Understanding the LEED Credit for Recycled Content

By Lionel Lemay, PE, SE, Senior Director of Applied Engineering, NRMCA

If you haven’t already supplied concrete for a LEED project, there is a good chance you will soon. LEED, which stands for Leadership in Energy and Environmental Design, is a rating system that is quickly becoming the standard for green building design and construction. It was developed through a consensus process by the United States Green Building Council (USGBC), a non-profit organization dedicated to promoting buildings that are environmentally responsible, profitable and healthy places to live and work.

The LEED rating system is credit-based, allowing projects to earn points for environmentally friendly actions taken during the design and construction process. A project requires a minimum of 26 points to be LEED certified. There are advanced levels of certification, including silver, gold, and platinum, requiring a minimum of 33, 39 and 52 points, respectively. There are five core credit categories to obtain LEED points: Sustainable Sites worth up to 14 points, Water Efficiency worth up to 5 points, Energy and Atmosphere worth up to 17 points, Materials and Resources worth up to 13 points, and Indoor Environmental Quality worth up to 15 points. There is a sixth category called Innovation and Design Process for an additional 5 points. There are a total of 69 LEED points available.

The LEED point system is not defined in terms of materials or specific systems but describes credits in general terms. Concrete can play a significant role in obtaining LEED points in every credit category. For example,
The Clearview Elementary School in Hanover, Penn., incorporates concrete to achieve LEED Gold certification. The project was built using insulating concrete forms to obtain LEED points for energy efficiency and used high volumes of slag in the concrete to obtain LEED points for recycled content. Concrete also helped achieve LEED points for using regionally manufactured and harvested materials. At left: NRMCA is a registered provider with the American Institute of Architects Continuing Education Systems (AIA/CES) and offers several seminars on concrete technology including LEED Green Building Rating System and Concrete.
one LEED point is earned for using a light colored pavement, such as concrete, for 30% of a site's paved surfaces. Using pervious concrete pavement to reduce stormwater runoff can earn one LEED point. Using energy efficient wall systems, such as tilt-up concrete walls or insulating concrete forms, can contribute to gaining LEED points. Concrete contributes to available LEED points by using regionally manufactured materials—concrete is made within a 500-mile radius of a building site and most of the materials are also harvested within 500 miles of the site.

Concrete also contributes to LEED points available for using recycled products. The requirement is to use materials with recycled content such that the sum of the post-consumer recycled content plus one-half of the post-industrial recycled content totals 5% for 1 point or 10% for 2 points. The calculation is based on value or cost of materials. The value of the recycled content portion of a material is determined by dividing the weight of recycled content in the item by the total weight of all materials in the item, then multiplying the resulting percentage by the total value of the item. Supplementary cementitious materials (SCMs) such as fly ash, slag and silica fume are considered post-industrial recycled content.

**Example:** Assume a project is built using tilt-up concrete walls, slab-on-grade, concrete footings and a concrete parking area. The total project cost is $5 million and the total cost of materials is $2.25 million. The total amount of concrete used on the project is 1,850 cubic yards at a cost of $70 per cubic yard. The mix design calls for 225 pounds of fly ash per cubic yard. The recycled content rate is calculated as follows: (at right)

To obtain one LEED point for this project, recycled content rates for all other items must total 4.84% or more to achieve the 5% minimum requirement. Other strategies for increasing recycled content in concrete include using flowable fill that contains high volumes of fly ash, using recycled aggregate.

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Weight of Concrete = 1,850 yd³ x 4,050 lbs/yd³ = 7,492,500 lbs

Weight of Fly Ash = 1,850 yd³ x 225 lbs/yd³ = 416,250 lbs

Recycled Content = 416,250 lbs x 0.5 * 7,492,500 lbs = 0.028

Recycled Content Value = 0.028 x 1850 yd³ x 70/yd³ = $3,626

Recycled Content Rate = $3,626 x 100% = 0.16%

*post-industrial recycled content is given 1/2 credit.
The seminar was developed to provide continuing education for architects and engineers but also serves as an excellent introduction to LEED for ready mixed concrete producers.

in concrete, or using other SCMs such as slag in concrete.

There is also an opportunity to obtain another LEED point by using SCMs in concrete. The USGBC has issued a Credit Interpretation that states that one Innovation Point will be awarded for reducing the total portland cement content in concrete. The requirement is to reduce the total carbon dioxide (CO₂) for all concrete on a project by a minimum of 40% from standard baseline mixes. Concrete must make up a significant portion of the work. The assumption is that 1 pound of portland cement is equivalent to 1 pound of CO₂. Baseline mixes are defined as standard 28-day compressive strength mix designs for the region. SCMs allowed include fly ash, slag, silica fume and rice hull ash.

Example. Assume the structural requirement for concrete is 4,000 psi. The standard mix design for the area uses 564 lbs. of portland cement per cubic yard. To obtain one LEED point, one would need to reduce the portland cement content by 40% or by 227 lbs. One strategy would be to require compressive strength to reach 4,000 psi at 90 days instead of 28 days, which could result in a reduction of portland cement by 100 lbs. An additional 127 lbs of portland cement could be replaced with fly ash to achieve the required 40% CO₂ reduction.

Keep in mind that if the standard baseline mix for the region already contained fly ash or other SCMs, then obtaining the LEED Innovation Point for reducing CO₂ in concrete would be even more difficult.

If ready mixed concrete producers are going to play a key role in green building they must have a thorough understanding of the LEED process. By working with architects, engineers and contractors to maximize LEED points, producers will help concrete develop a competitive advantage over other materials.

For starters, concrete producers should consider taking NRMCA’s seminar titled LEED Green Building Rating System and Concrete. The seminar was developed to provide continuing education for architects and engineers but also serves as an excellent introduction to LEED for ready mixed concrete producers. To arrange for a seminar, contact Lionel Lemay, senior director of applied engineering at NRMCA, L.Lemay@nrmca.org, (847) 918-7101. Visit www.nrmca.org for additional information on continuing education available from NRMCA.