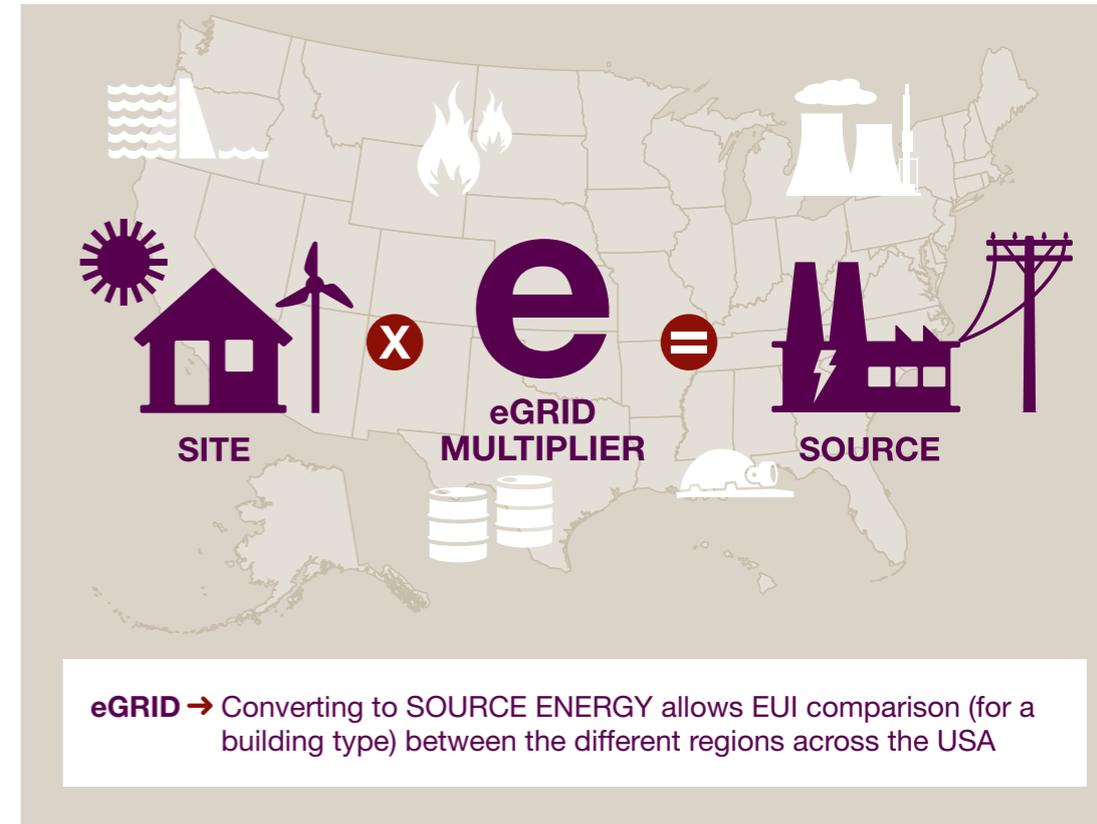
Section 2, Level 4

eGrid

eGrid is the data source maintained by the Environmental Protection Agency (EPA) related to electrical power generation in the United States. It describes the mix of electrical generation resources that make up national and regional power grids. Differences in the way electric power is generated has implications on the amount of carbon produced to generate electricity in different regions of the country.

In the EPA's own words, *"The Emissions & Generation Resource Integrated Database (eGRID) is a comprehensive source of data on the environmental characteristics of almost all electric power generated in the United States. These environmental characteristics include air emissions for nitrogen oxides, sulfur dioxide, carbon dioxide, methane, and nitrous oxide; emissions rates; net generation; resource mix; and many other attributes."*

This data is useful to the architectural profession because it enables us to better understand the real environmental impact of our building design's electrical consumption. This is due to two main reasons. First, because of power loss due to generation and distribution, the on-site electrical consumption of a building accounts for only a portion of the electrical power generated to serve the building. And second, different means of power generation have different emissions. Understanding the full impact of our building designs means understanding how the electricity is generated that serves the building as well as the associated emissions. eGrid provides information to better assess the carbon impact of electrical power by region in the United States.



Appendix: Key Definitions for Energy and Energy Modeling in the IgCC, *continued*

Section 2, Level 4

zEPI - Zero Energy Performance Index

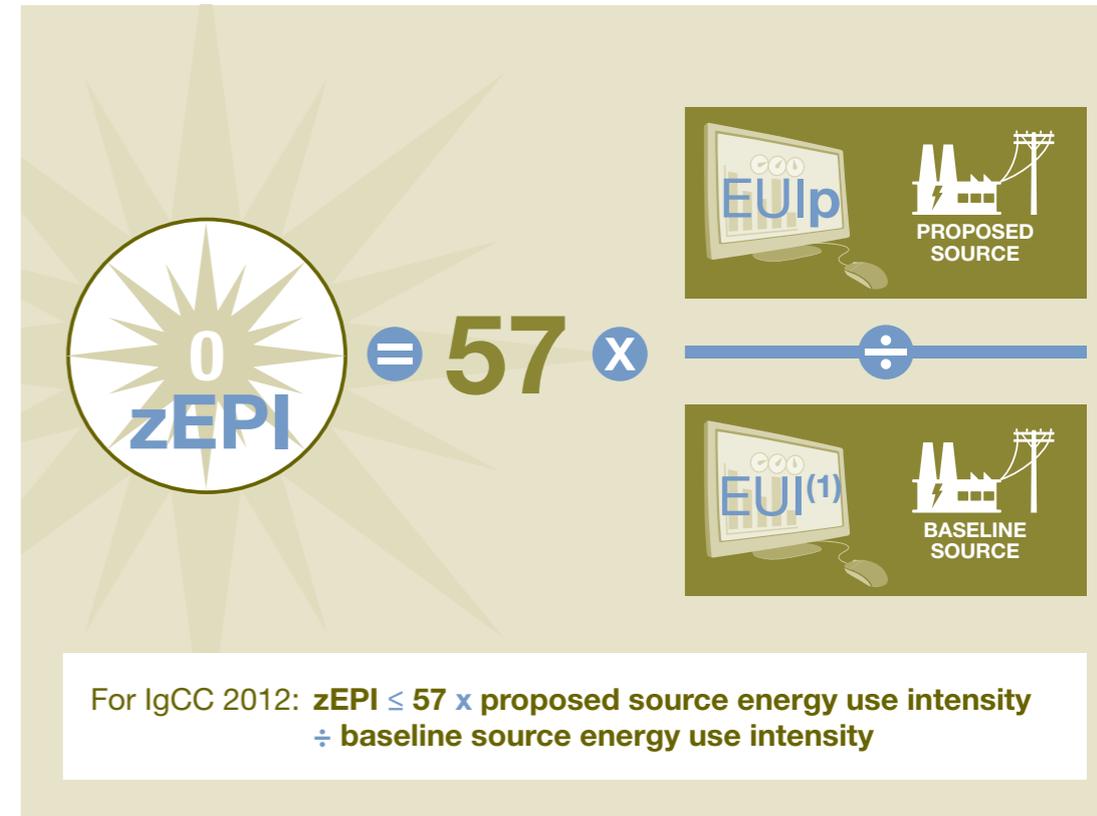
zEPI is a scalar representing the relationship of building energy performance to a fixed baseline of actual building energy performance representing the benchmark year of 2000. Policy goals set targets of approaching or achieving net zero building energy use, and the zEPI scale can be used to track progress in this effort. A zEPI score of 100 represents a building that performs the same as a benchmark 2000 building, while a score of 0 represents a building that has achieved net zero energy performance. zEPI scores can range from above 100 (for buildings that perform worse than the benchmark) to a score below zero for a building that generates more energy than it uses on an annual basis.

Note that the zEPI scale assumes similar characteristics of operation, occupancy, schedule, and climate between the two buildings being compared.

In IGCC< the zEPI scale is used to represent predicted performance of the project compared to actual energy use of a building performing at the benchmark. The goal of the code is to deliver buildings performing at a set increment better than the benchmark. Among the other requirements of the International Green Construction Code (IgCC), buildings complying with the modeled performance pathway requirements, the designs shall demonstrate a zEPI of not more than 51 as determined in accordance with Equation 6-1 for energy use reduction. zEPI is based on source energy.

⁽¹⁾The 2012 version of the IgCC uses EUI to represent the base annual energy use index in source kBtu/sf-yr for a baseline building and its site calculated in accordance with Section 602.1.2. This section references the energy modeling protocol of Appendix G in ASHRAE 90.1. For this use in the IgCC, the terms zEPI and EUI refer to a predicted energy use, not actual energy use outcome of the project being considered.

$$[zEPI = 57 EUI_p / EUI^{(1)}]$$



Appendix: Key Definitions for Energy and Energy Modeling in the IgCC, *continued*

Section 2, Level 4

Other Relevant Definitions

pEUI - predicted Energy Use Index

For those familiar with the AIA 2030 Commitment Program, there is a different treatment for EUI. pEUI is a term used by the AIA 2030 Commitment for the predicted Energy Use Index. Similar to the EUIp, the pEUI is a modeled number and does not reflect actual building energy use, rather modeled expectations. pEUI represents site energy, not source. This term is also employed to distinguish it from a measure of actual building energy consumption. This may be more directly aligned with a building's utility bills when it is operational, however pEUI is based on an energy model. This distinction is enormously important because there are many factors – modeling software accuracy, occupancy patterns, weather conditions ... – which contribute to differences between modeled information and actual building consumption.

