

business issues

UP TO SPEED ON LEED

BY JOHN CROSS, P.E., LEED AP

LEED WAS NEVER INTENDED to remain static but rather evolve over time—and evolve it has yet again.

Version 4 of the U.S. Green Building Council's rating system (which stands for Leadership in Energy and Environmental Design) is now a reality, approved by ballot in late spring of 2013 and announced to be open for the registration of new projects at USGBC's Greenbuild conference in Philadelphia this past November.

In an attempt to push building performance levels to a higher level, LEED V4 represents a major change from earlier versions of the rating system. In no section are the credit changes more dramatic than the one focusing on building materials. Whether these changes were well thought through, appropriate and based on a good analytical foundation was certainly much debated. But the fact is that LEED V4 is now a reality and the design and construction community is in the process of adapting to this new world.

LEED is not intended to exist in a vacuum as the only green building standard or rating system available for project owners. USGBC's stated strategy is to encourage the adoption of green building codes and standards, such as the *International Green Building Code* and ASHRAE 189.1, by state and local jurisdictions to define a baseline for sustainable construction. The LEED program will then sit on top of this baseline, recognizing projects that go above and beyond building code requirements. The combination of this strategy and the more complex and stringent credit requirements in LEED V4 will probably result in a decrease in projects seeking LEED certification but also an increase in the sustainable performance of the overall inventory of new buildings.

Many of the nuances relative to the implementation of LEED V4, as it relates to materials used in building projects,

What you need to know about the new version of the ubiquitous green building rating system.

are yet to be worked out in practice. Below are a series of questions related to LEED V4 that merit immediate attention by designers, fabricators and constructors.

Does LEED V4 immediately replace prior versions of LEED? No, projects can continue to be registered under LEED 2009 until June 1, 2015, and based on previous transitions between LEED versions those projects will then probably have until mid-2021 to complete construction and apply for actual LEED certification. This means that the existing requirements for recycled content and regional material documentation will continue to be in use for another seven years. For an overview of how these credits are addressed by the use of structural steel, see "A Green Roadmap" (MSC 02/13).

Does LEED V4 encourage the use of life-cycle assessments (LCAs) to select framing systems? Yes, the only way that new construction can gain any credit points under the MR credit for "Building Life-Cycle Impact Reduction" is either through the use of a large percentage of reused or salvaged materials or to conduct a life-cycle assessment of the project's structure and enclosure, comparing the structure to a similar "baseline" building. To gain three credit points the LCA must demonstrate a 10% improvement of the selected building in three of six environmental impact categories (one of which must be global warming potential) and no degradation of greater than 5% in the remaining three categories.

Are the data, expertise and technology required for LCAs available to support this level of analysis? No, the world of LCAs is a return to the Wild West. A limited number of LCA experts exist that understand the boundaries and calculation methodologies behind the various material data sets and are trained to use assessment tools that require the actual modeling of the entire construction process rather than an estimation of average impacts.

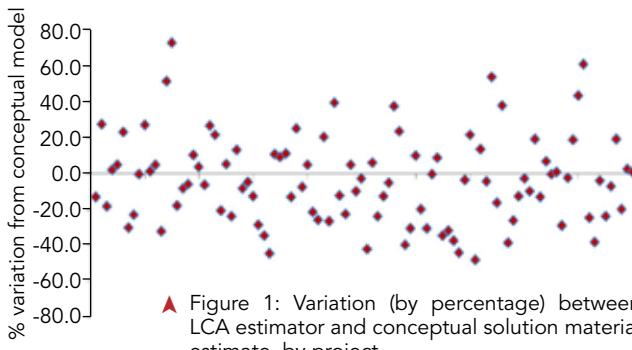
A variety of estimating programs for comparing the environmental impacts of competing framing systems have entered the marketplace in the last few years. The intention of these tools is to allow a design professional not trained in life-cycle assessment to perform these comparisons. The problem with them is twofold. First, relative to the environmental impact data, many assumptions are being made with respect to the environmental impacts of various materials and construction operations. These assumptions include the boundary definitions for the equivalent comparison of data and underlying methodologies for determining the LCAs for individual products and materials. In addition, no distinction is made between different sources of (or process for making) the same product; rather industry averages are used for material impacts. Secondly and of even greater



John Cross is an AISC vice president. You can reach him at cross@aisc.org.

concern is the determination of the quantities of materials used in each of the two framing scenarios. The quantities being used in these tools are based on rough parametric estimates rather than on preliminary design quantities. The parametric estimates are based on simple assemblies and limit the opportunity of the design professional to improve the efficiency of the structural system before the LCA comparison is made.

