



# GREENING THE CODES

BUILDING CODES BEGIN TO BROADEN THEIR CHARGE TO INCLUDE HUMAN AND ENVIRONMENTAL IMPACTS OF BUILDINGS INTO THEIR HEALTH AND SAFETY MISSION

## May 2011 Update:

A lot has happened since the first publication of this white paper in June of 2010. Since then, the nation's first statewide green building code has gone into effect in California, ASHRAE has developed and published addenda to Standard 189, the International Green Construction Code has undergone two rounds of public comment, and LEED's next version also began its public review. State and local jurisdictions have also begun seriously considering green building code adoption, and – with varying degrees of commitment – some communities have embraced these new codes. Amidst all the technical development, the government adoptions of these tools and the media that has been tracking the progress, the underlying vision of this white paper, the direction of USGBC's work, and USGBC's commitments to a collaborative, sustainable future are still very much constant.

## Overview

Events such as the 2010 earthquakes in Haiti and Chile remind us of the fundamental importance of building codes, of the importance of their consistent enforcement and of the need for codes to continually evolve. Governments around the world rely on building codes to protect their citizens from harm due to fire, structural collapse and other building related risks. In the United States, codes accomplish this by laying out the minimum requirements for both construction materials and construction practice in homes, offices, schools, manufacturing facilities, stores—virtually any built structure—and rely on both licensed professionals to design the building accordingly and on code officials to ensure that these minimums are met.

Although state and local government efforts to adopt mandatory building codes are often behind the most currently available versions, model codes are updated every three years to reflect the latest evolutions in building science, technology and practice that affect these fundamental protections. And while building code updates usually take the form of incremental improvement, history tells us that codes have also made periodic step changes, usually in response to a cataclysmic event that demanded a significant overhaul of building practice.

The rapidly growing awareness of a larger set of hazards created by the cumulative impacts of buildings on human and environmental health has brought about the need for a contemporary step change in the purview of the codes. This time, a change was prompted by the recognition that not all hazards related to the built environment are tied to acute building failures or cataclysmic events. There is a new and different kind of step change—one that requires focused attention to providing for healthy and active lifestyles, preserving the natural environment, conserving resources and addressing the toxicity of materials and processes. This “greening” of baseline regulatory minimums is the result of two key developments: both a greater awareness of the need for change, and widespread practical experience with built projects that have been raising the bar at the leading edge of building design and construction. These two key elements have necessitated the long overdue inclusion of the building regulatory community in the now all-inclusive green building conversation—a conversation that began with architects, engineers, designers and a handful of federal, state and local government authorities.

The increasingly visible impact of the U.S. Green Building Council (USGBC) and its LEED® Green Building Rating System™ has highlighted the need and potential for codes to begin to address this expanded



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understanding of building-related risks. Building green unleashes the potential for energy, water and resource savings, improves indoor environmental quality, and reduces waste and other environmental impacts. Furthermore, green building provides an improved perspective on safety, accounting for the cumulative, long-term impacts of both human exposure to the toxins and other maladies that are so often present indoors, and of the environment's constant exposure to pollutants, unyielding resource extraction, and the compounding effects of greenhouse gas emissions that threaten the world we live in as well as our day-to-day well-being. The increased attention to all of these hazards underscores how building green furthers the intent of building codes "to safeguard the public health, safety and general welfare ... from ... hazards attributed to the built environment."<sup>1</sup>

In addition to promoting the use of voluntary, beyond-code green building rating systems such as LEED, USGBC and its partners across the building industry are committed to advancing incremental and advanced regulatory change now available with the advent of green building codes and standards. Alongside these codes, rating systems play an important, distinct and complementary role and together, they are enabling truly sustainable buildings and communities.

## A Brief History of Building Codes in the United States

The idea of a building code is more than 3,000 years old. Even the earliest civilizations recognized that predictable and consistent minimum standards had to apply to construction materials and practice in order to provide practical and adequate protection of human life, safety and the welfare of the community at large. The Code of Hammurabi, named for the founder of the Babylonian Empire, outlined the responsibilities of builders for the safe construction of buildings and laid out harsh punishment for those who failed to comply.