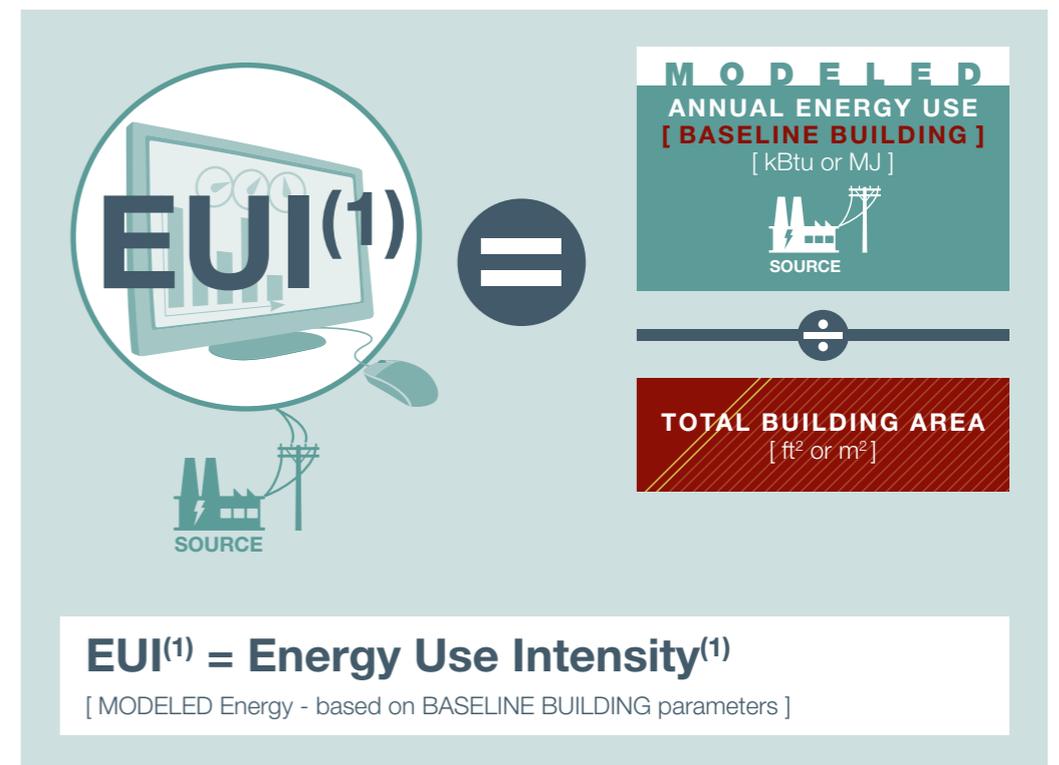
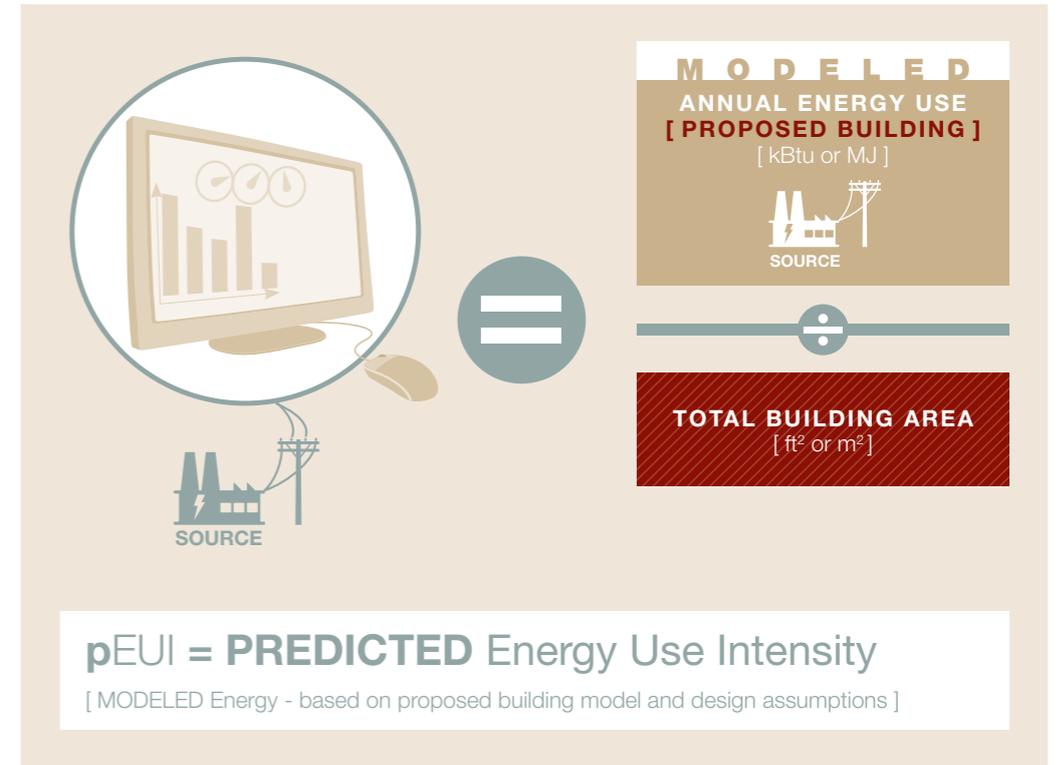
[pEUI = site kBtu/sf/year]

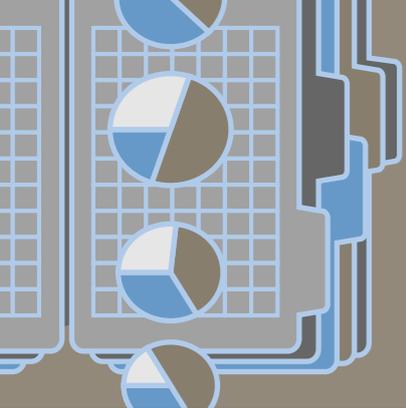
It is worth noting that EUI does not equal EUIp (a site-energy based prediction) which does not equal pEUI (a source-energy based prediction).

EUI'

The 2012 version of the IgCC uses EUI1 to represent the base annual energy use index in source kBtu/sf-yr for a baseline building and its site calculated in accordance with Section 602.1.2. This section references the energy modeling protocol of Appendix G in ASHRAE 90.1. For this use in the IgCC, the terms zEPI and EUI refer to a predicted modeled energy use, not actual energy use outcome of the project being considered.

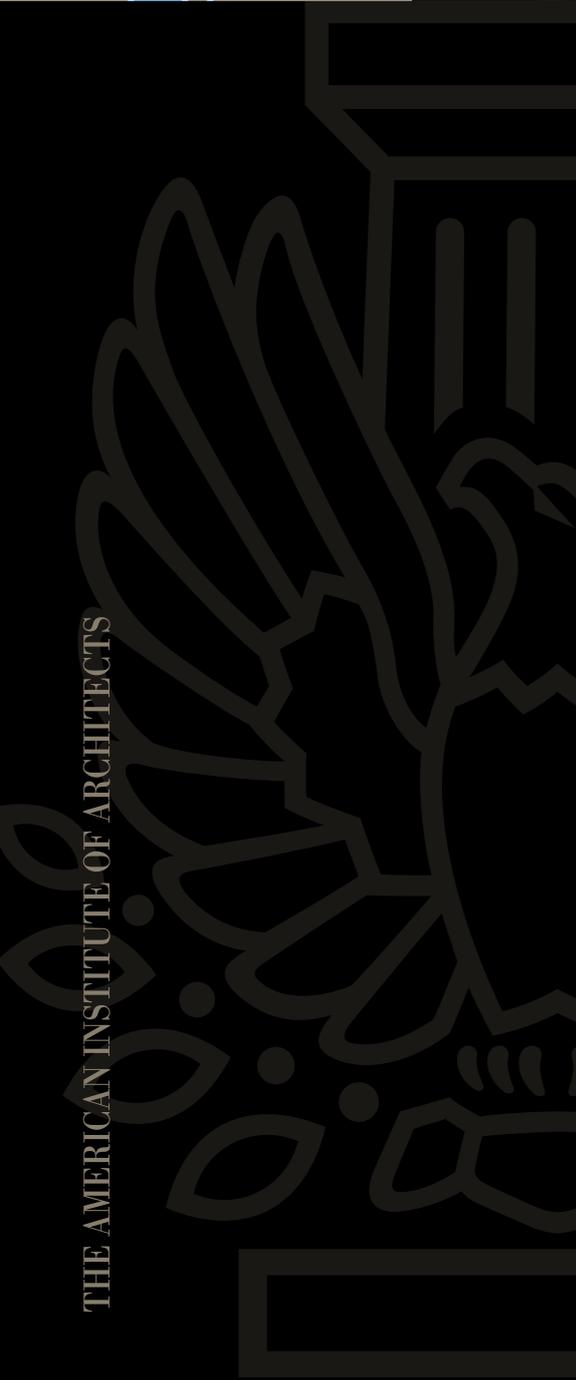
zEPI = 57 EUIp / EUI⁽¹⁾

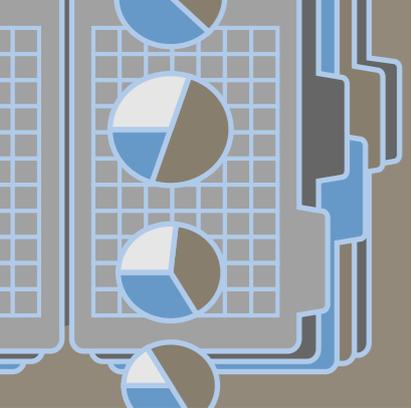




Section 3

3





Implementation: Practice

Section 3, Level 1

Impact of the IgCC on practice

The 2012 version of the IgCC was published in March of 2012. In some jurisdictions, it will be adopted relatively swiftly, if not immediately; in other jurisdictions, adoption may be a protracted process; and some jurisdictions may choose not to adopt it at all. Depending on the sorts of projects that your firm currently delivers and whether your jurisdiction already has sustainable design requirements, the adoption of the IgCC will have an effect on both design and practice. It is not one-size-fits-all, and it must be customized for local conditions. Architects should be at the center of the conversation to weigh the value of this standardized green code against its cost and practice impacts before adoption.

Even if not adopted in the jurisdiction(s) where you practice, the IgCC may eventually have an impact on your practice. For example, it may influence building design through contractual reference. Even in jurisdictions where it has not yet been adopted, owners may seek to incorporate provisions of the IgCC into their design and construction contracts. This practice will present a number of challenges, and the parties to such a contract will need to be careful. Among other things, the IgCC allows for the selection of jurisdiction-specific requirements and project-specific electives. Care must be taken to ensure that a contract, seeking to adopt the IgCC by reference, addresses those provisions normally dealt with as part of the code adoption and enforcement process. Failure to address such details, and any other issues required to be addressed as part of the code adoption process, may lead to contract ambiguity and dispute.

Once adopted, the IgCC will influence the standard of care for architects and engineers providing design services for projects in that jurisdiction. Generally, design professionals are required to exercise that degree of skill and care practiced by other design professionals under

similar circumstances in the locality of the project. Failure to meet the standard of care is generally considered negligence on the part of the design professional. Design professionals are generally expected to comply with the requirements of the applicable codes in the jurisdiction where a project is located. Failure to design to code may constitute evidence of negligence, and in some jurisdictions may be “negligence per se.” Even in jurisdictions where the IgCC is not officially adopted, professional practices initially adopted to comply with the IgCC may creep into the general practice of architecture or engineering on a local, regional, or national level and thereby influence the standard of care.



Implementation: Practice, *continued*

Section 3, Level 1

What the IgCC Means to Practice Leaders

The regulatory arena is changing, and documents change over time. There will be additional scope, which translates to additional time and perhaps compensation. The question that comes into play here is how architects explain that the additional investment in services will yield a building whose performance is more predictable, uses less resources to operate, and is a more cost effective structure. That is ultimately a net benefit to the building owner and to communities. How costs are distributed through projects may change, but redistribution does not necessarily mean an increase in cost. AIA Contract Document D503™–2011, Guide for Sustainable Projects, is helpful in identifying and managing the roles, responsibilities, and risks associated with sustainable design and construction projects. D503 is useful in helping to frame the discussion of many issues with a client. Though it is not all encompassing and was not specifically written around the IgCC, it addresses scope and fee issues and how the roles and responsibilities for the architect and other project participants may be defined.

Firm Size

Large firms often have specialists in energy modeling, construction management, quality control, and other areas necessary for full understanding of the IgCC. Small firms, with some exceptions in specialty practices, may not feel that they have the same depth of knowledge and resources necessary to create IgCC-compliant projects. There may be a heavier burden for compliance for the small firm, in that each individual will need to know more – and, in the case of the sole practitioner, everything – in order to tackle the entire code. But small firm owners can nevertheless seek out a combination of education and partners to ensure success or can become a specialist in a certain area and be the expert for others.

Additional Opportunities

The practice of architecture for a long time has been heavily weighted on the art side of the art/science equation. For those practitioners who focus on building science, the advent of the IgCC is a huge opening. As demand for high performance buildings has increased, the building sciences have become more relevant to the industry. This is an opportunity for the art and science of architecture to come together in a powerful way. This enables architects who have been frustrated because they were not sanctioned by their clients and budgets to do energy design before, or because that process was short-circuited by value engineering and prioritization of other aspects of design. For many architects who are passionately devoted to sustainable design, the IgCC will be an enabling influence that will reinforce to clients that desire for thoughtful, sustainable design, required by law.

The IgCC's requirement for energy modeling in the performance path option offers expanded opportunities for architecture firms that are able and willing to provide energy modeling services themselves. For the firm with the adventurous spirit, it is important to ask many initial questions to understand when and how training will be relevant. Understanding the “vernacular” of energy modeling is important – the language of inputs, the relationship between technical terminology, and the capacity to translate that to the client are all essential to gaining a deeper understanding of energy modeling in practice.

Similarly, the requirements for commissioning and post-occupancy monitoring provide an opening for more extended service models. Envelope commissioning is a place for architects with a high level of technical ability to explore. Some firms are already organizing themselves to assist in managing the post-design operation component of projects, either directly or as a trusted advisor to the building owner or facility manager.

Implementation: Practice, *continued*

Section 3, Level 1

To Consult or Not Consult – That Is the Question.

Ideally, the architect should engage early in assessment of options for energy design, in order to understand the energy goals of a project and the expectations for both the client and code enforcement officials. It will be necessary for the firm new to energy modeling, regardless of how deeply they explore it, to seek training in it. How and when to take it further than the initial design intent and an understanding of early design options is a business decision, one not to be taken lightly. If the firm chooses to use an energy modeling consultant, they must carefully consider the relationship between that consultant and the entire design team.



