



to be the pinnacle of sustainable design and performance. Today's architects are striving to go beyond Platinum-level sustainability, designing Net Zero Energy (NZE) buildings that are able to generate enough renewable energy to meet all of their consumption needs.

Of course, as the benchmark for sustainability continues to rise, architects, specifiers, consultants and others within the architectural openings industry must continually expand their knowledge of which products can be used to achieve these standards. Although doors and hardware typically account for less than two percent of a building project, they can make significant contributions toward LEED v4 points or an NZE environment. They can also provide significant energy savings, which is the type of sustainability that any building owner will be interested in achieving.

LEED v4

In an effort to address the problem of green-washing, the USGBC has shifted to a more stringent, performance-based approach in their latest version of certification guidelines, LEED v4, requiring measurable results rather than relying on potentially inaccurate estimates and manufacturer claims. All LEED projects registered after October 2016 must comply with the more stringent LEED v4, rather than LEED 2009.

The LEED v4 rating system has been expanded to include more market sectors, a stronger emphasis on indoor environmental quality and human health, and an increased focus on how buildings need to demonstrate their performance through energy and water metering. New categories include climate change, human health, water resources, biodiversity, green economy, community, and natural resources.

With the new emphasis now being placed on the overall environmental footprint, some of the most important changes in LEED v4 were made to the Building Design & Construction (BD+C) category. Within this section are two areas where doors and hardware can have a significant impact on a project's efforts to achieve certification.

Energy and Atmosphere

This category now requires each project to be capable of measuring whole-building energy use. Projects must track the total building energy consumption monthly for five years and report the measurements back to the USGBC. Rather than relying on projections of theoretical efficiencies, facilities must now deliver real-world

THE GREEN REVOLUTION

By Jeff Wherry

When green building first rose to prominence, many questioned if it was a trend or a fad. Critics would point to countless instances of "green-washing" in which exaggerated, misleading or even blatantly false claims were being made about the environmental impact of green building materials used to obtain LEED certification from the U.S. Green Building Council (USGBC). As with any new program, there was a learning curve for both the construction industry, as well as the USGBC itself, and plenty of mistakes were made (and exploited) along the way.

Today it's clear that green building is neither a trend nor a fad; it is a revolution that has been steadily and fundamentally changing the way buildings are constructed, operated and maintained worldwide. Over the last 17 years, LEED certification has become the most widely used green building rating system in the world. As of May 2016, over 80,000 projects in 162 countries had received some level of certification from the USGBC.

Lending further credibility to the concept of green building is the fact the standards have continued to be raised over time. For many years, LEED Platinum certification was considered

results to achieve certification. This requirement has resulted in tougher testing standards for many products, including door assemblies.

Materials and Resources

The requirements in this section encourage the use of sustainable building materials and reducing waste on-site to support a “life-cycle approach.” Steel has come to be recognized as one of the most sustainable building materials in the world, and as a result, this is an area where member manufacturers of the Steel Door Institute (SDI) can assist architects in achieving points toward LEED or NZE certifications.

SDI also partnered with Underwriters Laboratories Environment to develop the first Product Category Rules for steel doors and frames. These PCR enable manufacturers to conduct accurate Life Cycle Assessments (LCA) of their products. The LCAs can then be used in the development of the Environmental Product Declarations that may be necessary for building projects to comply with the new LEED v4 requirements.

“Allowing architects, general contractors and specifiers to understand the total environmental impact of the products they select is a mission of the SDI,” says Jeff Wherry, Managing Director of SDI. “Leadership in the creation of PCRs is an important step in fulfilling this mission.”

Real World Applications

While few deny the long-term importance of implementing sustainable building practices, what is frequently more persuasive to building owners and managers are the savings that can result from such energy efficient materials and construction. The typical office building in the U.S. spends 29 percent of its operating expenses on energy – over \$30,000 per year on average. Although doors and hardware may comprise only two percent of a building project, they can play a major role in reducing or even, in the case of NZE buildings, eliminating those costs completely. The following are

GREEN TERMS TO KNOW:

Life Cycle Assessments (LCA)

LCAs assess the environmental impacts associated with all the stages of a product’s life—from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling. Design professionals use this process to help critique their products.

Environmental Product Declarations (EPD)

An EPD is an independently verified and registered document that communicates transparent and comparable information about the environmental impact of products throughout their life cycle. There are different types of EPDs that can be industry wide, as well as product specific.