Around 64 A.D. the purview of the codes was widened to include for the first time, fire safety. Though the wealthy Roman Empire kept close rein on its public buildings, it was the burning of Rome—largely due to poorly made, flammable and otherwise unprotected buildings—that gave the impetus for a new generation of safer buildings and neighborhoods in Nero's subsequent master plan.

But as with much of the rest of the body of ancient knowledge, these Roman codes did not survive the Dark Ages. It took the great fire of London in 1666 to give rise to another early set of fire safety regulations. This same harsh reality was subsequently faced in cities across the globe: fire in cities and in buildings is a threat to human life and public safety, thus public officials around the world were faced with the clear and present obligation to safeguard against its devastating effects.

The next big change came in 1842, when Englishman Edwin Chadwick published a *Report on the Sanitary Condition of the Labouring Population of Great Britain*. For one of the first times in history, environmental conditions were recognized as the cause of disease and not simply a product of destiny in a life of poverty. This controversial finding gave rise to the Public Health Act of 1875, effectively putting "public

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<sup>1</sup> 2006 International Building Code. Section 101.3: Intent. International Code Council.



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health” on the map as both a field of study and an area in need of protection—particularly in buildings and neighborhoods—through smart public policy.<sup>2</sup>

In the United States, industrialization brought both fire and disease to American cities in the 1800s, and compelled the National Board of Fire Underwriters to write the first National Building Code in 1905. The very next year, the great quake of 1906 left the City of San Francisco under ash and rubble, not only due to its inadequate water distribution infrastructure to put out the fires, but also due to a newly recognized big environmental threat to human health: earthquakes. The severity of the quake highlighted a pressing need for minimum safety standards to protect building occupants and the community from structural hazards and—in areas with seismic activity—from the devastating threat of earthquakes.

The energy crisis of the 1970s brought yet another topic to the national stage. The soaring costs of energy and a growing concern about pollution and natural resource conservation caused Congress to pass the Energy Policy and Conservation Act that in 1978 would require states receiving federal funds to initiate energy conservation standards for new buildings. That same year, the State of California led the nation by adopting the California Energy Code, recognizing that energy consumption gone unchecked yields societal costs to consumers, to the economy, to the environment and ultimately to public health. It would take a number of compounding factors in the 1990s to revive this interest in building energy efficiency that ended up otherwise largely lost to other priorities in the 1980s.

In 1992, Hurricane Andrew struck Dade County in Florida, leaving 90% of all homes with roof damage and some 117,000 destroyed. Like the west coast earthquake and the national energy crisis, Andrew provided the impetus for the State of Florida to ensure better safety of Floridians by embedding new minimum requirements in their code to withstand the effects of a hurricane’s strong winds based on national models that would become part of the International Codes family.

The major advances in building sciences as well as in long-distance, interstate and international commerce in the late 20<sup>th</sup> Century, reinforced by steady economic growth, underscored the increasing antiquity of regional, or at least regionally and separately developed, building codes. The national building industry recognized that one national building code, based on engineering, material science and human safety—and less dependent on geographic and cultural differences—was good for building safety, good for business, and good for focusing participation in one national model code effort. In 1994 the three regional code organizations<sup>3</sup> came together to establish what would become the International Code Council (ICC). The ICC was charged with developing a single set of comprehensive and coordinated national model codes for building and fire safety, what has come to be known as the International “family” of codes, or the I-Codes. Alongside other codes developed by national code-setting organizations such as the International Association of Plumbing and Mechanical Officials (IAPMO) and the National Fire Protection Association (NFPA), ICC’s I-Codes provide a widely accepted set of comprehensive, coordinated minimum safeguards for people at home, at school and in the workplace, often relying on nationally recognized consensus standards in the process.

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<sup>2</sup> S. A. Moore and N. Engstrom, 2005. *The Social Construction of Green Building Codes. Sustainable Architectures*, Spon Press, Taylor & Francis Group: 51-70.

<sup>3</sup> These regional code organizations included the Building Officials and Code Administrators International, Inc. (BOCA), the Southern Building Code Congress International (SBCCI), and the International Conference of Building Officials (ICBO).