Practice Impacts and Opportunities

Section 3, Level 2

Cost

The cost impact of the IgCC will vary greatly by building type and design approach, and according to current local code and practice. Some of the requirements in the proposed code exceed most common practice and most current codes, even those in very “green” communities. Accordingly, there could be a measurable cost premium for almost all projects. However, the first question to consider on cost in general is “compared to what?” For firms that are heavily focused on sustainable design, changes in cost could be minimal. For others, while first costs may increase depending on a number of factors, when analyzed for long-term, life cycle cost, the IgCC may show an overall benefit to owners. Design fees may increase, construction costs may increase, yet operational costs may decrease due to lowered utility costs (and other soft costs such as lost productivity, etc.) Owners may even realize an overall savings, with initial costs being offset by long-term savings in energy and maintenance costs.

The IgCC contains a number of requirements not currently considered part of project design, development, or maintenance. In order to comply with such requirements, the architect may need to retain consultants with expertise in areas such as energy modeling, soils, or botany. Certain construction practices required by the IgCC may be new to contractors. Building and record maintenance requirements may represent new requirements for owners. In addition, code enforcement officials will need to learn the detailed requirements of the code. These new requirements will likely result in additional costs for project design, construction, and maintenance, as well as for code enforcement. It will be important for all project participants to anticipate and factor in these costs. It will also be important to consider that initial costs associated with code compliance may be targeted for offset by savings associated with energy efficiency, resource conservation, improved worker productivity, extended building and systems life-cycles, and other long term benefits. Finally, Investing in design ideas and professional expertise brings a higher quality product to the client.

[See section 4: chapter-by-chapter commentary for more information.](#)

Troubleshooting Performance Problems

If a building is not performing to the level it was designed one has the opportunity to work through the real issues affecting performance. What’s causing the lack of performance? Is it operations, is it systems, is it the fact that the building is being used by more people? The differences brought about by the IgCC – the involvement of the architect in commissioning, increased metering, and more widely available results of metering – will be instrumental in helping the architect troubleshoot performance problems.



Practice Impacts and Opportunities, *continued*

Section 3, Level 2

Implementation: Enforcement and Compliance

Local Interpretation

Since the IgCC addresses issues not previously addressed by most jurisdictions, and the language has not been tested, it is likely that there will be a wide range of interpretations by local code officials on how best to enforce the code. In some cases, interpretation or discretion is explicitly given to the code official; in others, it is simply a case of interpreting the language of the provision.

For most ICC codes, the changes between codes cycles are typically relatively small and within the existing expertise for most code officials. The proposed IgCC, however, represents entirely new material for most jurisdictions. The range of interpretation therefore creates a wide range of potential design, practice, and cost impacts. In addition, this range of interpretations will create inconsistency for project teams working in multiple jurisdictions.

Jurisdiction Agency and Department Impacts

Some municipalities that do not currently enforce an energy code or sustainability guidelines may consider adopting the IgCC. Architects can and should take the lead in such jurisdictions, especially in communities that are less energy focused. As a generalist, the architect has the expertise to help building officials through the sustainability guidelines themselves, the scope, issues of responsibility, and the relationships among parties. Code officials should also be encouraged to take advantage of the formalized I-code training offered by the ICC.

How the IgCC is adopted in a jurisdiction will determine how much energy modeling will be necessary to demonstrate compliance. The code has many options for jurisdictions, both in sections and levels within sections that may be adopted as jurisdictional electives and in the number of project electives required. These options, coupled with variability in interpretation and in the experience and capacity of code officials, will create an uneven patchwork of requirements across the country, leading to additional work for design teams and contractors as they try to navigate through a variety of codes and interpretations.

In some cases, departments that had not previously interacted with each other may be faced with communication, content, and collaboration issues. One department may handle plan review and another inspection. Your firm will want to engage the various departments that are handling review and compliance for the IgCC early and often to determine the appropriate path to compliance and the necessary milestones for a successful application. If you work in several jurisdictions, you may travel several distinct departmental paths.

Traditional Administrative Structure and the IgCC

Traditional approaches to administrative code enforcement include an understanding of the applicability of the code; requirements for documentation; an approval process including permits and fees; and, eventually, a certificate of occupancy. The IgCC does not include permitting language. This is by design, as the code authors did not want to have a green permit superseding other base permits. Rather, the green requirements will “overlay” other adopted codes, and permits will be issued per the IBC, IPC, etc., according to the methods and procedures in place in the adopting jurisdiction. Nevertheless, the IgCC will require a number of special procedures and administrative tasks with which you should familiarize yourself.

Determining Your Path through the IgCC

Section 3, Level 3

With the IgCC, it is essential that you determine your path and make a roadmap for the design process that incorporates any additional requirements that your jurisdiction has added, and any project electives (if Appendix A has been adopted) that your client wishes to employ.

Sections of the IgCC that will require careful attention regarding typical / traditional permitting and inspection procedures:

Construction Document Requirements

IgCC 104.1 Information on Construction Documents

List of Project Electives (303 – Table 303.1)

Commissioning Requirements (903 – Table 903.1)

IgCC 105.4 Alternative Materials

Approved by building official

IgCC 105.5 Compliance Materials

Software, work-sheets, compliance manuals

Site and Building Definitions

Products: Asbestos, VOCs, recyclability

Site: Brownfields, conservation areas, soils, native plant species, floodplain

Energy: ZEPI, geothermal, renewable

Water: Reclaimed, watersense

Building Construction: vapor retarders, LCA

Daylighting (new terms)

Jurisdictional Requirements (Table 302.1)

Requirements determined to be higher than base code compliance

Defines number of Project Electives the jurisdiction will require of the project

Indicates whether ASHRAE 189.1 is used as an optional compliance path

Defines no. of Project Electives the jurisdiction will require of the project

Materials Selection

Section 505 requires at least 55 percent of constructed materials selected for a project to be used, recycled, recyclable, bio-based, or indigenous, unless a whole building life cycle analysis is performed in accordance with Section 303.

Whole Building Life Cycle Assessment (303)

Alternative pathway to Section 505, if chosen, may require reliance on life cycle assessment consultants.

Due Diligence

You should do a conventional code analysis and then apply the provisions in your jurisdiction's adoption of the IgCC.

Project Electives (Appendix A)

When adopted by ordinance and checked off by the design team, electives become mandatory for your project. Appendix A addresses all the content in all the chapters of the IgCC. It allows the Owner and Architect to exceed the base level of the IgCC as they feel comfortable or as the team wishes to challenge itself. Though it may seem strange for an owner to want to go beyond the code, it does afford flexibility for owners and design professionals who are operating in jurisdictions that have mandated a specific number of project electives. Which electives and how they are met are left up to the project team.

A Closer Look: Post-occupancy, Commissioning and Compliance

Section 3, Level 4

Post-occupancy, Commissioning and Compliance

The commissioning, metering, and monitoring requirements of the IgCC are intended to provide stronger linkage between design and actual measured building performance. Understand the specific interpretation of commissioning in the IgCC and become familiar with your jurisdiction's expectations of the design professional in responsible charge. If you are considering offering commissioning services for the first time on a project for compliance with the IgCC, carefully evaluate the provisions and determine if your firm is qualified to perform the services before proceeding.

Commissioning Requirements

Commissioning requirements will now involve the architect or other commissioning agent well into the operations (post-occupancy) phase of the project. The newly incorporated element of commissioning recognizes that the proper functioning of a building is critical to its performance and must be accounted for after the certificate of occupancy is issued. Doing so involves understanding complex relationships among building systems and components that need to be tuned to deliver the intended design performance. Code-mandated commissioning assists in making sure that everything is working the way it is supposed to.

The commissioning requirements now included in the IgCC are an opportunity for architects to have a role in verifying that what they intended to happen in the building is really happening. It is a critical step to quality delivery, which works in the best interest of the design team as well as the owner and contractor.

The IgCC commissioning process utilizes a minimum of twelve months (one season of operation) to evaluate performance and make system adjustments to meet performance objectives. As a key team member with important design information and knowledge of project objectives,

the architect plays a vital role in this effort. The owner, operator, and tenants have just as vital a responsibility to operate and use the building effectively.

- The involvement of the architect in commissioning benefits architectural practice in several ways:
- It helps architects draw boundaries around their responsibilities, even as it helps them improve the delivery of the building;
- It affords architects the opportunity to oversee or provide commissioning;
- It increases architects' confidence that what they designed will be what the client gets; and
- It enhances the potential for the architect to become the client's long-term, trusted advisor.

Metering and Monitoring Requirements

The IgCC's more extensive metering requirements will facilitate better understanding of resulting performance, operating characteristics, and actual energy use. They will provide:

- A better and more detailed understanding of how a building is performing "under load";
- An understanding of the factors that are affecting that performance;
- A sense of how and where adjustments can be made to achieve better performance; and
- The ability to use that information to better inform future designs, thereby helping our clients achieve the level of performance they desire in both current and future projects.

Closer Look: Post-occupancy, Commissioning and Compliance, *continued*

Section 3, Level 4

Comparing metered data to modeled performance can also help distinguish between unanticipated increases in occupant loads and mechanical problems that might be affecting the building's energy consumption.

Additionally, the metering requirements in the IgCC are an important enabler. In any project, there is tension between initial construction cost and long-term operating performance. A robust metering system is often one of the first things to be eliminated. The architect will now be able to say to the client, "You know, I do understand there might be some construction cost issues, but it's required by code, so we need to install it."

The Impact of Monitored Data

The IgCC's requirement to provide owners with the outcome data from metering and monitoring will put market pressure on resulting performance. Owners will be able to compare the energy performance of their buildings to modeling predictions and ask, "Why isn't this building performing as anticipated?" This, in turn, will put pressure on the design tools to better predict performance; it will also inform future design and design services. It is important to recognize that outcome-based design and codes will require diligence on the part of the architect to understand the inherent risks involving the expectations that are set with both the client by contract and as required by code.

Enforcement of Metering and Commissioning

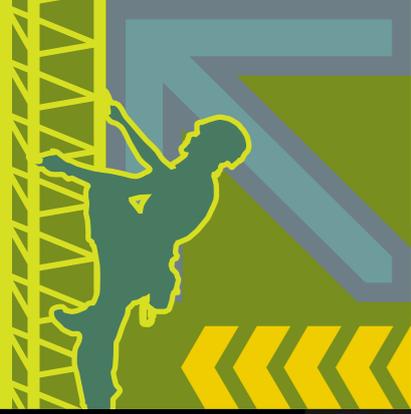
A number of jurisdictions have used the performance path for some time, so procedures and forms for submitting a building's performance prediction compared to a baseline are readily available.

Enforcement of the metering component of the IgCC simply requires a determination that meters are in place and that they allow the building to be operated. This determination can happen before the certificate of occupancy.

Enforcement of commissioning is probably the biggest grey area for architectural practice, as the required commissioning processes goes beyond the certificate of occupancy. New enforcement methods for commissioning are implied in the code but not explicitly addressed. Thus, more than likely, we will see jurisdictions begin to experiment with enforcement mechanisms that extend beyond the certificate of occupancy, which is going to be a big change for the jurisdiction and the design community. For example, some jurisdictions now enforce the existence of a contract for commissioning, but once the certificate of occupancy is issued, most of the available enforcement tools have been exhausted.

Managing additional responsibilities

Relative to energy and almost any other aspect of architectural design there is a challenge: you can meter energy, but you can't quantify design attributes like beauty and use of space. Responsibility for outcomes brings with it both worry and opportunity. Architects will need to understand all the systems that have meters attached to them, which is not currently common practice.





