

conference preview

SUSTAINABILITY 2015: WHAT'S NEW WITH STEEL AND SUSTAINABILITY?

BY JOHN CROSS, P.E., LEED AP

Plenty.

LEED... USGBC... LCA... LCI... EPD... PCR... HPD... ASHRAE 189.1... IgCC...

What do all these letters mean, what do they have to do with sustainability, how are they changing and more importantly, how do they impact the structural steel industry on a daily basis? Unfortunately, each of those questions is more difficult to answer than the last.

The Many Forms of LEED

The most familiar of these terms is LEED. For the general public, LEED has become synonymous with the concept that a LEED building is a better building in terms of its impact on our environment than a non-LEED building. While most people might not know exactly what a LEED building entails, they know they feel good about them. In reality, **LEED** is an acronym for “**Leadership in Energy and Environmental Design**” and refers to a voluntary program available to building owners developed by the **U.S. Green Building Council (USGBC)** to measure the sustainable characteristics of a building or community.

There are a variety of LEED programs covering different types and portions of buildings and communities, and each has gone through a series of new versions. The LEED program most directly related to the activities of the structural

steel industry is LEED for Building Design and Construction (LEED BD&C) for which version 4 was released in October 2013. Version 4 incorporated significant changes to sections of LEED dealing with material and resources. In earlier versions of LEED, individual credits were earned for the use of materials that documented a high percentage of recycled content, a regional origin or a high bio-based content. These credits, along with credits from other sections of the LEED program, were added together to determine what level of LEED certification a project would receive (Certified, Silver, Gold or Platinum).

LEED V4 completely changed the manner in which credits were gained by the use of specific materials such as structural steel, concrete or wood for a given building. Gone were the credits for recycled content, regional origin or bio-based content. The new set of material and resource credits deal rather with the reduction of environmental impacts over the life of the building, the disclosure of the environmental impact of products used in the construction of the building, the health impacts related to the ingredients of those products and whether the raw materials from which the products were made were sourced in a responsible manner.

Lifelong Assessment

The reduction of the environmental impacts of a building over its life is to be measured through the use of comparative **life-cycle assessments (LCAs)**, which compare two building alternatives during the design process by collecting material quantities and the environmental impacts generated during the life of the product (for structural steel, this would include material production, fabrication, erection, demolition and recycling) and optimize the design of the building based on the selection and use of those materials. In comparing the buildings, the energy efficiency and water consumption of the alternatives may also be taken into account.

In order to accurately make this comparison, two data sets are required. The first is an accurate inventory of the materials to be used in each building alternative (for struc-



John Cross (cross@aisc.org)
is an AISC vice president.

tural systems, this should be generated by a structural engineer based on preliminary designs, not by an overly simplified parametric estimating program) and the second is a quantification of the environmental impacts associated with the product on a unit basis. This means that each product used in a building should be documented through the development of a **life-cycle inventory (LCI)** of the product.

Key to this process is the availability of data in the marketplace for the products anticipated to be used in the building and the consistency of the methodology used to develop the data for similar products. The goal of the LEED V4 program is to have **environmental product declarations (EPDs)** available for all products—a goal that USGBC identifies as product transparency. The EPD will contain information regarding the environmental impacts of the product such as global warming potential, acidification, eutrophication, primary energy use and the potential for smog generation. To ensure comparability of similar products, each EPD is based on a **product category rule (PCR)** that is developed as a consensus document with public review defining the process for determining the various factors reported in the EPD.

Steel Rules

The structural steel industry is participating in a process that will soon finalize the PCR for various types of fabricated structural steel products. Following the finalization of the PCR a series of industry average EPDs will be published based on data collected from both the producing structural mills and member fabricators. Fabricator data was collected in a survey sent to all AISC full member fabrication shops this past December. The three industry average EPDs will be for Fabricated Hot-Rolled Structural Steel, Fabricated HSS and Fabricated Plate. According to the standards set by USGBC and ISO, these EPDs can only be used and submitted for LEED credit by AISC member fabricators who have participated in their development.

But the EPD only reports the impacts associated with the production of the product. It does not include information regarding any potential health hazards related to the use of the product. LEED V4 also provides credit for products that provide a **health product declaration (HPD)** identifying the material ingredients of the product and any health risks associated with those ingredients. The methodology behind the development of HPDs or similar health related disclosures is still in its infancy and subject to much debate within USGBC and green community. It is anticipated that for structural steel these HPDs will be provided by the producing mills, galvanizers and paint suppliers as the fabrication process does not change the chemical makeup of the product.