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## The Impact of LEED on Code Development

Founded in 1993, the U.S. Green Building Council (USGBC) set out to address a broad spectrum of risks to human and environmental health not otherwise addressed in the building code. To do this, USGBC would develop and establish a standardized rating system focused on the environmental performance of building projects. More than 15 years and tens of thousands of volunteer hours later, U.S. Green Building Council continues to lead the effort to harness the potential of buildings and neighborhoods to help solve current economic, environmental and energy problems. Using its voluntary program conceived by more than 2,000 volunteer experts from every sector of the industry, LEED set and then continued to raise the bar on how we could design, construct and operate buildings that are more energy and water efficient, more resource sensitive and healthier overall for those who occupy them. LEED's rigor, its third party certification protocol and its professional credentialing program have all contributed to turning green building from an idea into a business practice for organizations and communities that want to save energy, water and money, and at the same time demonstrate their environmental leadership.

But before attempting beyond-code measures in energy savings, water efficiency, CO<sub>2</sub> emissions reduction, improved indoor environmental quality, or stewardship of resources and sensitivity to their impacts, green buildings have always required compliance with baseline codes in a given jurisdiction. In practice, many of the innovative materials, technologies and methods employed in green buildings were not yet incorporated into or even recognized in codes or standards, resulting in many green building projects facing challenges in gaining regulatory approvals. USGBC formed its Codes Committee in 2005 to begin to address this challenge. Through an informal partnership with the Development Center for Appropriate Technology (DCAT), USGBC was able to build on DCAT's pioneering work and to establish strong relationships within the building codes community.

USGBC has strived to make LEED complementary and compatible with building codes and standards. LEED's recognition of ASHRAE Standards 90.1, 62 and 55, as well as standards set by the California Air Resources Board and the Sheet Metal and Air-Conditioning Contractors of North America are a few examples of how LEED has encouraged benchmarking against industry-accepted standards.

As ideas originally pioneered in LEED began to emerge as acceptable industry practice, a growing community of professionals recognized the need for enforceable codes and standards for large-scale adoption and implementation of green building practices by building departments and regulatory authorities. This codification of tried-and-tested practices into code has the potential to yield great economies of scale by driving demand for materials and technologies as well as the resulting expansion of expertise. This broad proliferation of green building practice is an important next step as USGBC works towards its vision of green buildings for all within this generation.

The early signs of market transformation can very clearly be seen in the exceptional increase in market demand for green buildings in the last decade. Beyond the design, development and building owner communities, elected officials and the general public have recognized green building and its expanded responsibility to address cumulative and long-term hazards to human and environmental health as a key element of smart public policy. This recognition gave rise to widespread community conversations that began in city halls, at neighborhood centers and in PTA meetings. This community dialogue resulted in a wave of public policy action that, among myriad other sustainability initiatives, included more than 400

