



DRIVING PERFORMANCE AND TRANSPARENCY IN GREEN BUILDING PRODUCTS AND MATERIALS





Driving Performance and Transparency in Green Building Products and Materials

In just a few short years, the use of environmentally preferable products and materials has become an essential element in the development and construction of new commercial and residential building projects. Driven largely by public interest in minimizing the potential environmental impact of building products, architects and builders now actively embrace “green” initiatives, such as the new International Green Construction Code (IgCC™) and the Leadership in Energy and Environmental Design (LEED®) program developed by the U.S. Green Building Council (USGBC). Indeed, according to a 2010 UL survey, architects, builders and contractors report that a significant number of projects they undertake have clear sustainability goals that require environmentally preferable products.

However, questions remain among manufacturers and buyers about just how to evaluate and compare the lifecycle-based environmental profiles of similar building products and materials. For example, what is the significance of a product bearing an “eco-label”? What are the differences between various types of product eco-certifications? What mechanisms exist to support comparisons between similar products? And, what steps can manufacturers take to bring environmentally preferable products to market as efficiently and as cost effectively as possible?

Each of these mechanisms, from eco-labels and environmental product certifications to lifecycle assessments (LCAs) and environmental product declarations (EPDs), is an important part of a larger “toolkit.” Collectively, these tools provide information regarding the total environmental impact of products, as well as their environmental performance, and offer an objective means of comparing similar products. Ultimately, these mechanisms enable buyers to make more informed decisions about the products they purchase, spurring further advances in product sustainability. Depending on their objectives, manufacturers can use one or several of these tools in combination to meet current and future sustainability expectations of buyers.

This UL white paper provides an overview of the various ways in which building product manufacturers can demonstrate compliance with green building certification programs and codes. The paper begins by reviewing current and projected trends in the demand for sustainable buildings and building products, as well as the current certification programs and building codes regarding green construction. The paper then discusses the various tools intended to aid in the evaluation and selection of





environmentally preferable products, such as environmental product certifications, LCAs and EPDs, as well as the specific functions of each. The white paper concludes with some thoughts about the value of both performance and transparency metrics in achieving environmental leadership.

Industry Trends in Sustainable Buildings and Building Products

The U.S. Department of Energy's Energy Information Administration has projected that the construction and operation of buildings now accounts for about 40% of domestic energy consumption and almost 75% of U.S. electricity consumption¹. By choosing environmentally preferable building products and materials, commercial and residential developers and builders can reduce the use of energy resources required to produce building products and materials, and save on energy consumption during construction and over the span of a building's useful life. Not only do these products and materials address the expectations of environmentally conscious buyers, but their use can actually result in tangible financial benefits for developers and builders.

Because of these and other advantages, it's not surprising that green construction is on the rise. According to Engineering News-Record, the top 100 green contractors in the U.S. reported revenue of \$44.1 billion in 2010 from building projects actively seeking certification for compliance with sustainable design and construction standards. This represents a nearly 100% increase in green

construction revenue since 2007, when the top 100 green contractors generated just \$22.8 billion from green projects².

Equally significant, green construction projects represent an increasingly important source of revenue for building contractors. For example, New York-based Turner Construction reports that 55% of its 2009 construction revenue resulted from green projects, up from just 15% of construction revenues in 2006³. Other construction firms report similar results.

In addition to generating more revenue from green building projects, architects and builders report increased client interest in construction projects with clear sustainability goals that require the use of environmentally preferable products. Research conducted on behalf of UL Environment in 2009 indicated that more than half of construction projects then in development had sustainability goals, with more than 75% of projects designed with environmental sustainability in mind. The survey also found that the impetus for sustainable construction projects was likely the client identifying sustainability goals for his or her project, or an architect or builder recommending environmentally preferable building products and materials⁴.

There are also clear indications of continued strong growth in green construction. For example, industry research firm IBISWorld projects that revenue from green and sustainable construction projects will increase an average of 23% annually for the next five years, growing from \$87 billion in 2011 to more than \$245 billion by 2016⁵.

A separate study from McGraw-Hill Construction projects a five-fold increase in revenue generated from green residential construction, growing from \$17 billion in 2011 to between \$87-114 billion annually by 2016⁶. This anticipated pace of future growth in green construction clearly provides significant economic opportunities for manufacturers of sustainable building products and materials.

