# A Guide to the Building Performance Landscape

## Introduction

Expectations for commercial building performance have risen steadily over the past 20 years[1]. This has rendered a market landscape that is complex, continuously changing and increasingly crowded with multiple pathways to improve building performance. Designed by various players, each pathway is intended to drive owners to improve upon existing buildings, or design new ones better. The motivations for improving building performance are multifold. They include: saving money, increasing asset value, reducing environmental impact, ensuring occupant well-being and safety, as well as assuring continuous and cost-effective operation and fulfillment of a building's intended mission.

**"Security, environmental, market and regulatory forces are driving building owners, architects, and leaders across the building community to a new focus on High Performance Buildings (HPBs). HPBs go far beyond the requirements of basic building codes and standards to achieve significantly reduced energy consumption and increased use of renewables; minimal environmental impact in material use and siting; enhanced human comfort and safety; and improved occupant productivity. In addition, HPBs create the flexibility necessary for open-plan space and respond efficiently to inevitable moves, adds, and changes within the building. HPBs achieve these performance objectives in a cost-effective manner throughout the lifetime of a building."**

The Drive for High Performance Buildings, Legrand White Paper, August 2013

[1] The Drive for High Performance Buildings, Legrand White Paper, August 2013
http://www.legrand.us/aboutus/sustainability/hi-performance-wp.aspx

Figure 1 presents the diversity of what this white paper characterizes as "building performance mechanisms." Some of these icons and logos are well-recognized, like the U.S. Green Building Council's LEED Rating System and the Environmental Protection Agency's ENERGY STAR® for Buildings, while others may not be familiar to the reader. Some represent the most recent iteration of longstanding building standards or codes while others are new or still in development. Some are mandatory. Others are voluntary. Some are energy focused while others go well beyond energy to address other performance objectives. Some are limited to the disclosure of information. Some set forth specific steps for a building owner to follow, while others offer suggestions to achieving better performance. Some mechanisms are oriented to anticipated performance, whereas others are directed to actual performance results. Some are developed and enforced by governments, while others stem from cross industry collaboration and consensus based processes. Some confer public recognition upon achievement of performance. Others do not.

**Figure 1: A Diverse Landscape of Building Performance Mechanisms**


AIA 2030 Commitment


ASHRAE 189.1-2011 Standard


ASHRAE Building Energy Quotient


BOMA 360 Performance


CAL Green


Energy Disclosure Laws


Energy Star for Buildings


Green Globes


ASHRAE 90.1-2010 Standard


International Green Construction Code


International Energy Conservation Code


LEED (Leadership in Energy and Environmental Design)


Living Building Challenge


STEP


Whole Building Design Guide

The building community is highly diverse and fragmented.
Players include:
- owners and their agents
- property developers
- architects and other specifiers
- contractors and installers
- manufacturers of building products and materials
- distributors of those products

Other key actors include:
- building code and standard development organizations
- local, municipal or state authorities that adopt and enforce them
- non-governmental, professional and industry organizations that serve and/or represent members of the building community

The federal government also plays a highly influential role through building-focused policies, programs and investments – as well as by setting performance targets for its own properties, both owned and leased.

- How do those who own, manage or serve the building community make sense of the breadth of performance-focused initiatives at work in the building marketplace today?
- How do these various initiatives relate to one another?
- Are all the trends in building performance playing out the same way across the U.S. building marketplace?

While there may be no singular way to structure or organize such an expansive topic, having sought to understand these trends, Legrand offers this white paper as a guide to others that may be seeking to navigate the dynamic landscape of building performance. This is the second in a series of white papers that Legrand hopes will advance understanding of and promote dialogue about the movement to high performance buildings. To that end, this paper:

- Analyzes and organizes the 15 building performance mechanisms shown in Figure 1
- Examines three key interconnected trends affecting the diverse deployment and diffusions of these building performance mechanisms
- Explores the evolution of Washington, DC's building performance requirements to show how these three trends are interconnected

## Making Sense of the Landscape

The breadth and diversity of programs and policies constitute a mix of standards, codes, rating systems, and other categories. Those terms all have meaning in their own right. To use one of these existing terms to describe all obscures their distinctions and the role each plays in the market, and the impacts they have upon the building. As such, Legrand employs the term "building performance mechanisms" to refer to the entire body of rating systems, codes, labels, and guidelines currently available in the U.S. building marketplace.