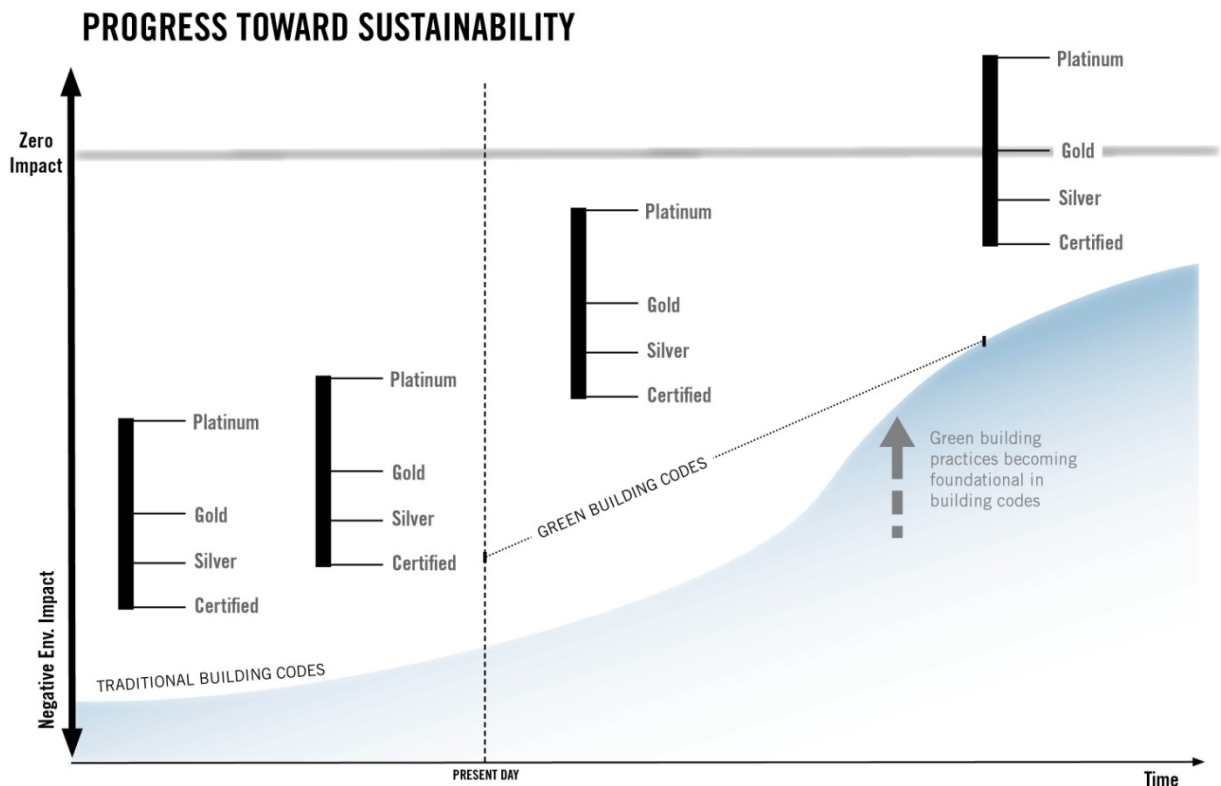


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local jurisdictions, 35 state governments and 14 federal agencies or departments that had adopted LEED as a tool for benchmarking higher performance green building practices, by May of 2011.<sup>4</sup>

USGBC has long recognized the importance of raising the bar for excellence in how, what, and where we build. But raising the bar for what is possible was just the first step. We knew early on that in addition to raising the ceiling it was also critical to raise the floor in order to rapidly and fully transform the market towards more sustainable building practices. However, because LEED was designed as a rating system and not intended to be used as a code or as a rigid standard, it became clear that the environmental, social and economic conditions were ripe for revisiting the minimum codes and standards for building safety. The far more inclusive perspective of risk and responsibility recognized by LEED set the stage for the next step change in the national codes.



USGBC worked on several fronts to initiate the next stage of this work.

In 2006 USGBC set out to contribute to the development of a new nationwide minimum green building standard to more rapidly advance commercial green building practices throughout the country. Called Standard 189,<sup>5</sup> it was developed in partnership with the USGBC, the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), and the Illuminating Engineering Society (IES).

<sup>4</sup> U.S. Green Building Council. "Public Policies Adopting or Referencing LEED." (accessed April, 2011).

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852>

<sup>5</sup> ANSI/ASHRAE/USGBC/IES Standard 189.1, the Standard for the Design of High-Performance Green Buildings, Except Low-Rise Residential Green Buildings. (February 2010). [www.ashrae.org/greenstandard](http://www.ashrae.org/greenstandard)