An Overview of Green Building Certification Programs and Codes

At present, green construction projects are largely defined by compliance with the provisions of voluntary green building certification programs and by mandatory building codes. Here's a brief overview of the most important green building programs and codes currently applicable to building design, construction and maintenance.

LEED Green Building Rating System

Initially developed with the active participation of the USGBC in the mid/late 1990s, the LEED certification program for the design, construction and operation of environmentally preferable buildings is currently the most widely used framework for assessing green building projects. Beginning with a single standard addressing new construction, the LEED program has evolved over time to include rating systems and certifications for new construction and major renovations, existing building operations and maintenance, commercial interiors, retail spaces, schools, hospitals, neighborhood developments, and



residential structures. The USGBC estimates that nearly 9 billion square feet of building space falls under one or more LEED rating systems, with an additional 1.6 million square feet certified every day⁷.

The current LEED rating systems use a 100-point system to determine whether a building project qualifies for certification. Points are awarded in each of the following six categories:

1. Sustainable sites
2. Water efficiency
3. Energy and atmosphere
4. Materials and resources
5. Indoor environmental quality
6. Innovation in design

A total of 40 points is currently required to achieve the minimum certification level. Silver, gold and platinum certification levels are available for projects that have earned greater point totals.

International Green Construction Code (IgCC)

The 2012 IgCC is the product of a collaborative effort between the International Code Council, the American Institute of Architects and ASTM International. IgCC is a consensus-based model code that creates a framework for other existing international codes, including the International Energy Conservation Code and ICC 700, the National Green Building Standard. As such, IgCC incorporates sustainability measures addressing every phase of a building project, from design through construction and occupancy.

The IgCC can be used for new and existing buildings, including high-rise residential buildings. However, as a model code, the IgCC must be adopted by governing jurisdictions and embedded in state and local building codes before its provisions become enforceable under law. In implementing the IgCC, governing jurisdictions can modify certain provisions to address specific local conditions or enhanced performance requirements through the addition of “jurisdictional requirements.”

California’s Green Building Standards Code

In terms of building codes, the 2010 California Green Building Standards Code (also known as CALGreen) came into effect on Jan. 1, 2011, and addresses green building design and construction for new residential and non-residential buildings. The provisions of the California Green Building Standards Code have already influenced requirements in other construction codes, such as the International Green Construction Code (IgCC). It is expected that other jurisdictions will look to California’s example when formulating their own green building requirements.

Green Globes

Used in the U.S. and Canada, the Green Globes online assessment and rating system has its origins in the Building Research Establishment’s Environmental Assessment Method (BREEAM). The Green Globes system has operated in the U.S. since 2004 under the oversight of the Green Building Initiative (GBI), the first green building organization to be

accredited as a standards development organization by ANSI. A Green Globes ANSI standard was published in 2010. The Green Globe system is applicable to both new and existing buildings.

Living Building Challenge™

Operating under the International Living Building Institute (LBI), the Living Building Challenge certifies the development of buildings, neighborhoods, villages/campuses and cities. It evaluates a project’s performance against seven separate metrics, including site, water, energy, health, materials, equity and beauty. The Living Building Challenge requires the use of a third-party auditor responsible for reviewing relevant project documents and conducting an onsite verification.

Other Actions

At the federal level, it is anticipated that the U.S. General Services Administration (GSA) will incorporate environmental product certifications as a factor in government purchasing decisions in 2012 or 2013. This action is based on Executive Order 13514⁸, issued by President Obama in October 2009 that requires U.S. federal agencies to “leverage federal purchasing power to promote environmentally-responsible products and technologies.”⁹ With annual expenditures approaching nearly \$6 trillion, federal buying requirements are also likely to speed acceptance of these compliance mechanisms by private industry.



Mechanisms for Demonstrating Product Environmental Performance

Within the context of green building certification programs and codes noted above, there are a number of mechanisms available to support claims regarding the environmental performance of building products and materials. These mechanisms vary in complexity, ranging from an assessment of a single aspect of a product to a more comprehensive evaluation of a product throughout its entire lifecycle. Following is a brief summary of the various types of mechanisms for demonstrating a product's environmental attributes and impacts.

- **Environmental Product Certification**—An environmental product certification enables buyers to identify products that meet their specific environmental and/or sustainability goals. An environmental product certification is typically based on an environmental performance standard that sets metrics for one or more criteria, such as energy reduction, waste diversion, recyclability, use of salvaged materials, and conservation of natural resources. An environmental product certification indicates that a product has undergone independent testing, auditing or both and complies with that standard.