Product Category Rules (PCR)

PCRs define the requirements for Life Cycle Assessments and Environmental Product Declarations of a certain product category. They are essential in the development of environmental declarations because they allow consumers to compare similar products.

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just a few examples of how sustainably designed and properly specified doors have helped facilities significantly improve their energy efficiency.

The National Renewable Energy Laboratory's Campus of the Future

The NREL was committed to becoming a global model for sustainability by maximizing the value of all natural resources and building products used in its research campus facilities. Their goal was to have all new construction result in sustainable green buildings that met or exceeded the Gold Level of LEED certification.

Door and hardware experts helped the NREL ensure it was constructing buildings that were not only sustainable, but also safe and secure. A combination of acoustic and fire-rated steel doors injected with CFC and HCFC-free polyurethane foam were specified throughout the campus. These high-performance openings allowed the facility to significantly reduce building thermal and air leakage with the use of recycled and rapidly renewable materials while still ensuring the life safety and security of its occupants.

As a result, two of the eight buildings on campus, the 71,000 sq. ft. Science and Technology Facility and the 222,000 sq. ft. Research Support Facility (RSF), have exceeded their goals and attained LEED Platinum certification. The RSF carries the additional distinction of being a net-zero energy building. The energy efficient design and materials enable the facility and its occupants to consume only the amount of power produced by on-site renewable energy sources, resulting in significant long-term savings.

Wolf Ridge Environmental Learning Center is a great example of how incorporating green products into the opening of a facility has had a dramatic impact on the bottom line. Located in Finland, Minn., the campus was regularly subjected to the ravages of nature. In winter, temperatures can drop into the -50°F range and soar to over 100°F

in the summer; annual snowfall can accumulate over 100 inches. Replacing the leaky doors on the main entrance of the 25 year-old facility was identified as a vital first step towards enhancing energy efficiency.

The architect selected to undertake this retrofit was presented with the challenge of securing heating efficiency and thermal savings using sustainable technology and materials. After performing calculations to assess thermal properties and heat transfer, a fire-rated door with a steel stiffened laminated core and thermal break frame was selected. The complete assembly was then tested to determine building envelope thermal and air leakage performance. The opening showed a dramatic annual kBtu reduction of 1,792 in leakage and conductive loss according to an independent audit by Conservation Technologies. Once the 300 door building complex retrofit is completed, the energy efficient openings are estimated to deliver an impressive \$20,000 in annual energy savings for the facility.

Kohler Environmental Center (KEC) at Choate Rosemary Hall was designed for net-zero energy efficiency. The 31,325 sq. ft. facility includes dormitory rooms, faculty apartments, common spaces, classrooms, laboratories, and a state-of-the-art research greenhouse. The building utilizes solar panels and careful site orientation to enable daylight harvesting to reach its efficiency goals.

The architect also installed integrated opening solutions that have been thoroughly tested to the highest sustainability standards for green building construction. Although ASTM C518 is the industry standard for thermal testing doors, it fails to reflect the real world performance of an opening. Because the USGBC's new standards now require certification to be based on performance, the door core calculation alone is no longer viable and could result in reduced energy efficiency values and the failure to meet the NZE or LEED standards. Instead, the facility chose products based on the more

stringent ASTM C1363 operational testing standards that require the full assembly to be tested in a simulated operable environment to ensure maximum performance and efficiency.

As a result of installing these and other sustainable products, the KEC was able to minimize its thermal and air leakage and achieve LEED Platinum certification.

The Future is Green

These projects offer just a glimpse of what can be achieved in the future if building product manufacturers continue developing high performance, sustainable solutions. As a growing number of cities, states and countries continue to recognize the financial and environmental benefits of green building, demand for these products has only been increasing.

Architects, consultants and specifiers have a vital role to play in this movement, selecting the products that will be most effective at providing the level of real world performance necessary to comply with the increasingly stringent LEED standards for sustainability and efficiency.

Partnering with manufacturers who are experienced with LEED projects will make this task much easier. Not only do SDI member manufacturers have a deep understanding of LEED, they can also provide the necessary certification contribution documents. Contact an SDI manufacturer early in the design phase of your next project to find out how steel doors and frames can help you maximize your LEED points. ■



JEFF WHERRY has been Managing Director of the Steel Door Institute (SDI) for more than two decades. For more information on how steel doors and SDI member companies can contribute to your next

green building project, visit www.steeldoor.org.