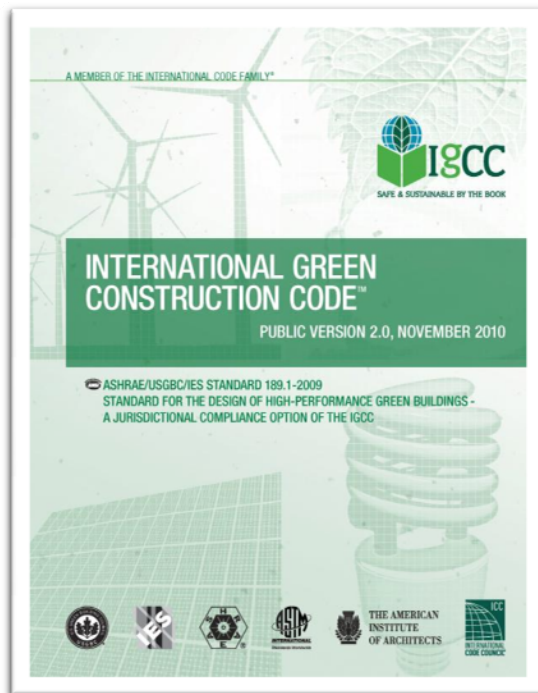


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The Standard was designed to provide a starting point for states, localities and other jurisdictions striving to write minimum requirements into building codes for building design, construction and operation practices that incorporate an expanded view of safety—indeed, more than 40 of the jurisdictions that have adopted USGBC’s voluntary green building rating system include LEED as a mandatory requirement for certain private sector buildings in their community. Like green building rating systems, Standard 189 covers criteria including sustainability, water use efficiency, energy efficiency, indoor environmental quality, materials and resource use, construction practice, and the building’s impact on the land.

During that process USGBC also worked with a network of building safety experts to identify barriers, share success stories and best practices, lead discussions on enforcement and compliance with green building programs, and provide resources and education. Through education delivery programs and partnerships, USGBC is expanding code enforcement-focused education<sup>6</sup> to begin to address these needs, and to tap into the opportunity that code officials provide in achieving some of the lowest-cost means of realizing energy efficiency potential.<sup>7</sup>



Working with experts in green building design, construction, verification and operations, USGBC began to address the responsibility that is required of the codes in safeguarding public health, safety and welfare from risks related to the built environment—and these ideas have spread. In 2009 the International Code Council launched the development of the International Green Construction Code (IGCC)<sup>8</sup> with cooperating sponsors the American Institute of Architects (AIA) and the ASTM International (ASTM), and with a USGBC seat on its drafting committee. Recognizing the mutually beneficial value of the several years of expert content development in ASHRAE Standard 189.1 and ICC’s unparalleled delivery model to all 50 states and more than 22,000 jurisdictions, ICC, AIA and ASTM worked together with ASHRAE, IES and USGBC to launch a joint effort in March of 2010 to release the IGCC with Standard 189.1 as an alternate path to compliance.<sup>9</sup>

With this step, the first comprehensive set of national model green building codes and standards was born. This code is both consistent and coordinated with the ICC Family of Codes used throughout the US, and relies on widely respected protocols and standards.

<sup>6</sup> Find code-related courses and much, much more on USGBC’s education portal at [www.usgbc.org/courses](http://www.usgbc.org/courses), and a specific 2011 education collaboration between USGBC, AIA, ICC and ASHRAE at [www.usgbc.org/webinars#greencodes101](http://www.usgbc.org/webinars#greencodes101)

<sup>7</sup> *Scenarios for a Clean Energy Future*, Interlaboratory Working Group, ORNL/CON-476 and LBNL-44029, November 2000.

<sup>8</sup> International Green Construction Code. (March, 2010). <http://www.intlcode.org/cs/IGCC/Pages/default.aspx>

<sup>9</sup> Read more about the joint launch of the IGCC and Standard 189 at: <http://www.usgbc.org/Docs/News/IGCCRelease.pdf>



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Foreshadowing these efforts, California kicked off 2010 with the much-anticipated launch of its Green Building Standards Code. Its mandatory code will affect all new buildings in the state and, as such, is a remarkable step forward for most buildings in the state that had not previously been required to address this more holistic set of risks to human and environmental health. In New York City, the Urban Green Council (USGBC's local affiliate) released arguably the most comprehensive analysis and set of recommendations for the incremental greening of any building code. The work of NYC's Green Codes Task force, established by Mayor Michael Bloomberg and the New York City Council, mirrors a national trend of communities taking action to address today's pressing economic, environmental and community health issues. One year after its February 2010 release, 22 of the Task Force's 111 recommendations have been adopted or are being acted upon.<sup>10</sup>