The AISC Steel Solutions Center routinely develops conceptual solutions for structural steel-framed projects using structural design software. While these conceptual solutions are one step before an actual preliminary design, they have been found to be typically within 10% of the final steel quantities for a project—a range that is appropriate for use in a LCA estimate. A random sample of 100 structural steel-framed projects for which conceptual solutions had been performed were analyzed using one of the more prevalent environmental impact estimators. The difference between the quantities generated by the estimator and the quantities determined in the conceptual solution were significant, ranging from an 80% overstatement of steel quantities to a 40% understatement (see Figure 1). It is impossible to make a meaningful comparison of environmental impacts to the required level of 10% improvement or 5% degradation if the variation of the material quantities can be as great as plus 80% or minus 40%.



▲ Figure 1: Variation (by percentage) between LCA estimator and conceptual solution material estimate, by project.

The bottom line is that for a meaningful comparison of the environmental impacts of two building structures, it is necessary to engage the expertise of two trained professionals. An LCA expert who understands the background and limitations of the data sets being used in developing the comparison and a structural engineer who can create preliminary design models for the two alternatives from which material quantities can be extracted; see “And the Winner is...” (*MSC* 08/10) for an LCA study comparing two alternative building designs.

What's all this talk about “transparency?” Transparency is a key concept in LEED V4. Three credits address transparency in three different areas: transparency in the reporting of environmental impacts, transparency in reporting the sourcing of raw materials and transparency in the disclosure of material ingredients. To meet the requirements of these sections a minimum of 20 products used in the building project must have this information available. In each of the three credits, a point can also be earned for making a selection between similar products based on the information that has been disclosed.

Environmental impacts will be reported on a product basis through the use of an environmental product declaration (EPD). EPDs can be issued for the product at any stage of the product’s

life cycle and on either an industry average or individual product manufacturer basis. For example, there will be an industry average EPD for hot-rolled structural steel sections from cradle-to-mill gate and the individual mills producing hot-rolled structural steel may also opt to create a producer-specific EPD for hot-rolled structural steel. In addition, an industry average EPD for *fabricated* hot-rolled structural steel from cradle-to-fabricator gate will also be produced using fabrication industry data collected in a survey to be conducted over the next several months.

Responsible sourcing documentation can be either self-declared manufacturer reports of product sourcing practices (if self-declared, the product only gets half credit) or third-party verified reports relative to the supply chain of the project. In addition, a separate credit is available based on the sum of a number of single attribute factors including recycled content of all the materials in the project exceeding 25% of the cost of project materials (however, the overall contribution of structure and enclosure materials is limited to 30% of the compliant building materials).

The disclosure of material ingredients will most likely take the form of a health product declaration (HPD) or material data sheets that list all of the ingredients of the product down to 1,000 parts per million. This data is product-specific and cannot be presented as an industry average. An additional point of credit is available for use of materials in the project exceeding 25% of the cost of the overall project materials, whose material ingredient disclosures are third-party verified and do not contain any chemicals with health-related issues.

This seems pretty complex; is the structural steel industry ready to provide this documentation? The structural steel industry will continue to provide the documentation of recycled content and regional sourcing required by LEED 2009 and is committed to providing environmental impact documentation required by LEED V4 on an industry average basis by mid-2014. Individual producers are working on developing the documentation required for responsible sourcing and material ingredients. As the transition to LEED V4 will be occurring over the next several years, this should meet the ongoing requirements of any building project.

Will LEED V4 result in more sustainable buildings? Any rating system like LEED cannot guarantee that it will result in more sustainable buildings. A rating system only focuses on limited discrete aspects of the building’s design and construction. It is when design and construction professionals work together, using their expertise to optimize their designs and activities from both an economic and sustainable perspective, that the actual building becomes a more sustainable structure. LEED V4 can provide incentives, perspective and market push to help accomplish those goals, but in the end it is the expertise, collaboration and common sense of the design and construction professionals and the guidance of the project owner that will result in a sustainable structure.

Where can I get additional help in understanding the requirements of LEED V4? *MSC* will continue to publish articles exploring the requirements of LEED V4. In addition, AISC regional engineers are available to discuss issues—and give presentations—regarding the sustainable characteristics of structural steel and the requirements of LEED V4, and the Steel Solutions Center is happy to answer questions regarding this new version of LEED. ■