Chapter-by-Chapter Summary of the IgCC

Section 4, Level 1



Chapter 1, “Administration”

Chapter 1 sets forth the administrative criteria for the IgCC, which is applicable to all occupancies except low-rise residential occupancies under the International Residential Code. The IgCC is not applicable to equipment or systems used primarily for industrial or manufacturing purposes, with some exceptions (e.g., some energy provisions address limited aspects of process energy). The chapter references the IBC for establishment and operation of administrative functions, including enforcement and appeals. It notes that the code is intended for adoption as a legally enforceable document, requiring adequate administration and enforcement. Chapter 1 also establishes the rights and privileges of the design professional, the contractor, and the property owner.

A jurisdiction may opt for applying the technical provisions of ASHRAE 189.1, Standard for the Design of High-Performance Green Buildings, rather than those of the IgCC, but retaining the administrative criteria of IgCC Chapter 1.

Chapter 2, “Definitions”

Chapter 2 provides definitions of all terms specific to the IgCC. These terms are shown in italics wherever they appear in the code. As with any code, terms may have a unique meaning in the code, different from the ordinarily understood meaning of the term. Accordingly, users should consult Chapter 2 regularly to assure correct interpretation.

Chapter 3, “Jurisdictional Requirements and Life Cycle Assessment”

By design, the code is flexible in its format to enable communities to adapt the code to unique environmental and regional goals and needs. Table 302.1 lists optional, enhanced performance features, which, when adopted by the jurisdiction, become enforceable for all build

ings in the jurisdiction. The table also lists the appendices to the IgCC, including project electives, as adoptable choices. The project elective option requires the design team to select, in agreement with the owner, a minimum number of elective criteria from a list of options. The accompanying text emphasizes that, “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.”

Chapter 4, “Site Development and Land Use”

Chapter 4 establishes 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. Among these requirements are site inventory and assessment; storm water management; potable water uses related to landscape irrigation and outdoor fountains; vegetation, soil and water quality protection; the diversion of land-clearing debris and excavated soils; bicycle paths and storage; heat island effect mitigation; and light pollution from buildings.

Chapter 5, “Material Resource Conservation and Efficiency”

Chapter 5 encourages building material conservation, resource efficiency, and environmental performance. Its requirements address material selection, recycling, reuse, renewability, toxicity, and durability, including resistance to damage caused by moisture. Section 505 requires at least 55 percent of constructed materials selected for a project to be used, recycled, recyclable, bio-based, or indigenous, unless a whole building life cycle analysis is performed in accordance with Section 303.

Chapter-by-Chapter Summary of the IgCC, *continued*

Section 4, Level 1

Chapter 6, “Energy Conservation, Efficiency and CO₂e Emission Reduction”

Chapter 6 requires buildings and building sites to be designed, constructed, commissioned, and operated for the effective use of energy. It provides both prescriptive and performance-based paths to this goal. Buildings designed on the prescriptive basis must meet prescriptive requirements for building envelope systems, mechanical systems, service water heating systems, and electrical power and lighting systems. Performance-based designs must comply with modeled performance pathway requirements and plug load controls. All buildings must meet requirements for energy metering, monitoring, and reporting; certain specific appliances and equipment; building renewable energy systems; and energy systems commissioning.

Chapter 7, “Water Resource Conservation, Quality and Efficiency”

Chapter 7 is intended to conserve water, protect water quality and provide for safe water consumption. It requires the metering of water used indoors, outdoors, and in wastewater conveyance; and prescriptive maximum flow rates for fittings and fixtures, including water-based HVAC systems. It includes requirements for water treatment systems, rainwater harvesting, greywater systems, and reclaimed water systems. Among the jurisdictional electives associated with this chapter is a requirement for the use of municipal reclaimed 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. It requires an air quality management plan, the ventilation of buildings during the construction phase, and the provision of natural light for specified occupancies. It prohibits smoking within buildings; limits pollutant sources in print, copy, and janitorial rooms; and provides filter requirements for air-

conditioning systems. It establishes pollutant control requirements for fireplaces, solid fuel-burning appliances, and various gas appliances. It prohibits the use of urea-formaldehyde foam insulation and materials that contain asbestos and regulates emissions from wood products, adhesives, sealants, paints, coatings, flooring, acoustical ceiling tiles, wall systems, and insulation. A jurisdictional elective associated with Chapter 8 limits sound transmission levels.

Chapter 9, “Commissioning, Operation and Maintenance”

Chapter 9 is intended to require building owners and facility managers to operate and maintain buildings in a manner that will attain the designed performance goals. It establishes pre- and post- occupancy commissioning procedures to evaluate the operation, performance, and maintenance of buildings as constructed. It requires the inclusion of building operation and maintenance information in the construction documents. In a departure from the LEED process, it allows commissioning to be performed by the architect.

Chapter 10, “Existing Buildings” and Chapter 11, “Existing Building Site Development”

The provisions for existing buildings and existing building sites in the IgCC are loosely based on the provisions of the International Building Code (IBC). They are not retroactive, but apply only to buildings that are altered or added to, and only to the parts that are altered. 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 altered may remain as is. At least 10 percent of the cost of alterations must be dedicated to improvements related to water and energy conservation and efficiency. Additions are treated much like new construction: the applicable require-

Chapter-by-Chapter Summary of the IgCC, *continued*

Section 4, Level 1

ments of the code must be satisfied. The IgCC does, however, require that an existing building that undergoes alterations or additions, even if they are of a minor nature, comply with the basic minimum energy and HVAC requirements.

Section 1005 provides relief for historic buildings under certain conditions. Where buildings are decommissioned, Section 1006 requires that a material and waste management plan be developed to ensure that such buildings are demolished in such a manner that at least 50 percent of materials are diverted from landfills.

A jurisdictional elective associated with Chapter 10 requires post-certificate of occupancy reporting of Zero Energy Performance Index (zEPI), energy demand and CO₂e emissions.

Chapter 12, “Referenced Standards”

The IgCC contains numerous references to standards used to regulate materials and methods of construction. They are part of the code to the extent of the reference to the standard, and compliance with the reference standards is required. Chapter 12 lists all of the standards referenced in the IgCC alphabetically, by acronym of the promulgating agency.

Appendix A, “Project Electives”

Appendix A, when adopted by a jurisdiction, encourages performance beyond the minimum requirements of the IgCC. It does so by requiring a project team to select specified minimum numbers of project electives from lists of options corresponding to the principles addressed in Chapters 4 through 8. It is thereby able to encourage the implementation of sustainable practices that would be difficult or impossible to mandate for all sites. Some jurisdictional electives (see commentary on Chapter 3, above) remove some options from the list of project electives, making them mandatory within that jurisdiction.

Appendix B, “Radon mitigation”

Radon comes from the natural radioactive decay of the element radium in soil, rock, and water and finds its way into the air. Appendix B contains requirements for the design and construction of systems that mitigate the transfer of radon gases from the soil to building interior spaces.

Appendix C, “Optional Ordinance”

The optional ordinance contained in Appendix C addresses key elements of an evidentiary-based adoption structure that includes performance-bonding requirements. These bonding requirements are tied to the issuance of building permits, certificates of occupancy and the process of compliance verification.

Appendix D, “Enforcement Procedures”

As the text of the code itself puts it, “Appendix D is intended to ensure that buildings constructed in accordance with the IgCC are maintained in a manner that is compliant with the code. [It] requires that existing buildings that do not comply with these code requirements be altered or repaired to restore compliance with the IgCC.”



Design and Practice Implications of the IgCC, Chapter-by-Chapter Commentary

Section 4, Level 2

The following chapter-by-chapter commentary summarizes the focus of the chapter and identifies key topics for consideration. Some of the issues discussed in the commentary include:

- Provisions that may need to be addressed at the time of code adoption in order to clarify the code requirements for design, construction, operation, and maintenance;
- Provisions that may affect the scope of design team work or the applicable standard of care for design professionals, perhaps resulting in the need for new consultants or increasing the level of work required of current design team members;
- Provisions that may impose new requirements on owners; and
- Practice recommendations to be considered in order to address the issues raised by the text of the Code.

Chapter 1, “Administration”

Chapter 1 of the IgCC describes the scope and applicability of the code, the intended coordination with other ICC codes, and the duties and powers of the code official.

Section 101.3 provides that the IgCC is intended to apply to “the design, construction, addition, alteration, change of occupancy, relocation, replacement, repair, equipment, building site, maintenance, removal, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures and to the site on which the building is located.” Unless the jurisdiction chooses to include them pursuant to Chapter 3, and specifically through the use of the Jurisdictional Requirements table 302.1, the IgCC is not intended to apply to the following types of residential construction. If included pursuant to table 302.1, these residential building sites must comply with ICC 700.

- Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane in height with a separate means of egress, their accessory structures, and the site or lot upon which the buildings are located;
- Group R-3 residential buildings, their accessory structures, and the site or lot upon which the buildings are located; and
- Group R-2 and R-4 residential buildings four stories or less in height above grade plane, their accessory structures, and the site or lot upon which the buildings are located.
- Equipment or systems that are used primarily for industrial or manufacturing processes.
- Temporary structures approved under Section 3103 of the International Building code.

Pursuant to Section 101.2, the IgCC is an “overlay document” to be used in conjunction with other codes and standards adopted by a jurisdiction. Section 102.4 lists nine other International Codes that are considered part of the requirements of the IgCC. Numerous other standards are referenced throughout it, as well.

Section 102.4.1 attempts to establish a rule for the interpretation of conflicting provisions between the IgCC and referenced codes and standards, but the rule is confusing and should probably be clarified by the adopting jurisdiction. Similarly, the IgCC is ambiguous when it comes to the interplay between it and other existing codes and ordinances in the jurisdiction. Jurisdictions should consider clarifying these issues as part of the code adoption process.

Section 103 authorizes and directs the code official to enforce provisions of the IgCC; to render interpretations and to adopt policies and procedures to clarify the application of the code and how it relates to

Design and Practice Implications of the IgCC, Chapter-by-Chapter Commentary, *continued*

Section 4, Level 2

other applicable codes and ordinances; and to make inspections, as required, to determine compliance. The procedures for enforcement and, more significantly, the consequences for non-compliance are not clear. An adopting jurisdiction may wish to consider clarification of these issues and enact more detailed provisions to address them, such as those set out in Appendix D.

Chapter 2, “Definitions”

Chapter 2 provides definitions for close to two hundred terms used in the IgCC. In addition, it adopts the definitions of terms defined in the International Building Code, International Energy Conservation Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, and International Plumbing Code. Terms not otherwise defined in the IgCC or the listed codes are to be given their “ordinarily accepted meanings such as the context implies.”

Many, if not most, of the definitions set forth in Chapter 2 are straightforward. Some definitions, however, might benefit from clarification. For example, the term “95th Percentile Rainfall Event” is defined as, “The rainfall event having a precipitation total greater than or equal to 95 percent of all rainfall events during a 24 hour period on an annual basis.” Practitioners and code officials in adopting jurisdictions may want to review the definitions carefully and request or publish clarifications to the definitions as necessary.

Chapter 3, “Jurisdictional Requirements and Life Cycle Assessment”

Chapter 3 provides the mechanism for each jurisdiction to select “jurisdictional requirements” (requirements specific to the jurisdiction). It also establishes the requirements for a “whole building life cycle assessment.”

Table 302.1 lists the requirements the adopting jurisdiction may select as part of its IgCC requirements, along with an IgCC chapter section reference where a description of each requirement is found. Obviously, it will be critically important that the adopting jurisdiction fully consider the implications associated with adoption of each jurisdictional requirement. As with the standard requirements of the code, the jurisdictional requirements may have practice and cost implications for design, construction, enforcement, and maintenance.

Available jurisdictional electives are summarized in Table 302.1, which includes provisions for:

- Flood hazard area preservation
- Surface water protection
- Conservation areas
- Agricultural land
- Greenfield sites
- High Occupancy vehicle parking
- Low emission, hybrid and electric vehicle parking
- Light pollution control
- Minimum percentage of waste diverted from landfills
- zEPI of jurisdictional choice (offers a lower zEPI score of 46 or less as indicated)
- Municipal reclaimed water
- Post-construction, pre-occupancy baseline indoor air quality testing
- Sound transmission and sound levels

Design and Practice Implications of the IgCC, Chapter-by-Chapter Commentary, *continued*

Section 4, Level 2

- Evaluation of existing buildings
- Post-certificate of occupancy zEPI, energy demand, and CO₂e emissions reporting

Section 303.1 describes the requirements for a whole building life cycle assessment. The process involves utilization of a life cycle assessment tool approved by the code official. The assessment must demonstrate that the building project achieves an improvement in environmental performance when compared against a reference building. If a project uses a whole building life cycle assessment that complies with Section 303.1, the project does not also have to comply with the Material Selection requirements of Section 505. If you know how to perform a life-cycle assessment according to [ISO Standard 14044](#), this may be an attractive option for your owner and design team.