**mech·an·ism**
*noun*
the agency or means by which an effect is produced or a purpose is accomplished.

Legrand analyzed 15 different mechanisms to ascertain their characteristics, origin, and intentions. Based on this analysis, the mechanisms were classified into one of five types. This taxonomy is aimed at assisting those in the building community in understanding the differences between mechanisms and the path and influence of their evolutions.

To organize these mechanisms, Legrand first grouped them by their fundamental type. As noted in the following descriptions, each type of mechanism has a distinct purpose and the mechanisms in each category tend to function in a similar way.

Next, Legrand analyzed the scope of each type of mechanism to place them along a spectrum ranging from "Basic" to "Advanced." The scope of the "Basic" mechanisms is energy and carbon emissions, while mechanisms in the middle of the scale address multiple environmental attributes, such as water efficiency, indoor environmental quality, sustainable sites, and materials and resources. Mechanisms at the "Advanced" end of the scale are much more comprehensive, encompassing factors such as lifecycle assessment and occupant performance.

## The 5 Major Types of Mechanisms


**1. Building Energy Disclosure:** These mechanisms impose requirements upon building owners to collect and report annual energy usage data for the purposes of benchmarking this data across similar buildings. The data and benchmarking results are often made public by the government entity imposing the requirement. As of March 2014, nine U.S. cities and two states have enacted benchmarking and disclosure laws and ordinances. All require the use of energy rating systems, such as **ENERGY STAR®** or **ASHRAE bEQ**, as the means to capture and benchmark the data.

**The intention of these policies is to provide transparency of energy consumption to both city officials and building owners, flag inefficiencies, and ultimately inspire actions that will reduce building energy intensity and thereby carbon footprint of a city or state.**

Many of the cities that have already implemented disclosure requirements, or are considering doing so, are also pursuing other initiatives to improve the sustainability profile of their communities.

**2. Building (Energy & Sustainability) Codes and Standards:** These mechanisms set forth minimum efficiency requirements to achieve targeted reductions in energy use/greenhouse gas emissions over the lifecycle of new or renovated buildings.[2]

Building codes are developed by code development bodies, such as the International Code Council (ICC), that craft model codes and set the minimum safeguards for construction and design. Both building standards and codes are developed through consensus-based processes and are recognized by the American National Standards Institute (ANSI).

Building standards are drafted by recognized Standards Development Organizations, such as ASHRAE, in language that can be readily adopted as code and enforced within local jurisdictions. Localities will often select and adopt provisions from more than one standard in order to tailor local code to meet their specific conditions or needs.

[2] "About Building Energy Codes." *Building Energy Codes Program*. DOE, n.d. Web. 12 June 2014. http://www.energycodes.gov/about-building-energy-codes

There are two major types of codes when it comes to performance: **model energy** and **stretch**.

**Model energy codes are intended to set the minimum level of energy performance in a building.** The latest model codes are **ASHRAE Standard 90.1-2013** and the **International Energy Conservation Code (IECC) 2015**.

**Stretch codes define performance levels beyond those of the model energy code to address other dimensions of sustainability, such as indoor environmental quality, water efficiency, and site design.** The latest examples of stretch codes are **CAL Green, ASHRAE Standard 189.1-2011,** and the **International Green Construction Code (IGCC) 2012.**

Model and stretch codes undergo a similar development process, but differ in terms of intended application. While model codes are intended to set the floor for building energy performance and are mandatory for all, stretch codes can be applied as an "overlay" on existing model energy codes to set an additional level of performance.

**3. Professional and Industry Sponsored Rating Programs: These mechanisms seek to promote best practices in building performance within a specific industry or professional community.** Examples include the **BOMA 360 Performance Program®**, which was designed with the building owner and facility manager in mind; the **Sustainable Technology Environments Program™ (STEP)**, which was created by a group of technology trade associations to highlight the role of Information and Communication Technologies (ICT) in achieving building performance; and the **AIA 2030 Commitment**, which is intended to demonstrate the contribution of the architectural community to reducing overall building carbon emissions. These organizations set forth performance criteria or guidance, offer tools and resources to achieve results, and in some cases confer public recognition.

**BOMA 360. 2011**
**TIME WARNER CENTER TOWERS, NY, NY**

The iconic Time Warner Center towers above Columbus Circle in New York City, a 2.8 million square-foot complex housing a luxury hotel, a world-class performance venue, Time Warner Inc.'s headquarters with CNN's studios, high-end retail and condominiums. Time Warner Center was the first building in New York City to earn the BOMA 360 designation.[i]

Image Source: OptimumPx, Time Warner Center, May 2010. New York. Web. 29 May 2014.