- **Lifecycle Assessment (LCA)**—An LCA evaluates a product's environmental impact throughout its various lifecycle stages, from material and component sourcing through final disposal or recycling. It provides a comprehensive picture of the amount of energy, water and materials consumed in the production and use of a product. As such, an LCA is appropriate when used to assess a product's environmental impact in support of a company's efforts to improve operations or meet internal goals. However, because it is difficult to compare multiple products within a given category, an LCA is not typically used to communicate these improvements publicly.
- **Environmental Product Declaration (EPD)**—An EPD is a comprehensive, verified disclosure of a product's lifecycle-based environmental impact. It reports the results of a product's lifecycle assessment (LCA) according to a set of international standards and product category rules (PCRs), and includes other information relevant to a product's environmental profile. An EPD will usually include information on a product's carbon footprint, ozone depletion, acidification of land and water, eutrophication (an impact of water pollution), photochemical ozone creation, and depletion of abiotic resources, as well as other

pertinent environmental and health-related impacts. Because the information contained in EPDs is based on a set of common rules (the critical difference between an EPD and an LCA), EPDs enable buyers to make more informed purchasing decisions across a given product category.

Types of Certification

In addition to the various mechanisms available for demonstrating a product's environmental attributes and impacts, confirmation of environmental performance claims can be achieved through different levels of certification, as follows:

- **First-party certification**—Also known as self-certification, first-party certification is based wholly on a declaration by a manufacturer that a product meets certain environmental performance requirements. As such, first-party certifications are considered the least credible, and do not meet the requirements of buyers who are seeking products with independently verified environmental performance claims.
- **Second-party certification**—In some cases, industry, trade or special interest groups are directly involved in the creation of performance standards, in the operation of a certification program, or in the verification



of environmental performance claims on behalf of their members. While commonly confused with third-party certifications, these types are actually second-party certifications.

- **Third-party certification—** Third-party certification is conducted by an unbiased, independent body whose only connection with a manufacturer seeking certification is the fees paid by that manufacturer for assessment and verification services. Third-party certification warrants that all aspects of the certification program, from standard development, operations and verification of environmental performance claims, are conducted independently and free of any conflicts of interest.

Types of Eco-Labels and Declarations

An eco-label or declaration signifies a product's compliance with environmental performance requirements and standards. According to some estimates, there are over 430 different eco-labels in use by 25 industry sectors in 246 countries around the world¹⁰. As such, there is understandable confusion about the meaning and importance of different types of eco-labels.

To bring clarity to the significance of various types of eco-labels, the International Organization for

Standardization (ISO) has created a series of guidelines for labels and declarations regarding product environmental claims. ISO standards categorize eco-labels and declarations into one of the three following types:

- **Type 1** (*ISO 14024: 1999, Environmental labels and declarations—Type 1 environmental labeling—Principles and procedures*)—Type 1 labels and declarations affirm compliance with pre-determined, multi-attribute, lifecycle-based environmental performance requirements for products within the same category. However, products bearing Type 1 eco-labels may offer different levels of environmental performance in areas outside the scope of the label or declaration.
- **Type 2** (*ISO 14021: 1999, Environmental labels and declarations—Self-declared environmental claims Type 2 environmental labeling*)—Type 2 labels and declarations reflect environmental performance claims made by a product manufacturer. The performance criteria have not been defined or accepted, or independently verified.
- **Type 3** (*ISO 14025-2006, Environmental labels and declarations—Type 3 environmental declarations—Principles and procedures*)—Type 3 eco-labels

and declarations present objective, quantifiable, lifecycle-based environmental information about a product in a consistent manner. Also known as Environmental Product Declarations (EPDs), Type 3 ecolabels are based on product category rules set by an independent body, known as a program operator. In some cases, environmental information presented in Type 3 declarations must be independently verified by the program operator.

The LEED Material Disclosure and Assessment Pilot Credit

In 2012, the USGBC modified the LEED certification credit structure to award pilot credits for the use of environmentally preferable building products and materials that have been certified by a third-party. The LEED Material Disclosure and Assessment pilot credit, known as Pilot Credit 61, was developed to increase the use of building products and materials “with life cycles, ingredients, and attributes understood and optimized to improve overall environmental, economic and social performance.”¹¹ The pilot credit applies to the use of structural and non-structural building products and materials under all LEED rating systems, with the exception of residential construction.