To even the casual reader, this might seem to be a major change in the reporting requirements for the LEED program. It certainly is. LEED V4 was rolled out on November 1, 2013, and projects were allowed to register under LEED V4 at that point of time. (Projects register with USGBC to seek certification early in the design life of the project and later submit the required documentation needed to apply for the actual LEED certification.) The original plan by USGBC was to allow a period of time during which a project could opt to register under either the new program or the old LEED 2009 version of the LEED program (LEED 2009 credits for structural steel are based on recycled content and product origin). The cutoff date for registration under LEED 2009 was announced to be June 1, 2015, with the

Survey Says!

This past December, AISC Member fabricators were asked to fill out an survey on the environmental impacts of their shops. Here is a portion of the information they were asked to provide:

Inbound Transportation Distance for:

- Welding Supplies
- Compressed Gas
- Liquid Gas

Tonnage of:

- Fabricated structural steel shipped
- Total steel scrap sold for recycling

Quantities used of:

- Hydraulic Fluid and engine oil (in-house use)
- Welding Electrodes
 - Stick
 - Flux Core
 - Metal Core
- Compressed Gas
 - Acetylene
 - Argon
 - Carbon Dioxide
 - Natural Gas
 - Nitrogen
 - Oxygen
 - Propane
 - Propylene
- Liquid Gas
 - Argon
 - Nitrogen
 - Oxygen
 - Propylene
- Other material inputs to final product (e.g., packaging)
- Electricity
- Propane for internal transport
- Gasoline for internal transport
- Diesel for internal transport

Amount of shop waste sent to a landfill

final date by which the actual application for certification needed to be received being June 1, 2021. However, the marketplace acceptance of LEED V4 has fallen significantly below expectations due to the complexities of the new system and USGBC has opted to extend the period of overlap between LEED V4 to LEED 2009 to October 15, 2016.

Keeping Tabs

What does this mean to the structural steel industry? Clearly the old requirements of providing documentation of recycled content and point of origin are not going away any time soon. But at the same time we will need to make sure that industry-wide LCI data is available in the published databases of such data and that EPDs and HPDs



will be available to provide on projects seeking LEED certification. AISC will provide the industry average EPD for member fabricators to use as project documentation, while the HPD and information on the respon-

sible sourcing of raw material will come from the producing mills.

The need to document recycled content and point of origin will not go away even after the sunset date of LEED 2009 in 2021. Both the **ASHRAE 189.1 Standard for High Performance Buildings (ASHRAE 189.1)** and the International Code Council's **International Green Construction Code (IgCC)** have requirements for the provision of recycled content documentation, point of origin and EPDs. To date, ASHRAE 189.1 and IgCC have been adopted as a mandatory requirement in only a handful of jurisdictions, but there are indications that may change. Recent discussions by a variety of associations involved in green design and construction, including ASHRAE (American Society of Heating, Refrigeration and Air Conditioning), ICC, USGBC and the American Institute of Architects (AIA) has resulted in a tentative agreement to use the technical content of ASHRAE 189.1 and the

basis of a new version of the IgCC, with ICC contributing the adoptable administrative language. Compliance with this new version of the IgCC will then become a prerequisite for any project seeking LEED certification irrespective of whether the jurisdiction in which the project is located has adopted the IgCC.

Demonstrably Green

So where are we as an industry? We are moving forward on the development of the documentation required to be submitted to demonstrate the sustainable nature of fabricated structural steel. This will include both LCI data and EPDs, which are anticipated to be available by mid-2015. At the same time structural steel producers will continue to provide documentation of recycled content and material origin. The producers will also be involved in the provision of HPDs and information related the responsible sourcing of raw materials.

The bottom line is that a significant portion of construction activity will continue to seek LEED certification and that the documentation requirements are not simply changing, but actually expanding. And the changes in these programs and requirements show no indication of slowing down. ■

This article serves as a preview of Session N26, "Sustainability 2015: What's New with Steel and Sustainability," at NASCC: The Steel Conference, taking place March 25-27 in Nashville. Learn more about the conference at www.aisc.org/nascc.