[i] "Iconic Landmark Demonstrates Ongoing Excellence – Time Warner Center Case Study." BOMA 360 Case Studies. Building Owners and Managers Association (BOMA) International, n.d. Web. 13 June 2014. http://www.boma.org/awards/360-program/case-studies/Pages/time-warner.aspx

**4. Building Rating Systems and Certifications:** These mechanisms provide prescriptive and/or building performance criteria that require 3rd party certification to verify achievement. Upon certification, public recognition can be conferred, often in the form of a plaque or certificate. **Rating systems provide a pathway for building owners to improve the performance of their buildings and distinguish their achievement in the market.**

### LEED PLATINUM, NC, 2011
### BILL & MELINDA GATES FOUNDATION, SEATTLE, WA

"The Bill & Melinda Gates Foundation campus houses the largest private philanthropy in the world. Its culture of "impatient optimism" seeks to solve seemingly impossible problems with a mixture of innovation, scientific rigor and, most important, constant collaboration. Similarly, the Foundation's 900,000 gross $ft^2$ downtown Seattle campus that includes two acres of green roofs and a one million gallon underground rainwater storage tank is designed to provide an informal office culture that helps employees share ideas more freely and move them forward at a faster pace."[ii]

Image Source: Adbar, Bill and Melinda Gates Foundation Front, March 2013. Seattle. Web. 29 May 2014.

[ii] Alspach, Peter, and Anne Marie Moellenberndt. "Impatient Optimism." High Performance Building Magazine, Winter 2014. Web. 13 June 2014. http://www.hpbmagazine.org/case-studies/office-institutional/bill--melinda-gates-foundation-campus-seattle-wa

Rating systems range in scope, from those focused principally on energy to those that address a wider range of performance areas. They have been developed by both government and the private sector. The principle government system is EPA's **ENERGY STAR®**, which as the name suggests, is predominantly energy focused. **LEED** and **Green Globes** are two other prominent building rating systems. **LEED** and **ENERGY STAR®** enjoy the highest rates of adoption and the widest recognition in the U.S. building market today, especially through their significant government support. At the far end of the spectrum is the **Living Building Challenge**, the most comprehensive and ambitious certification system developed to date. While the **Living Building Challenge** has not yet achieved scale, it is viewed as a harbinger of future building performance requirements.

### LIVING BUILDING CHALLENGE, 2013
### The Bullitt Center, Seattle, Washington

"One of the most ambitious aspects of the Bullitt Center will be achieving the goals of the Living Building Challenge (version 2.0), as described by the International Living Building Institute. Once fully occupied, to be certified as a Living Building a structure is required to be self-sufficient for energy and water for at least 12 continuous months and to meet rigorous standards for green materials and for the quality of its indoor environment."[iii]

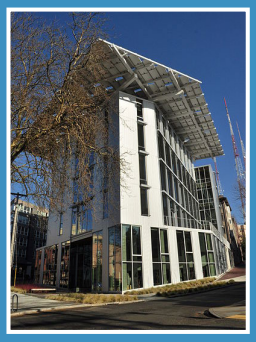


Image Source: Mabel, Joe. Seattle - Bullitt Center 01, January 2014. Seattle. Web. 29 May 2014.

[iii] "Living Building Challenge." Bullitt Center Living Building Challenge Vision. N.p., n.d. Web. 13 June 2014. http://www.bullittcenter.org/vision/living-building-challenge/

**5. Building Design Guidance:** This mechanism provides highly substantive guidance on building design but does not entail any form of certification or reporting. The principal source of comprehensive building performance design guidance in the U.S. market today is the **Whole Building Design Guide (WBDG)**. The **WBDG** offers an 8-point framework for designing high performance buildings based on a continuous stream of input from industry, government, academia and the architectural community. It identifies 8 specific attributes of a High Performance Building: Accessible, Aesthetic, Cost-Effective, Functional/Operational, Historic Preservation, Productive, Secure/Safe, and Sustainable. The **WBDG** also references all relevant codes, standards, legislation and guidelines pertaining to a specific area of building performance, as well as identifying relevant professional organizations that have competence or resources on the performance topic.