Pilot Credit 61 calls for the use of certified building products and materials that have a total weighted value of at least 20% of all non-structural materials and products



used in a project. Building products and materials qualify for credit in one of the following three ways:

1. Having a publicly available LCA that has been independently peer reviewed in accordance to ISO 14044
2. Having a third-party certified, industry-wide EPD or
3. Having a third-party certified, product-specific EPD

Equally important, the method selected can increase or decrease an individual product's contribution to the overall weighted value. For example, the weight of products with a certified, industry-wide EPD is calculated at cost, while the weight of products with a certified, product-specific EPD is calculated at two times their cost. The weight of products with a product-specific LCA is calculated at half their cost.

LEED Pilot Credit 61 elevates the importance of using building products and materials that are accompanied by detailed information about their environmental profile, making them more a more attractive choice for architects, developers and builders. The pilot credit program's weighted value calculation based on product certification type also allows manufacturers to select a certification path that represents a balance between a product's economic value and its contribution to the overall environmental performance of a project.

Achieving Performance and Transparency in Environmental Certifications

As the LEED pilot credit program illustrates, certifying the environmental performance of building products and materials can proceed along one of several paths. A third-party certification based on compliance with an environmental performance standard indicates that a product meets one or more sustainability criteria, such as energy reduction, recyclability or resource conservation. Certification based on an assessment of a product's overall environmental impact empowers purchasers to make more informed decisions.

Of course, each available certification path offers its own unique advantages and constraints. Certification to product performance standards that address a single attribute, e.g., lower levels of volatile organic compound emissions, or increased use of recycled content, etc., is valuable for demonstrating leadership in a specific environmental performance category. At the same time, however, single product attribute certifications do not offer an overall view of a product's environmental performance.

Certification to product performance standards based on multiple attributes address a variety of important impacts within a given product category. It can provide an overall assessment of

whether a product is, in fact, "greener" than a traditional product, and often considers health and social impacts as well as environmental impacts of products. At the same time, multi-attribute standards and certifications simply denote that a product is more preferable than another from a sustainability perspective, without indicating the reason that it is more preferable. This approach can prove challenging to those looking for more transparent information about a product's environmental, social or health performance against specific parameters.

Certification of an EPD warrants that the environmental impact information presented has been reviewed and validated by a credible third-party. Based on life-cycle assessment and thinking, an EPD essentially tells a product's overall environmental story, enabling purchasers to make more informed decisions about the products they buy. However, as noted earlier, EPDs do not indicate whether a product is environmentally preferable and, as such, should not generally be used to evaluate a product against an environmental performance certification.

Given the unique advantages and constraints of each of these certification options, manufacturers of building products and materials should view them as complementary and not competitive. When used in conjunction with EPDs, single-attribute and multi-attribute product certifications provide



performance metrics that assess whether a product is environmentally preferable while also disclosing its lifecycle-based impacts. Together, these certification options provide buyers with objective, comparable environmental performance data to facilitate an informed product selection process. This allows buyers to more easily identify environmentally preferable products, thereby driving environmental performance in sustainable building efforts.

Conclusion

Today, green construction represents a substantial sector within the construction marketplace, impacting both commercial and residential construction projects. Even as the overall construction market experiences nominal growth, economic indicators point to robust increases in green construction between now and 2016. Architects, developers and builders are reporting increased requests for environmentally sustainable construction projects, and are frequently specifying building products and materials that are environmentally preferable.

Green building certification programs are recognizing the importance of sustainable products and materials in reducing a building's overall environmental footprint. This trend is perhaps best exemplified by the recently introduced LEED Material Disclosure and Assessment Credit that offers credits for third-party certified building products and materials. Attention to the use of sustainable building products can be expected to increase, as the aggregate impact of building products and materials represents a larger proportion of a building's overall environmental footprint.

These market dynamics provide important opportunities for manufacturers of third-party certified building products and materials. Certifications of a product's environmental performance that are complemented by a third-party certified disclosure of its environmental lifecycle impacts equip manufacturers with an unrivaled tool for marketplace differentiation. Moreover, these certifications provide buyers with assurances of a product's environmental preferability, as well as a manufacturer's commitment to support sustainable building practices.

For further information about UL's environmental product declaration and certification programs, please contact environment@ul.com.



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- ³ "Green Building Market Barometer, 2010" Turner Construction. Undated. Web. 31 Mar. 2012. <http://www.turnerconstruction.com/content/files/Green%20Market%20Barometer%202010.pdf>
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