If your jurisdiction has adopted Appendix A, you will have the responsibility to choose the electives (with your client) that will meet the project electives requirement, the required number having been designated by the jurisdiction.

Chapter 4, “Site Development and Land Use”

Chapter 4 requires a pre-design land use assessment and, depending on the electives that your jurisdiction has adopted, may limit where you can build. The IgCC requires links to transportation infrastructure, the provision of showers, and dense parking. These are all new provisions to the base codes. Heat island effect is addressed with paving materials requirements.

Chapter 4 contains requirements for development and maintenance of a building and the building site, intended to “minimize negative environmental impacts and to protect, restore and enhance the natural features and environmental quality of the site.” Major sections within

the chapter address issues such as Preservation of Natural Resources, Storm Water Management, Landscape Irrigation and Outdoor Fountains, Management of Vegetation, Soils and Erosion Control, Building Site Waste Management, Transportation Impact, Heat Island Mitigation, and Site Lighting. Many of the topics addressed in Chapter 4 are addressed by existing codes. Some, however, will involve new concepts and requirements, or will be more detailed and extensive, and will therefore require careful study. Not all of the requirements of Chapter 4 will apply in all jurisdictions; several, including those relating to surface water protection, conservation areas, agricultural land, and greenfield sites, involve jurisdictional requirements that must be selected in accordance with Chapter 3 and Table 302.1.

Site development and land use have been the subject of significant study and regulation in many areas of the country and are often considered parochial matters. Wholesale adoption of Chapter 4 of the IgCC may result in jurisdictions superseding previously enacted land use regulations. Design professionals and local officials need to understand the impact of adopting the code and carefully consider whether the provisions of Chapter 4 are appropriate for their jurisdiction. In addition, adoption of the provisions of Chapter 4 at a local level may create a conflict with state regulations addressing the same issues. Care will need to be taken to insure that all such potential conflicts are identified and addressed as part of the code adoption process.

Some of the requirements in Chapter 4 that may involve additional work on the part of the design professional or the involvement of new consultants include the submission of the pre-design site inventory and assessment; the development of a soil and water protection plan; and the development of a building site waste management plan. The pre-design site inventory and assessment must be submitted with the construction documents and must include the location of any

Design and Practice Implications of the IgCC, Chapter-by-Chapter Commentary, *continued*

Section 4, Level 2

“protection areas,” as those areas are defined in the code; an assessment of whether, and to what degree, the native soils and hydrological conditions of the building site have been disturbed and altered by previous use or development; identification of invasive plant species for removal from the site; and identification of native plant species on the site. The soil and water quality plan must be submitted by the owner and approved prior to construction and must include a soils map, site plan, or grading plan that indicates designated soil management areas for all site soils; a written erosion, sediment and pollution control program for construction activities associated with the project; and a written periodic maintenance protocol for landscaping and storm water management systems. The building site waste management plan must be developed and implemented to divert not less than 75% of the land-clearing debris and excavated soils, with specific requirement to address materials diverted, destruction and disposal of invasive plant species, removal of contaminated soils, and record keeping and documentation associated with these activities.

Chapter 5, “Material Resource Conservation and Efficiency”

Chapter 5 Sections include provisions for storage and handling of construction materials and controlling moisture impact during construction, as well as for construction waste management; inclusion of recycling areas for use by building occupants; requirements that, with certain exclusions and exceptions, not less than 55% of the total building materials meet certain requirements for used materials and components, recycled content building materials, recyclable building materials and components, bio-based materials, and indigenous materials. Unless a different percentage is selected as a jurisdictional requirement, not less than 50% of nonhazardous construction waste must be diverted from disposal. A Construction Material and Waste Management Plan must be developed and implemented to recycle and salvage construc-

tion materials and waste; however, the code does not indicate when that plan must be developed or whether it must be submitted. Since construction waste management is normally within the contractor’s means and methods, it will be difficult to prepare such a plan without the contractor’s involvement. In addition, design professionals generally avoid taking action that might be seen as dictating construction means and methods, due to the associated and sometimes uninsurable risks involved. This point should be clarified as part of the code adoption or implementation process.

The potential penalty for failure to meet some of the waste management or material selection goals might also be considered and clarified during the code adoption process. Unlike many other code requirements, the failure to adequately divert, recycle, or reuse construction waste may not readily lend itself to correction. Similarly, if the failure to comply with material selection standards is correctable only by removing non-compliant material and replacing it with compliant material, the waste associated with removal of the non-compliant material might have a greater negative environmental impact than the gains achieved by using the compliant material. Jurisdictions and code enforcement officials should carefully consider these issues and will likely need to develop alternative remedies for non-compliance.

Design and Practice Implications of the IgCC, Chapter-by-Chapter Commentary, *continued*

Section 4, Level 2

Chapter 6, “Energy Conservation, Efficiency and CO₂e Emission Reduction”

Chapter 6 is intended to regulate the design, construction, commissioning, and operation of buildings and building sites, to achieve the effective use of energy. The energy performance requirements of Chapter 6 can be met by following either a prescriptive path or a performance path. The prescriptive path requires the design to comply with a set of guidelines and assembly performance values. When the checklist of required performance values is adhered to, the project will have met the baseline code requirements. The prescriptive path will, by its nature, place restrictions on the elements of the building design. The performance path defines a process pursuant to which design professionals can achieve code compliance with a custom design. In order to establish that the overall reduction in energy use to be achieved by the custom design is at least as good as the baseline reduction to be achieved by the prescriptive path requirements, the project designers will need to utilize energy modeling.

Determining the path for energy compliance early on with your owner is essential for success. You have the option of using a prescriptive approach or the performance path, which includes a requirement for energy modeling and plug load controls. All performance path designs must have a zEPI ([Zero Energy Performance Index](#); see [Chapter 2, “Definitions”](#)) of no more than 51 (or less, if so adopted by the jurisdiction).

Regardless of the path chosen, the requirements of Chapter 6 will significantly impact the work of the design professionals on the project. Early in the project, perhaps in the programming phase, the architect and its consultants will need to discuss energy efficiency and design related issues with the project owner, facility manager, and perhaps future tenants. Architects and consultants will likely begin to make significant use of energy modeling. They will also likely become much more deeply involved in overseeing or providing building commissioning services.

Depending on what energy code is currently enforced in your jurisdiction, the energy chapter will represent a potential range of changes to your design and project delivery processes. The performance-based path requirements are generally in the range of 11% to 15% higher than the 2009 IECC requirements and approximately 20% higher than the 2006 IECC requirements. For projects in jurisdictions that have currently adopted the 2009 IECC, the new IgCC represents a moderate increase in performance. In jurisdictions that have adopted the 2006 IECC or have no energy conservation code, the new IgCC represents a significant increase in performance over a code minimum building.

For a thorough analysis of the requirements and implications of Chapter 6, please see [Section 2, Level 3 and 4](#).

Chapter 7, “Water Resource Conservation, Quality and Efficiency”

Chapter 7 includes requirements intended to establish means for conserving water, protecting water quality, and providing for safe water consumption. Major sections within the chapter address topics and issues such as Fixtures, Fittings, Equipment and Appliances; HVAC Systems and Equipment; Water Treatment Devices and Equipment; Nonpotable [sic] Water Requirements; Rainwater Collection and Distribution Systems; Gray Water Systems; Reclaimed Water Systems; and Alternate Onsite Nonpotable [sic] Water Sources. Much like chapter 4, some of the topics and provisions of chapter 7 will involve new concepts and requirements for practitioners and will therefore require careful study.

Design and Practice Implications of the IgCC, Chapter-by-Chapter Commentary, *continued*

Section 4, Level 2

Chapter 7 limits fixture flow rates. Municipal reclaimed water, where available, must be provided to fixtures. Water in HVAC systems is regulated. Hot water supplies are limited. Water treatment devices, internal decorative fountains, and grey-water systems are provided for and regulated.

Many of the topics addressed in chapter 7 are currently addressed by existing codes. In some circumstances, however, the requirements in the IgCC will be seen as much more detailed and extensive than the requirement of existing regulations, and there will be a corresponding increase in the level of work required of the architect or its consultants. Of particular note is the number of tables and formulae set out in chapter 7. It may take considerable time and use for design professionals to become familiar with the tables and formulae and to incorporate them confidently into the building design. Similarly, code enforcement officials may need considerable review and training time to become comfortable with using the tables and formulae.

Chapter 8, “Indoor Environmental Quality and Comfort”

The requirements of chapter 8 are intended to create an interior environment that is conducive to the health of building occupants. It contains detailed requirements related to air quality during construction and building occupancy; the control of other environmental pollutants; acoustics and noise control; and natural lighting. An indoor air quality plan must be developed, and it must address the methods to be used during design and construction to comply with the code. It is not clear how the air quality provisions are tied to the design phase, and this point will need to be clarified as the code is being considered for adoption. In addition, it is not clear if or when the indoor air quality plan must be submitted to the permitting jurisdiction. Many of the air quality requirements will impact the contractor’s means and methods, and the

contractor will play a role in development of the plan and a significant role in meeting the code requirements.

An optional jurisdictional requirement in Chapter 8 involves a post-construction, pre-occupancy baseline IAQ test. If this jurisdictional requirement is selected, the building is tested for VOC levels after all interior finishes are installed. It would appear that, if the interior air quality does not meet the required standards, there may be a period of mitigation and retesting. Failing that, the apparent remedy is to flush the building by supplying continuous ventilation with all air handling units at their maximum outdoor air rate for at least 14 days while maintaining an internal temperature of at least 60 degrees F. and relative humidity not higher than 60%.

Occupancy is permitted to start 7 days after the start of flush out, provided the flush out continues for the full 14 days. The requirements of this section are somewhat unclear, and should be clarified as part of the code adoption process. In addition, jurisdictions considering adoption of this provision should consider the practical implications of such a requirement. Some points for consideration include the potential impact on substantial completion and building occupancy, particularly if testing must await installation of all interior finishes, and the difficulty associated with undertaking the required remedial measures in an occupied building or during summer or winter months.

Chapter 9, “Commissioning, Operation and Maintenance”

The IgCC is unique in its approach, in that the jurisdiction can authorize the architect to be the commissioning agent for the project. This is a departure from LEED, which requires third party evaluation. Commissioning requires a series of administrative duties and inspections, which you should consider carefully before proceeding as the commissioning agent for the project.

Design and Practice Implications of the IgCC, Chapter-by-Chapter Commentary, *continued*

Section 4, Level 2

The provisions of Chapter 9 establish requirements for pre- and post-occupancy commissioning, operation, and maintenance of the building. The “registered design professional in responsible charge” or an approved and independent agency must perform commissioning during construction and after occupancy, as outlined in a lengthy table included in the chapter. Building operations and maintenance documents, meeting certain prescribed requirements, must be submitted to the owner prior to issuance of the certificate of occupancy. Record documents, including the approved construction documents, as-built plans and specifications, engineering and institutional control information related to brownfield sites, and the certificate of occupancy, must also be submitted to the owner. The building owner is required to file a letter with the code official certifying receipt of the record documents and building operation and maintenance documents.

A post-occupancy commissioning report must be provided to the owner within 30 months after issuance of the certificate of occupancy and made available to the code official upon request. While commissioning and the development and delivery of record documents and maintenance and operations documents are not new concepts, the level of detail required by Chapter 9 and in other sections of the code may involve considerably more work than normally provided by the design professional or independent commissioning agent. The design professional and owner must be sure to understand the scope of work and associated cost and responsibility necessary to provide the required services.