Maintained by the National Institute of Building Sciences, and created initially to meet the building design needs and objectives of federal agencies, the **WBDG** is now utilized by over 500,000 U.S. and global users that download 6 million documents per month.[3]

**With its expansive scope, the WBDG most closely reflects the definition of a "High Performance Sustainable Building" as set forth in U.S. law; the Energy Independence and Security Act of 2007.**

### Energy Independence and Security Act of 2007

Title IV – Energy Savings in Buildings and Industry
Sec. 401. Definitions
(12) HIGH PERFORMANCE BUILDING – The term 'high-performance building' means a building that integrates and optimizes on a life cycle basis all major high performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.

About the Council, High Performance Buildings Council, n.d. Web. 13 June 2014.
http://www.nibs.org/?page=hpbc.

[3] "The Gateway to Up-To-Date Information on Integrated 'Whole Building' Design Techniques and Technologies." WBDG. N.p., n.d. Web. 12 June 2014.

The chart below shows the 15 building performance mechanisms in this new taxonomy.

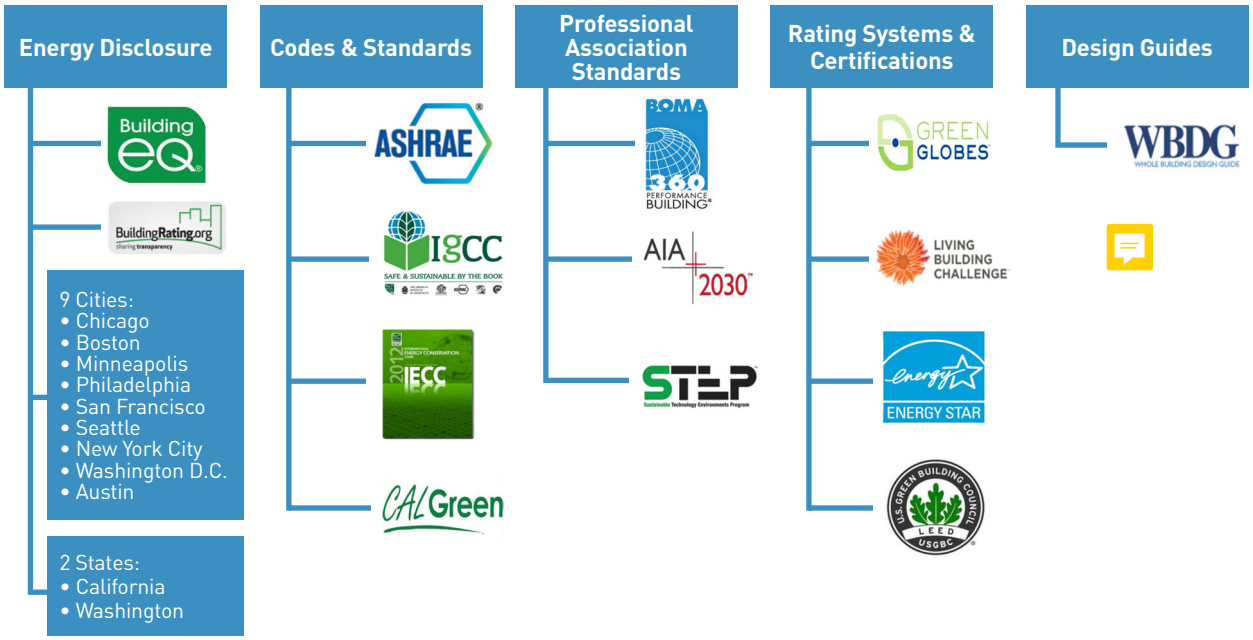



Image Source: Legrand

## Three Interconnected Trends on Building Performance Mechanisms

In analyzing the evolution of the 15 building performance mechanisms, three interconnected trends emerge.

1. Change is constant and performance trends upward
2. Mechanisms influence one another
3. Adoption trends varies across the United States

### Change is Constant and Performance Trends Upward

Perhaps the most prominent and important factor for change is the long-standing three-year-cycle for standard and code development. Each successive generation of model energy codes has promoted higher levels of building efficiency. For at least the last decade, Title 24, California's energy code, has exerted significant upward pressure on other energy codes. This is due to the state's historical reliance on energy efficiency as a means to meet energy demand.