Amidst all this progress in technical development, green building codes may still be several years from adoption in some jurisdictions, and even further off for enforcement and meaningful compliance. In the interim, USGBC continues to work on several fronts towards our goal of transforming the market. USGBC is developing education, coordinating research, and convening an ongoing dialogue on what's next in green building.<sup>11</sup> USGBC is also developing a template for code compliance that can be adapted for any alternative green building method or material to overcome real or perceived barriers to building green. Additionally, USGBC is advocating that state and local governments adopt and implement smart green building policy.<sup>12</sup>

## Jurisdictions Have the Right Tools

For the large number of jurisdictions embarking on sustainability planning, and also for those who are well on their way, a green building code and a beyond-code green building rating system provide the best-case scenario of *push* and *pull* market-driving tools. Without stronger, more comprehensive mandatory codes, the majority of buildings may remain untouched by the positive benefits that building green provides. But without promoting and enabling the use of beyond-code rating systems, these codes may be seen as the best we can possibly do, rather than the most we can reasonably expect. Any jurisdiction engaged in sustainability planning should consider the universe of available green building policy options, and also press hard to further the policy innovations that have become a hallmark of the green building movement. With the right kit of tools for the job, jurisdictions may now consider:

**Raising the Floor:** While green building rating systems such as LEED have been designed to benchmark beyond-code leadership for buildings that intend to go beyond the minimum, it is equally important to complement this leadership with stronger, more comprehensive, mandatory green building codes. Safer, healthier, and more environmentally responsible codes are at the heart of sustainability planning for raising the floor for the entire community. These codes are a viable new baseline off which incentives for exemplary leadership and commitments for public buildings to pave the way can naturally be built.

<sup>10</sup> Stat as of April 1, 2011. Learn more about the NYC Green Codes Task Force, the report and progress on incorporating the recommendations at [www.urbangreencouncil.org/greencodes](http://www.urbangreencouncil.org/greencodes).

<sup>11</sup> Thousands of building professionals from all over the world come together at Greenbuild for three days of outstanding educational sessions, renowned speakers, green building tours, special seminars, and networking events at U.S. Green Building Council's annual Greenbuild International Conference & Expo – the world's largest conference and expo dedicated to green building. [www.greenbuildexpo.org](http://www.greenbuildexpo.org)

<sup>12</sup> In April, 2011, USGBC released a policy brief to help clarify the role of green building codes and LEED as policy levers. See [LEED and Green Building Codes: Distinct & Complementary Policy Tools](#). For more on USGBC's public policy and advocacy work, see [www.usgbc.org/government](http://www.usgbc.org/government).





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For commercial buildings: In addition to adopting and implementing the most recent version of the national model energy code for commercial buildings (ASHRAE Standard 90.1-2007), consider adopting the International Green Construction Code and its technically rigorous Standard 189.1 compliance path as mandatory requirements alongside all other minimum code regulations for commercial buildings.<sup>13</sup>

For residential buildings: In addition to adopting and implementing the most recent version of the national model energy code for residential buildings (2009 International Energy Conservation Code),<sup>14</sup> consider promoting the use of a well-established, green homebuilding program in your area.

**Establishing Incentives:** Establishing incentives for green building demonstrates a clear commitment to lowering real or perceived barriers to building green by allocating value to the multiple co-benefits that green buildings provide through prioritization of resources or monetary support. Jurisdictions should consider supporting green building practices by providing structural, financial or other incentives for commercial building projects that are willing to take steps beyond code minimums.

For a full list of green building incentive policy options: See USGBC's list of Green Building Incentive Strategies: <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=2078>

**Leading by Example:** 167 local governments, 26 state governments and 12 federal agencies or departments have committed to better building practices and responsible stewardship of public dollars by benchmarking the performance of their public buildings with LEED. Beyond the reduced impact on the environment and on the health of its occupants or visitors, green public buildings teach the community that green buildings are achievable, create jobs, save energy, water and money, and build local expertise in green-building-related practices and trades.