Chapter 10, “Existing Buildings”

Existing buildings and sites, including historic buildings, are given special treatment in Chapters 10 and 11. If the bulk of your work is retrofits, renovations, additions, and alterations, you will want to pay close attention to the provisions in these chapters.

Chapter 10 establishes the requirements applicable to the alteration, repair, addition, maintenance, operations, and change of occupancy of existing buildings and structures, including relocated existing buildings. The exact requirements are determined by a number of factors including building size and the percentage of total building value represented by the modifications; the percentage of the value of the requirements to the value of the complete modification; the feasibility of implementing any particular requirement; and whether the existing building is an historic building.

Treatment of Historic Buildings

Another area of great interest and concern is historic buildings. The code provides an exemption when implementation of such provisions would require a change in the visible configuration of building components in a manner that is not in keeping with the building’s historic nature, as determined by the code official, or where compliance with such provisions would produce a conflict with a building function that is fundamental to the historic nature of the building. These exemptions are not compatible with the requirements for continued inclusion on the National Register for Historic Buildings, which requires protection of fabric and character in addition to the visible configuration and function. In addition, some of the required alterations could trigger long-term damage to the building.

Chapter 11, “Existing Building Site Development”

Chapter 11 establishes requirements for the alteration, repair, maintenance, and operation of existing building sites. The requirements will vary depending on the nature of the building site modification being implemented.

Design and Practice Implications of the IgCC, Chapter-by-Chapter Commentary, *continued*

Section 4, Level 2

Chapter 12, “Referenced Standards”

Chapter 12 lists the standards referenced in the IgCC, with the promulgating agency, the standard identification or reference number, the effective date and title of the standard, and the section(s) of the IgCC where the standard is referenced. It should be noted that the IgCC references well over 100 standards promulgated by almost 40 separate agencies. Design professionals and code enforcement officials will need to maintain a compilation of the referenced standards.

Appendix A, “Project Electives”

In addition to selecting jurisdictional requirements in Table 302.1, adopting jurisdictions may require owners and designers to select and incorporate additional requirements as project electives, in order to incorporate “conservation practices that achieve greater benefit than the minimum requirements of the IgCC.” Selected project electives become mandatory requirements for the project. Therefore, it will be important for the architect and owner to discuss the potential project electives and to carefully select those that are achievable for the project.

It should be noted that, in general, it is not clear how the adopting jurisdiction is to indicate whether Appendix A, or any of the other appendices, are adopted as part of the Code. The preface to the Code indicates that “[a]ppendices have the same force and effect as the first 12 chapters of the IgCC only when they are explicitly adopted by the jurisdiction. Table 302.1 lists all appendices of the IgCC as provisions which jurisdictions can choose to enforce as mandatory requirements.” Table 302.1 does not list the appendices or provide any method for selection of the appendices as enforceable. Appendices A, C, and D each begin with a statement indicating that the provisions contained in the appendix are not mandatory unless specifically referenced in the adopting ordinance. Appendix B, Radon Mitigation, does not contain this limiting language. Neither the short form sample ordinance in the

Preface, nor the longer sample ordinance in Appendix D, contains sections clearly addressing the adopting jurisdiction’s intent to adopt each of the appendices. The adoption of one or more of the appendices will need to be clearly addressed by the adopting jurisdiction, and, in particular, the applicability of Appendix B should be clearly addressed.

Obviously, it will be critically important that the adopting jurisdiction take the time to fully consider the implications in setting the minimum requirements for project electives. As with the standard requirements of the code, the number of required project electives may have practice and cost implications for design, construction, enforcement, and maintenance. The design professional must ensure that the appropriate number of project electives is identified and incorporated in the project.

Appendix B, “Radon Mitigation”

Appendix B contains a map developed by the EPA and the US Geological Survey, which assigns each of the 3,141 counties in the United States to one of three radon zones. Mandatory radon mitigation requirements are applicable to projects located in Radon Zones 1 & 2. Design professionals and contractors not already familiar with radon mitigation will need to learn how to design and construct the necessary features.

Design and Practice Implications of the IgCC, Chapter-by-Chapter Commentary, *continued*

Section 4, Level 2

Appendix C, “Optional Ordinance”

Appendix C contains sample text that may form the basis for jurisdictional adoption of the IgCC. It expressly repeals all other ordinances in conflict with the terms of the IgCC as adopted by the jurisdiction. It also contains provisions requiring that performance bonds, or their equivalent, be posted as part of the permitting process. The bonding requirement is intended to help ensure that the project complies with the code. The sample ordinance also contains provisions for the creation of a Green Building Fund to provide incentives for, and defray the costs associated with, implementation of the green building practices; and the creation of a Green Building Advisory Council to monitor compliance with the ordinance and make policy recommendations to continually improve and update the ordinance.

Adopting jurisdictions will need to thoroughly understand each of the terms of the sample ordinance and the ramifications of those terms. In addition, it will be important for jurisdictions to determine the feasibility of obtaining the envisioned performance bonds or alternative security. It is not at all clear that these types of bonds are, or will be, commercially available.

Appendix D, “Enforcement Procedures”

Appendix D contains additional enforcement provisions intended to supplement the provisions of Chapter 1 of the code. The provisions in Appendix D are not mandatory unless they are specifically referenced in the ordinance or other regulation or legislation used to adopt the code. The supplemental provisions establish that failure to comply with a notice of violation or order issued by the code official will constitute a misdemeanor or civil infraction, and the violation shall be deemed a “strict liability” offense. In addition, each day a violation continues after notice has been served constitutes a separate violation and offense. Appendix D also contains provisions related to the duties and powers of the code official, the form and substance of notices and orders pertaining to code violations, emergency measures and abatement actions to be taken in the case of code violations resulting in an imminent hazard to the building site or surrounding public or private property, and procedures for appealing notices of violation and orders of compliance issued by the code official.



5

Section 5



THE AMERICAN INSTITUTE OF ARCHITECTS





Advocacy: How to Discuss the IgCC with Others

Section 5, Level 1

Architects make great advocates. They are often at the center of important issues in a community. They interact with a myriad of clients, public officials, and the general public. They have a general understanding of the laws of the built environment; are bound by their licenses to protect the health, safety, and welfare of the public; and tend to be passionate about the benefits of good design to society.

Architects are often faced with challenges that prepare them for answering difficult questions. Naturally inquisitive, architects ask hundreds of questions throughout the design process in order to create spaces that satisfy the needs and aspirations of clients. The same skill is necessary for effective lobbying for any cause, and, in particular, for facing the challenges of modifying any ordinance for the built environment.

One strength architects bring to the table is the ability to build coalitions. Building coalitions and staying at the center of the conversation are key aspects of effective advocacy work, especially on the IgCC. It is important to remember that everyone who touches the design, construction, and enforcement of codes for buildings will be affected by the adoption of the IgCC. Building coalitions with other design and allied professionals, fire and building officials, owner and governmental associations, and manufacturers will help to build awareness of and successfully implement the IgCC.

Understanding the underlying reasoning behind the code, and its overall value, will help the architect advocate to keep the message about the IgCC straight and simple. This will help the architect-advocate better serve his or her community.



Advocacy: How to Discuss the IgCC with Others, *continued*

Section 5, Level 1

Whether you are advocating for IgCC adoption at the local or state level or for the passage of a new law or amendment of an existing one, there are some rules of the road for effective advocacy:

The Ten Commandments of Lobbying

1. Be honest.
2. Be brief.
3. Be polite.
4. Know your message and stick to it; take time to rehearse what you plan to say.
5. Do not disparage other constituencies or interest groups.
6. Relate legislation to your personal experiences whenever possible.
7. Do not argue or take a hostile tone with a legislator or staff member;
you are trying to form alliances.
8. Explicitly ask for support for your position.
9. Thank the legislator for his or her time.
10. Stay in touch with your legislator and other officials; at the least, write a thank you note, reminding the legislator or staff member of the issues you discussed.

And, when things get difficult, it's important to remember that there are resources at the local AIA component level as well as AIA National to help with adoption activities, technical guidance and management of information, and education. The AIA encourages all architects to participate in the challenge of developing, adopting, and implementing the first national model green code.





Advocacy: Lobbying 101

Section 5, Level 2

Sometimes people and organizations won't lobby because they're afraid they don't know how. They are staunch supporters of their cause, they recognize the importance of lobbying, and they know it pays off. Yet they hold back, on the mistaken notion that lobbying is only for experts. If you can make a phone call or write a letter, you can lobby. All you need to be effective are three things:

- Knowledge: know a few basic facts.
- Conviction: believe in your cause.
- Common sense: use it.

Of course, as in anything else, the more you know about how to lobby, the better you will be.



Knowledge

Know a Few Basic Facts

The most important single thing a lobbyist needs to know is his or her subject. What is the substance of the legislation you are proposing (or opposing)? Why is it so important? What will happen if it passes? What will happen if it does not pass? How much will it cost?

Typically, the place to get these facts is your AIA state or local chapter. Most likely, whoever asks you to get involved in lobbying, perhaps the chair of your state's legislative committee, the executive director, or your chapter president, will provide these facts along with a call for action.

Know Your Legislators and Other Officials

It certainly helps to know the legislator or legislators you contact. What are his or her interests? What is his or her background? What is his or her record of support? What positions does he or she hold in the legislature? Who is the chair of the committee that will consider your proposal? Who is the chief spokesperson for the opposition?

Know the System

An effective advocate also knows how the system works. What steps does a proposed municipal ordinance or state law or appropriation bill go through from introduction to enactment? Which committees will consider the legislation? This information is normally available through staff and volunteer leadership.

Advocacy: Lobbying 101, *continued*

Section 5, Level 2

Conviction

Conviction Counts

Facts alone are not enough. Without conviction, dedication to the cause, loyalty to the organization, and determination to see the job through no matter how long it takes (and it can indeed take a long time), a lobbyist won't be very effective.

Concentration Counts, As Well

Difficult as it is, keep your focus on just one issue. It's the only way you can successfully marshal your resources and ultimately prevail in the tough environment you will face in any legislative fight.

Be Patient

It takes a sales person an average of thirteen tries with a prospect before making a sale, and legislative offices offer a similar challenge. So, be both patient and persistent.

Common Sense

Common Sense Principles

Be brief; be clear; be accurate; be persuasive; be timely; be persistent; be grateful. These principles apply whether you're lobbying by telephone, by letter, or face-to-face. The only factor that's a bit difficult for the beginner is timing. There are good times, better times, and best times, and, until you've become an expert in your own right, your organization's staff or volunteer leadership should call the shots on timing.

Don't Make Promises

Never promise reward for good behavior or threaten retribution for failure to support you. Be persuasive rather than argumentative or demanding. You are seeking to build alliances. Don't knock the opposition; they probably believe in their position as sincerely as you believe in yours.

Writing

When you write, keep your letter or fax to a single page — literally. If you need more space, include an attachment elaborating on that one page summary. Be absolutely sure you spell your legislator's name correctly, use the correct title, and get the address right. If you don't, he or she will wonder how credible the rest of your letter is. And, of course, always personalize your letter. Get the facts from your organization, but use your own words on your own stationery.

Meeting Face-To-Face

The first time you meet face-to-face with your representative or senator — or, for that matter, your city councilman — you probably will have butterflies in your stomach. It would be unusual if you didn't. If you'd feel better having others along, fine. Just make sure that those who accompany you can also speak to the matter at hand and are not simply along for the ride. Keep the group small. The fewer present, the more candid the legislator will be. Again, as in writing, be brief. Make an appointment, be on time, state your case, and leave. Plan to cover your topic in five minutes if possible, ten minutes at the most. Don't linger unless your legislator chooses to prolong the meeting. When you depart, hand your host a written summary — again, a one-pager — of your position, and state exactly what it is you want him or her to do about it.