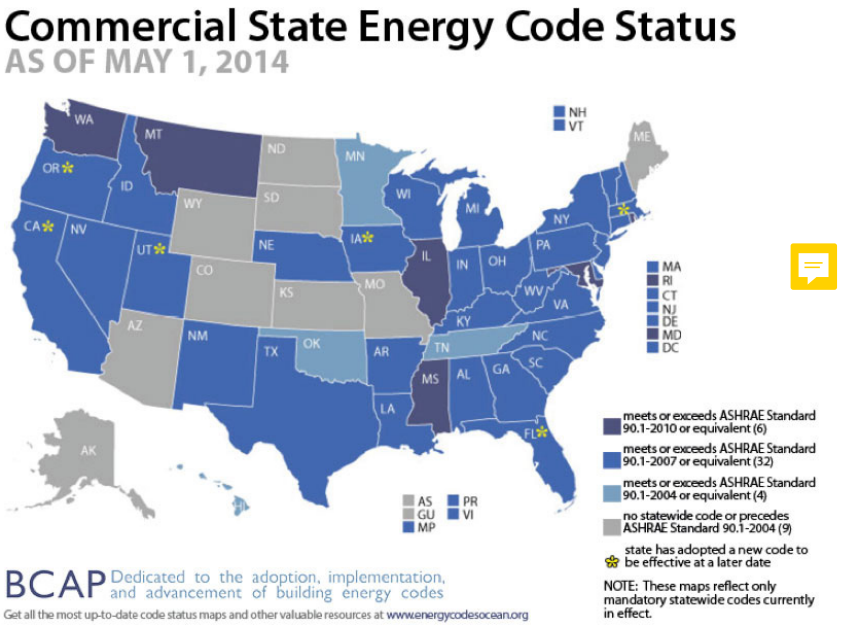
### So What's the Deal with Building Labels?

As noted in this paper, many building performance mechanisms offer building owners some form of physical representation to recognize the achievement of meeting specified performance provisions. LEED and ENERGY STAR® plaques in a lobby or on the face of a building may come quickly to mind.

But labels are often construed to be more detailed, representing specific pieces of information about the object to which they are affixed. Appliances, cars and food items have labels that offer a consistent representation of "the facts" about a product, such that the consumer can make an informed comparison between products – and therefore an informed choice.

The move toward building labels seems to be underway, but still at an early stage. The distinction between a plaque and a label is worth making in the interest of advancing building performance.

Notably, as depicted in the map below, although code and standards are updated on a three-year-cycle, the timeframe for adoption of the latest model code is at the discretion of local jurisdictions. This means that across the United States, not all states are deploying the same edition of model code at the same time.




"Code Status: Commercial." Online Code Environment and Advocacy Network. Building Codes Assistance Project, May 2014. Web. 1 June 2014. http://energycodesocean.org/code-status-commercial

There are also regular revisions to rating systems. For example, since its inception in the late 1990s, LEED has been through five revisions. The latest version, LEED v.4, reflects advances in building science and technology, as well as a shift in emphasis from prescriptive measures to the achievement of actual performance outcomes. The Living Building Challenge, now in its third version, is driving expectations for building performance even further with ambitious targets such as requiring local and regional sourcing of materials, third-party certification of fair labor practices, and sustainable resource extraction standards.[4]

Governments also factor into the pace of change. For example, in 2009 the federal government tied state eligibility for American Recovery and Reinvestment Act (ARRA) funding to the declaration of a state's intent to adopt the latest model energy code. There is also growing evidence of a "race to the top" among states and cities as Governors and Mayors strive to advance sustainability policies as part of an effort to promote economic development and community revitalization. The growing interest in the adoption of building energy benchmarking and disclosure laws is part of this trend.

[4] "Certification Options" Living Building Challenge. International Living Future Institute, n.d. Web. 13 June 2014 http://living-future.org/living-building-challenge/certification/certification-options

## Mechanisms Influence one Another

The influence of mechanisms upon one another can be seen in a number of ways. For example, there is the practice of "incorporation by reference" of model codes. This has been the case with ASHRAE Standard 90.1 being incorporated in the LEED rating system. This linkage can also be found from code to code, such as ASHRAE Standard 189.1 being cited as an alternative compliance path to the IGCC.

The influence also occurs as voluntary performance mechanisms incorporate the use of other voluntary mechanisms into their systems. For example, ENERGY STAR Portfolio Manager® is referenced in multiple mechanisms including LEED, Green Globes, and ASHRAE bEQ.

And in yet another twist of influence, what is voluntary can become mandatory, as has happened when municipalities require their public buildings to achieve LEED or Green Globes certification. Additionally, local governments may require certain private buildings provide evidence of adherence to a rating system.