For government-owned and government-funded buildings: In addition to the minimum requirements of an appropriately adapted green building code as mandatory for all buildings in a jurisdiction, consider applying LEED to all new and existing government buildings or major renovations of at least 10,000 sq. ft. (Government-funded buildings should include at the very least schools, hospitals, and public and affordable housing to ensure that the benefits of healthier buildings reach the populations that need it most). Governments also benefit from the demonstrated value of the LEED program through

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<sup>13</sup> The IGCC coalition (USGBC, ICC, ASHRAE, AIA, IES, and ASTM) have developed a green building policy document for state and local government advocacy. Find it here: <http://www.usgbc.org/ShowFile.aspx?DocumentID=8668>

<sup>14</sup> Section 410 of the American Recovery and Reinvestment Act of 2009 required any state that accepted State Energy Program Funding to adopt, implement and demonstrate compliance with the national model energy codes for residential and commercial construction by 2017. Note the [clarifying statement](#) issued by USGBC and its partners in building energy efficiency on December 1 of 2009.





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building performance information and feedback,<sup>15</sup> considerable economies of scale,<sup>16</sup> and the power of investigative analysis through green building data and research.<sup>17</sup>

Beyond these measures, jurisdictions are engaging their communities and considering a wide array of policy measures in recognition of the need for sustainability planning. See the Playbook for Green Buildings and Neighborhoods for more information: [www.greenplaybook.org](http://www.greenplaybook.org)

## Conclusion

While codes provide an important means to reduce risks to an acceptable level, codes by themselves cannot eliminate all potential building-related hazards. There is a shared role and responsibility amongst the diverse stakeholders related to construction practice – including building owners and operators, licensed professionals and the code enforcement community – that requires diligence, commitment and a common understanding of this broadened definition of health, safety and welfare. With proper design education, sound construction practices, effective code administration programs, beyond-code leadership programs, and the critically important advancement of building science (that informs code development that, in turn, informs beyond-code rating system development), we can get remarkably closer to truly safe and hazard-free buildings and communities.

It is a watershed event that “safe and hazard-free” also now includes human and environmental sustainability, including improved indoor air quality, greater efficiency in energy and water use, and mitigation of negative environmental impacts. This broader and more comprehensive definition of the purview of the codes paves the way for the use of significant advances in building science and technology to provide long overdue protections to building occupants and the natural environment.

An ever-expanding network of advocates and green building practitioners have worked to promote the revision and improvement of state and local building and zoning regulations that would enable and pave the way for green buildings and neighborhoods, while creating jobs and strengthening the economy. Jurisdiction by jurisdiction, USGBC and its chapter community<sup>18</sup> are working with state and local governments to advance these ideas, to recognize and reward leadership, and to proliferate the benefits of building green through the adoption of healthier, safer, more environmentally responsible and resource efficient green building codes.

The adoption and enforcement of green building standards and codes fundamentally advances USGBC’s mission to transform the way our industry designs, constructs and operates buildings. By integrating tried-and-tested green building practices into minimum code language, green building standards also provide USGBC, LEED and the green building industry the freedom to go further and faster, blazing new

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<sup>15</sup> For more information on USGBC’s Building Performance Partnership, see: [www.usgbc.org/bpp](http://www.usgbc.org/bpp)

<sup>16</sup> For governments or organizations planning to certify a large number of new-construction projects or existing buildings, USGBC’s LEED Volume Program is designed to streamline and improve the efficiency of the certification process and lower associated costs, all without compromising LEED’s rigorous benchmark standards. For more information, see: <http://www.usgbc.org/volume>

<sup>17</sup> The Green Building Information Gateway is a novel information technology that provides an unprecedented view of the green building landscape and reveals trends, patterns and processes in green building practice. GBIG allows for the investigation and analysis of data about LEED-certified projects, and enables users to view green building in the context of other spatial and temporal factors. For more information, see: [www.usgbc.org/gbig](http://www.usgbc.org/gbig)

<sup>18</sup> USGBC’s network of nearly 80 chapter organizations can be found in every corner of the country. For local events, education, networking and more find your local chapter: [www.usgbc.org/chapters](http://www.usgbc.org/chapters)



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trails towards a truly sustainable future. On the road to sustainability and to restorative and regenerative communities, it's not a choice between green building codes or green building rating systems; instead it's both these codes and rating systems working together, learning from one another, and continuously improving content, implementation and results.

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