You Are the Expert

In many cases, you may find that you know more about the topic at hand than the legislator or staff. This is because state elected officials and their staff tend to be generalists. They handle a wide range of complex subjects, from regulation to the environment to education, and they can't be experts in everything. That's where you come in. If they like and trust you, they will rely on your advice and knowledge. If you get hit with any questions you can't answer, admit it and provide the answers later. Don't bluff; it always shows.

Advocacy: Lobbying 101, *continued*

Section 5, Level 2

Aides Are Influential

Do not be offended if you don't get to see the boss. Even if you had a firm appointment, you may be referred instead to an assistant. The demands on a legislator's time are unbelievable, and quite often he or she cannot avoid last minute changes in schedule. Never underestimate the importance of an aide. Treat him or her just as you would your legislator, not only as a matter of courtesy but also because the aide is in a position to advance your cause or sink it without a trace.

Say Thank You

When you get back home, or after you've talked with your legislator by phone, or after he or she has voted your way or done something else to help you, send a thank-you letter. The vast majority of all mail a legislator gets is either asking for personal favors, complaining about something the government has or has not done, or blasting the legislator for something he or she has or has not done. A thank you letter really scores. Besides, it's the polite thing to do.

Always Report Back

Report back to your AIA state chapter. Whom did you see or talk with? What did you discuss? What was his or her position? Your report and those of other volunteers are indispensable to your leadership for planning strategy.

Following Up Is Vital

The sad truth is that many legislative offices will ignore your first request for a specific action. They have many people asking for many things; they want to know that you're serious about your request before spending precious staff resources. By asking again, you demonstrate that you really are serious and that you will keep asking until you get an answer!



What, You Lobby?

Of course you can. It's fun, it's stimulating, you'll learn a lot, and you'll be a real participant in this business called democracy. Not only will you help bring about positive change; you'll also get more satisfaction out of lobbying than you ever imagined.

Advocacy: Lobbying 101, *continued*

Section 5, Level 2

Forming Coalitions

A big part of effective advocacy work is building partnerships with other interested parties. There is strength in numbers. Here are a few tips for finding, cultivating, and keeping coalition partners.

Finding Allies

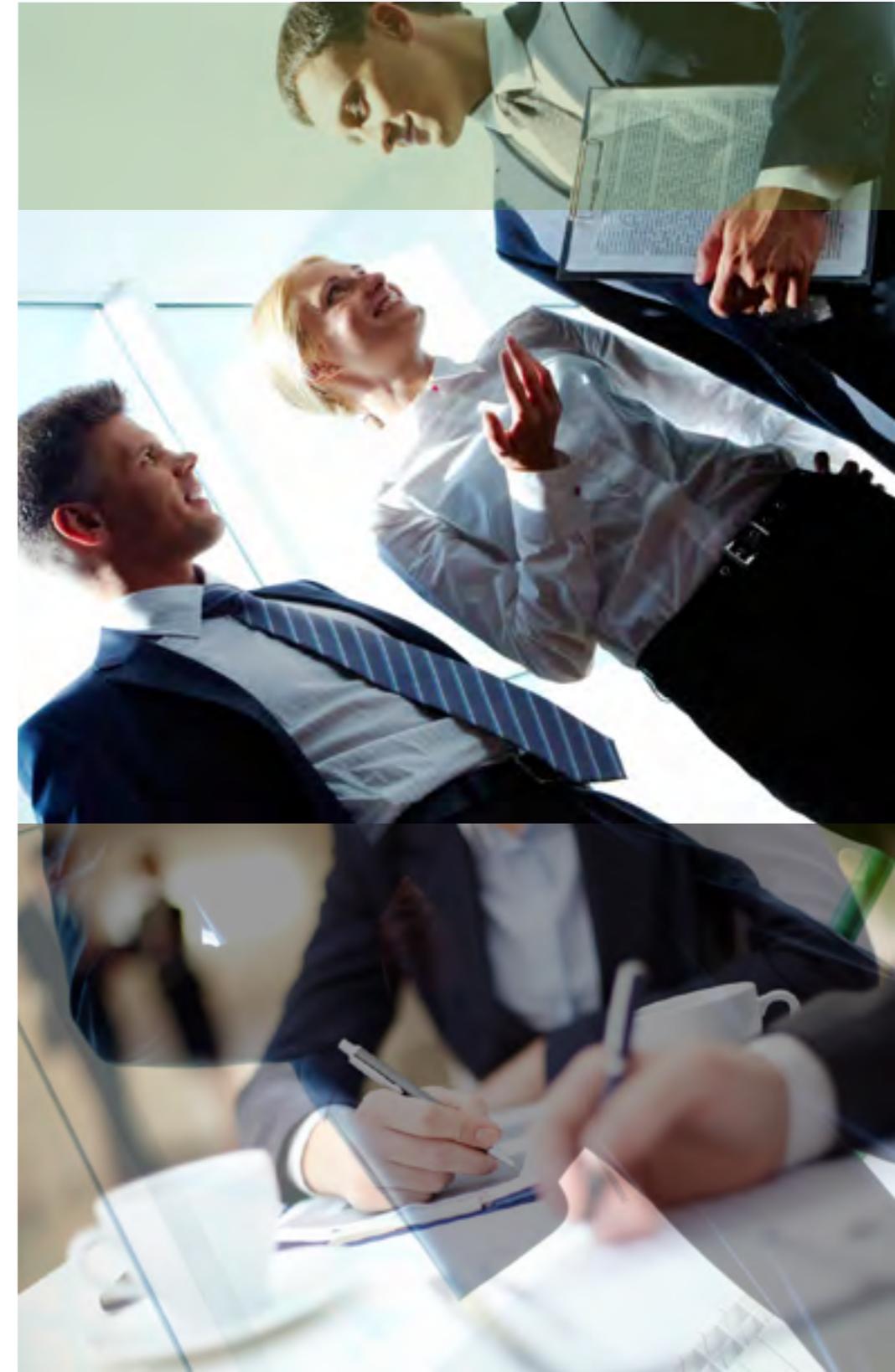
Look for allies among organizations you're already working with; among similar organizations in your community, such as building industry professionals in the design, manufacturing, and code enforcement arenas; and among other groups in your community that may not be so obvious but may have common interest with your group. Who else might be approaching the code in the same way you are?

Cultivating and Maintaining Relationships

Having identified potential allies, make sure you're after the same goal for similar reasons. Why is the issue of importance to each potential partner? What does each have at stake? And what influence does the partner bring to the table?

Identify specific topics that you can rally around: What aspects of the code will your group focus on? Do you have common challenges or opportunities?

Take the political temperature of participating groups as well as of the relevant governing body. Remember that you won't always be on the same side of every question: don't let your differences on one issue hinder your ability to work together on others. And be aware that some partnerships are more successful than others.





Advocacy: Resources for Lobbying

Section 5, Level 3

The AIA has established a resource package to aid AIA components as they advocate for the adoption of the IgCC. Components vary from state to state, and the code adoption process varies, as well. While there has been an attempt to make the resource guide for advocacy universal, the AIA is aware that individual circumstances call for a much more comprehensive effort, personalized to the jurisdiction. To that end, the AIA has established a response mechanism comprised of the following:

- AIA national staff members who will be available to support the efforts of the component from the Institute's offices;
- A group of AIA members who have expertise in the IgCC, its meaning, its application, and the reasons for adoption, available to speak to members of your state's governmental structure responsible for the adoption of the code;
- AIA members, staff, and lobbyists available to educate your members on the code; and
- The publication of collateral material to use in your advocacy efforts.



Frequently Asked Questions

What is the scope of the IgCC?

The IgCC covers all commercial buildings except industrial, manufacturing, and temporary structures. For low-rise residential buildings, including R-3 and R-2/R-4 that are four stories or fewer in height, each jurisdiction has the flexibility to decide whether to include these structures in the scope of the IgCC through meeting the provisions of ICC 700. Residential occupancies of five stories and higher must comply with the IgCC, by one of three paths: the IgCC base requirements, ASHRAE 189.1, or ICC 700.

What has been AIA's involvement in the process of creating the IgCC?

AIA has been involved with the creation and development of the IgCC from its beginning in 2009, with several AIA members serving on the development committee (the Sustainable Building Technology Committee, or SBTC) as well as on the review committees for the two public hearings.

Why is the AIA participating in the development of the IgCC?

As the old saying goes, "If you're not at the table, you're on the menu," a statement which certainly holds true in the model code development arena.

There are hundreds of stakeholders who participate in the development of national model codes, and the AIA has made not only being at the table, but also leading the process, a priority. Creating the first model green code supports existing AIA Board position statements on the value of a unified code, sustainability, and sustainable codes, standards, and rating systems.

What is the AIA's position with respect to adoption?

As a cooperating partner of the ICC in the creation of the first national green model code, the AIA supports adoption of the IgCC. The architects in each jurisdiction involved with adoption should play a key role assisting the jurisdiction to take full consideration of local building stock, climate, and social and economic conditions and to make an informed choice regarding adoption of the IgCC.

Why is AIA supporting adoption of the IgCC?

The adoption of the IgCC is a step toward achieving the goal of carbon neutrality in building construction by 2030, an effort to which the AIA is deeply committed. With so many participants in the code development process, including architects, engineers, code and fire officials, building owners, and a host of material and building industry interests, the potential for unintended consequences to the profession of architecture are too great for the AIA not to participate in both the development and adoption of the IgCC.

Why do we need more regulation?

The issue is not more regulation; it is consistent regulation. Confusion reigns on how best to make buildings energy efficient and sustainable. Some communities are taking initiatives to create green construction codes without the benefit of a model. Many jurisdictions already have green ordinances, based primarily on the LEED rating system. Local governments need a credible, enforceable, and adoptable code, which the IgCC provides.

Uniformity in regulation allows architects to provide better services at lower costs, while guiding designs toward higher levels of performance. The design and construction world is evolving, and if the profession of architecture is to remain relevant it too must evolve. However, in response to this evolution there must be uniformity: widely understood

parameters are at the heart of effective regulation. The purpose of the IgCC is to effectively and uniformly administer the sustainable design components of an evolving built environment.

Why another national model code?

As a matter of policy since 1975, the AIA has fostered a “one code” approach to building regulations. The IgCC is a natural progression in the movement toward a sustainable built environment that began fifteen years ago with voluntary rating systems. The IgCC brings some clarity as a minimum usable, adoptable, and enforceable green code. It will be administered like other codes and make use of the distribution, training, permitting, and enforcement procedures that are already in place across the country. There was no real mandatory model green code available for adoption or implemented before the IgCC. Everything now is, in a sense, optional (LEED, Green Globes, Energy Star, etc). Rather than having individual agencies attempting to regulate performance, jurisdictions can streamline their efforts into one set of codes.

What will be the value of the IgCC for the environment?

The IgCC can have a major, immediate impact. According to the Energy Information Administration (EIA), buildings generate almost 40 percent of all greenhouse gas emissions and 76 percent of all power plant generated electricity. Architects know that buildings can be designed to operate with significantly less than today's average energy levels. For measurable progress to be made, a regulatory framework is needed in place that can only be offered by a code.

Advocacy: Resources for Lobbying, *continued*

Section 5, Level 3

How does the IgCC account for local variations in building practice, climate, and the like?

The IgCC has the virtue of flexibility. It is easily customized by states and municipalities to meet locally established goals. Like each of the I-Codes, it is a model code and will work as an overlay to existing codes. It will be tested based on what actually works, with input from architects, engineers, code officials, contractors, building owners, and other experts.

How am I going to get up to speed in terms of education?

This guide is a good start! And one of the benefits of AIA membership is the network of local and state components, which provide education and other resources. Training and tools are also available from the ICC, as well as from a wide variety of other organizations.

How much training is required to make me proficient in understanding the IgCC?

Many architects already practice sustainable design extensively and will have a shorter learning curve to create IgCC-compliant designs. Others will have a bigger task ahead of them. It is important that each architect or firm assess their capabilities and challenges and map out an appropriate method for learning the code, whether through the development of in-house expertise or the use of consultants.

Why is this a priority for AIA members?

As the pre-eminent association of architects in the U.S., the AIA has a responsibility to maintain standards of professional practice. We set the example. Because the energy used and the waste produced by the built environment has a direct and significant effect on the natural environment, it falls to the architectural profession to find and implement efficiencies in design and construction.