The maps below show how cities and states have increasingly taken performance mechanisms that were intended to be voluntary, and written them into law.

State-based LEED policies 2010

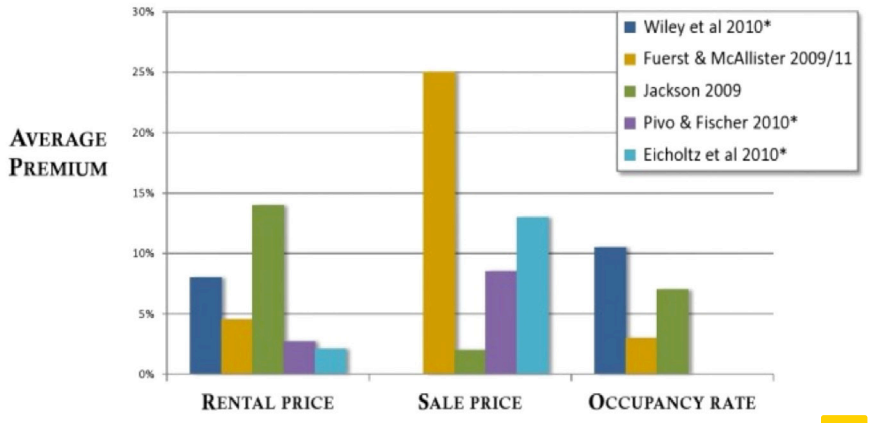
State-based LEED policies 2011-2012


Image Source: Legrand

## Adoption Trends Varies Across the United States

Building owners across the United States do not contend with the same expectations or requirements for building performance. The variance in adoption patterns is a function of several factors.

For one, certain states and localities are more predisposed toward higher performance buildings, influenced perhaps by the number of Class A properties they have or are working to attract. Such jurisdictions often incentivize or require certain building performance mechanisms. The dynamics of the marketplace are also a significant factor; building owners in some communities face more competitive pressures to deliver higher performance buildings as they seek to attract and retain tenants, obtain higher occupancy rates, and improve building valuations.




Higher rental rates, sale prices, and occupancy rates: As our graphics demonstrate, studies consistently show that ENERGY STAR and LEED-certified commercial buildings perform better.

Source: IMT.org, Energy Efficiency and Property Value: How Energy Efficiency Drives Up Commercial Property Values
http://www.imt.org/policy/efficiency-and-value

For owner-occupied buildings, attracting and retaining talented staff, improving occupant experience and productivity, and burnishing brand and reputation are all factors that can drive demand for higher building performance in some markets and not in others. As indicated in the chart above, multiple studies have shown that LEED or ENERGY STAR® certified buildings achieve higher rental rates, sales prices and occupancy rates.

## Case Study: Washington, DC

This case study of Washington, DC, a city with multiple mechanisms in play, presents one example of the three interconnected trends.

From the outset of its efforts to address building performance in 2006, the city connected its building codes to the LEED rating system by requiring that all non-residential buildings larger than 50,000 square feet be LEED certified.

In 2008, not satisfied that this would achieve the level of energy performance it desired, the District added a new requirement for larger buildings to disclose and benchmark their energy and water use. This new requirement applied to all commercial and multi-family structures larger than 50,000 square feet, all public buildings larger than 10,000 square feet, and all new construction greater than 50,000 square feet.[5] Government owned buildings began annual reporting in October 2009.

The first reporting period for private building energy and water disclosure began in April 2013 with buildings over 200,000 square feet. As of April 2014, all buildings over 50,000 gross square feet, including multifamily residences, must annually measure and disclose their consumption data to the District Department of the Environment (DDOE). Both public and private buildings must report using the ENERGY STAR Portfolio Manager® benchmarking tool, showing the connection between building performance mechanisms.

**LEED Requirements**

**New Public, Buildings:** Must be designed and constructed so as to achieve no less than the applicable LEED standard at the Silver level or higher.

**New Public, Schools:** Must be designed and constructed to meet the LEED standard for Schools, at the Gold level or higher.

**New Private, Non-Residential:** New construction and major renovation of privately-owned non-residential buildings over 50,000 square feet must achieve the LEED NC, LEED CS, or LEED for Schools standard at the Certified level starting January 1, 2012.

**Tenant Fit-out:** For tenant fit-outs, both new construction and major renovations, over 30,000 square feet, exclusive of common space, must achieve LEED at the Certified level.

In 2014, in the wake of the 2011 adoption of the Sustainable DC Plan – which set an explicit goal to "make the District the healthiest, greenest, most livable city in the nation over the next 20 years"[6] – the city updated its building code requirements to drive even greater performance. First, to address energy use, it adopted an amended 2012 IECC, as its basic energy code. Second, to address the sustainability of the entire construction project, it adopted the IGCC, a stretch building code.

Within this new stretch code, projects "greater than 10,000 square feet will have several alternatives for satisfying the Green Construction Code requirements, including LEED, Enterprise Green Communities, ASHRAE 189.1, or ICC-700 certification."[7] This further demonstrates the interconnectedness between voluntary and mandatory mechanisms.

[5] "Policy Brief: Washington, D.C." BuildingRating.org. Institute for Market Transformation, 2013. Web. 1 June 2014. http://www.buildingrating.org/content/policy-brief-washington-dc

[6] About Sustainable DC. The District of Columbia, Sustainable DC. Web. 1 June 2014. http://sustainable.dc.gov/page/about-sustainable-dc

[7] U.S. Green Building Council. National Capital Region Chapter. District of Columbia Adopts Innovative New Construction Codes to Promote Sustainable Buildings. N.p., 28 Mar. 2014. Web. 13 June 2014. http://www.usgbcncr.org/news/dc-adopts-innovative-new-green-construction-code/

Of course, in addition to meeting the city's imposed requirements, all Washington, DC building owners may elect to use other available mechanisms, such as BOMA 360 or the Whole Building Design Guide.

As this brief history demonstrates, the **District's building codes and other requirements have changed rapidly**, in less than a decade, as the city has crafted an ambitious and broad sustainability agenda. **There is a close interconnection between different mechanisms**, as building ratings and certifications, especially LEED and ENERGY STAR Portfolio Manager®, have been incorporated into the city's building codes and disclosure ordinance. Finally, while building owners in the District of Columbia are subject to the requirements described above, neighboring building owners just a few miles away in Virginia or Maryland are not, as the **adoption of building mechanisms** varies between these closely located jurisdictions.

## Conclusion

By examining these building performance mechanisms, it is evident that the consistent upward pressure on building performance creates a ripple effect up and down the building industry, impacting owners, architects, designers, contractors, installers, manufacturers, service providers, and ultimately, the people and communities that live, play and work in buildings.

The evolution of building performance mechanisms is a function of many significant social, economic and environmental trends at work.

Increasing urbanization means more and more people living in cities, all of whom hold an expectation that their workplaces, homes and communities are clean, healthy, connected and high performing. The intertwined concerns of energy security and climate change will increase public demands for buildings that are highly energy efficient, can participate in demand response and even produce their own clean energy.

The realities of man-made and natural disasters and growing issues around resource scarcity are fueling the desire for buildings that are resilient and capable of functioning in the aftermath of crisis. Information and communication technologies – and the advent of "big data" – will additionally allow easy measurement, monitoring and management of building performance across a broad scope of measures.

These trends mean that those who construct and own buildings will need to deliver greater levels of performance across a wider scope of expectations, including areas that go well beyond energy and environmental performance. Product manufacturers and service providers will need to adapt to deliver the products and services that meet these new expectations. All parties to the building industry will need to refine their tools and systems to fulfill the potential for high performance building, meaning one which "integrates and optimizes on a life cycle basis all major high performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations."[8]

[8] Ibid Page 6.

High performance building mechanisms are pivotal to creating a future in which buildings are not cost-centers, but profit centers. Going forward, the building community can expect to see:

- Further demands for transparency into building performance and the environmental and health profile of the products and materials that are used within them
- More rigorous energy and sustainability building codes and standards to drive investment in more efficient equipment, spurring innovative behavioral and process changes in building design and construction
- Expanded voluntary commitments by building professionals to design and operate buildings to achieve higher performance levels that continue to raise the bar for the broader market
- Enhanced asset valuations and occupant experience resulting from the recognition, rating and verification of building performance
- A steady move toward whole building, life-cycle design reflecting a higher aspiration and new paradigm for the role of buildings in society

The dynamism and evolution of the built environment will continue for many years to come.

For questions or comments on this White Paper, please contact Susan Rochford, VP, Energy Efficiency, and Sustainability, Legrand North America.

## Coming Next:
## Where is “High Performance” for Buildings Headed?