Will there be ongoing reporting requirements, post-construction?

Although no explicit post-occupancy evaluation criteria are in the code, there are requirements that commissioning, metering, and monitoring actually be put into place and occur. Architects should recognize that commissioning, post-occupancy evaluation, and monitoring of the operations, maintenance, and use of a building provide an opportunity to continue the relationship with the client, as well as to begin to better understand how our designs actually perform. In fact, continued involvement is encouraged, to prevent unlicensed, third-party evaluations from occurring.

Is the AIA creating contract documents to support the implementation of the IgCC?

The AIA has a supplemental guide to sustainable projects, D503 “Guide to Sustainable Projects,” which was written with the development of the IgCC and the use of voluntary rating systems like LEED in mind.

What are AIA components doing to help with the transition?

Local AIA components with support from AIA National are tasked with providing educational opportunities to members, as well as information on how best to promote adoption of the IgCC.

Is this the best possible green code?

Is it the best for architects?

Model codes are improved by the industry over time. No other contemporary code has had as much time and focus brought to it by so large a number of architects. We believe it is a great first step to aligning communities in moving toward sustainability. Some will have ‘catching up’ to do while others are ‘ahead of the game.’ Every jurisdiction will be different, but overall this code will raise the bar, and architects have been involved from the very beginning.

Why a green code over LEED?

First, rating systems such as LEED are voluntary, whereas a model code, once adopted by the jurisdiction, is enforceable and has the weight of law. Design decisions are backstopped by the code review process of the adopting jurisdiction.

LEED was not designed for compatibility with the prevailing model building codes; the IgCC is. Finally, while LEED has proven effective in challenging society to do better and do more, in order to continue to drive and challenge the industry to hit higher and better sustainable design targets, it should remain an above-code option for owners who choose it. In jurisdictions where the IgCC is adopted, its practices will become a normal part of doing business. LEED certification will still be available to tenants and builders seeking that form of recognition.

When will this code take effect?

The IgCC was published in March 2012, but it takes effect only when adopted by a jurisdiction. Several jurisdictions have already adopted portions of earlier Public Versions. Check with your jurisdiction to find out whether it has adopted the IgCC or is in the process of doing so.

What is the adoption process?

Each jurisdiction has its own process. Some require new legislation. Some jurisdictions require adoption of regulations, and others can simply amend the existing code. The AIA will provide resources for promoting code adoption to local components as requested.

When is the next code change cycle?

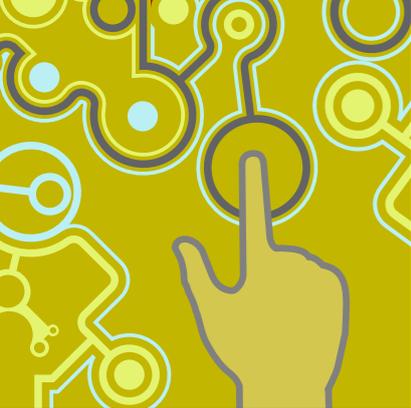
The IgCC will follow a routine three-year cycle of review, similar to the other I-Codes, beginning with the submission deadline of January 2013.

Will the adoption of the IgCC raise my liability exposure?

Any changes to the standard of care as a result of adoption of the IgCC will depend entirely on the facts and circumstances in your jurisdiction. Practitioners should stay up to date on the potential for changes in the standard of care.

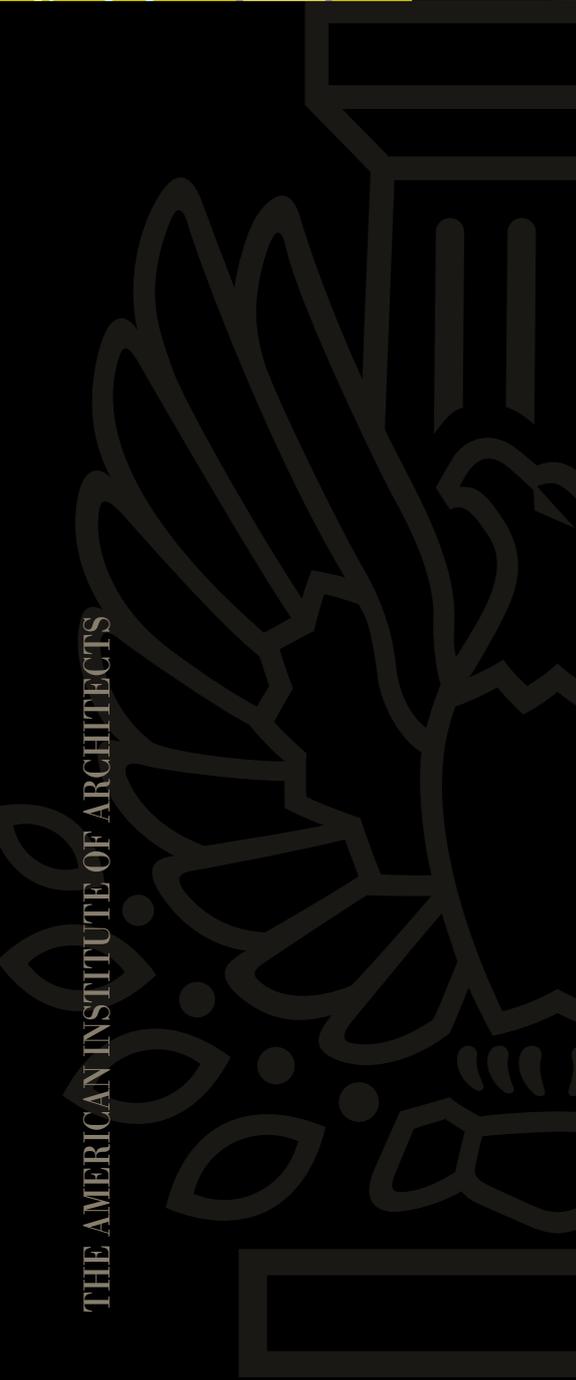
Will the IgCC increase construction costs?

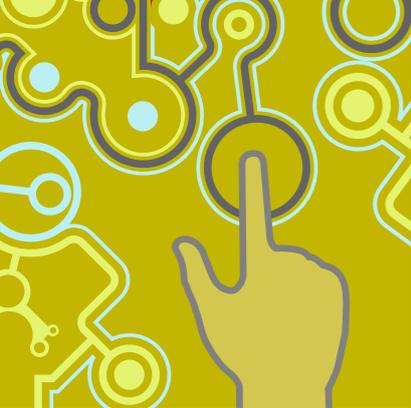
The first concept to consider is “compared to what?” For firms that are heavily focused on sustainable design, changes in cost could be minimal. For others, while first costs may increase depending on a number of factors, when analyzed for long-term, life cycle cost, the IgCC may show an overall benefit to owners. Design fees may increase, construction costs may increase, yet operational costs may decrease due to lowered utility costs (and other soft costs such as lost productivity, etc.) Owners may even realize an overall savings, with initial costs being offset by long-term savings in energy and maintenance costs.



Section 6

6





Resources

Section 6, Level 1

Additional Note: Further Energy Modeling Tool Development

It is important to reiterate that while no current software tool delivers output that demonstrates IgCC code compliance explicitly, there is current software available that is capable of providing this information. It is, however, likely that in many cases architects may need to have the software ‘operated’ by modeling specialists until new, easier-to-use tools/interfaces are developed that respond better to how architects work.

It is critical for architects to get involved in and actively advocate for further development of energy analysis and energy code compliance software tools that will:

- Be more useful (and friendly) to architects, so they will be used more frequently and throughout design (including the early stages of design);
- Help architects understand if they are on-track toward compliance with performance measures stipulated by code and set as project goals;
- Provide output that can clearly and quickly illustrate code compliance to IgCC requirements; and
- Enable the design community to more easily deliver projects that meet regulated policy goals.

To this end, architects should define what it is *they* want in energy modeling tools and what *they* need for compliance with the IgCC, and communicate that to the AIA. The AIA is advocating for refinements to current tools to support related processes that architects use, as well as developing better tools that will suit all needs. In the interim, we must identify ways to support architects in their need to engage current energy modeling tools in design early and often.

The AIA has the positioning (through proven advocacy efforts and strategies) to facilitate the needed feedback loops with policy and private sector software developers (which seems to be the money/

support path for software development). The AIA is key to helping the architectural community by:

- Helping to shift policy makers’ focus to the ‘usability’ of these tools by architects (to increase the number of projects that meet policy);
- Encouraging and inspiring our members and code officials to think through what’s useful and not useful in software tool development;
- Facilitating engagement of software developers with our feedback; and
- Directly supporting the development of a recognized output format to demonstrate IgCC code compliance for projects.

Codes and Standards Resources

[I-Codes Free Online Reader](#)

[ASHRAE Standard 189.1
Frequently-Asked Questions](#)

[Press Release: “Standard 189.1
Deemed Compliance Option For
IGCC; ICC Announces Availability
of New Green Code”](#)

[Purchase the IgCC](#)

[Purchase Standard 189.1](#)

Advocacy Resources

[AIA website dedicated to the IgCC](#)

[AIA general Codes Advocacy
Website](#)

[Alliance to Save Energy Building
Codes Assistance Project](#)

[New Buildings Institute](#)

Design Resources

[AIA 50to50](#)

[DOE High Performance Buildings
Database](#)

[ASHRAE Advanced Energy
Design Guides](#)

Energy Modeling Resources

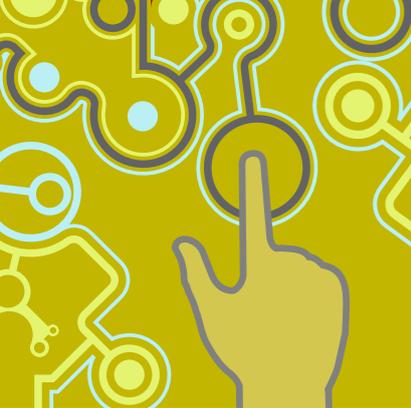
[Resources at the Department of
Energy \(DOE\)](#)

Education Resources

[AIA Continuing Education](#)

[ICC website dedicated to the IgCC](#)

[sbse carbon neutral design project](#)



Credits

Section 6, Level 2

The AIA would like to acknowledge the dedication and hard work of the 2011-2012 IgCC Task Force and supporting staff in the creation of the AIA Guide to the IgCC.

AIA IgCC Task Force

Mary Ann Lazarus, FAIA, Co-Chair

Norm Strong, FAIA, Co-chair

Advocacy Working Group

Joseph Simonetta, CAE (liaison to Task Force)

Miguel Rodrigues, FAIA

Kurt Cooknick, Assoc. AIA

Cesar Gallegos, Assoc. AIA

Code Development Working Group

Dave Collins, FAIA (liaison to task force)

Tom Liebel, FAIA

Kevin Flynn, FAIA, IES

Education Working Group

Dennis Andrejko, FAIA (liaison to Task Force)

Sara Kay, Hon. AIA

Bill Seider, AIA

Steve Winkel, FAIA

Energy and Energy Modeling Working Group

Maurya McClintock, Assoc AIA
(liaison to Task Force)

Rand Ekman, AIA

Mark Frankel

Chris Green, AIA

Business and Risk Management Working Group

Cara Hall, FAIA (liaison to Task Force)

Don Brown, FAIA

Tim Twomey, Esq, FAIA

Bill Wilson, FAIA

AIA Staff

Ken Cobleigh, Esq.

Jessyca Henderson, AIA (project lead)

Pablo de la Llama, CAE

Kyle McAdams, AIA

Brian McLaren, AIA

Paul Mendelsohn

Margaret Pursell

David Robb

William Richards, PhD

Ken Ross, FAIA

Brett Rosenberg

Carolyn Snowbarger

Stephanie Spear, Esq.

Michael Tamara, Assoc. AIA

Bill Worthen, AIA, LEED AP

Kimberly Yoho



THE AMERICAN
INSTITUTE
OF ARCHITECTS

