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LEED* or Get Out of the Way!

What does the precast industry need to do to “go green”?

By Greg Stutz

[Editor’s Note: This is Part 2 of a two-part series. Part 1, which appeared in the July-August 2007 issue of MC, explained the LEED rating system and how it relates to the precast concrete industry. Part 2 explains how precasters can maximize the “green” aspects of concrete with the LEED rating system.]

* LEED is a trademarked name for the Leadership in Energy and Environmental Design developed by the U.S. Green Building Council.

Precast concrete and LEEDing by example

Using precast concrete can increase the number of points awarded to a building in the LEED system. The following are suggestions for earning LEED-NC v2.2 points through the use of precast concrete products. The potential number of available points that can be earned through the use of precast concrete range from 19 to 28. The following are suggestions for using precast in support of the LEED elements:

- Site development – maximize open space by reducing the footprint of the development
- Stormwater design – minimize the disruption, pollution and natural flows of water runoff
- Optimize energy performance – components (walls and floors) help moderate indoor temperature extremes via their thermal mass
- Building reuse materials – precast has a long life and can be reused when modifying designs or intended use
- Construction waste management – diverting construction debris from landfill disposal by recycling the material
- Recycled content – supplementary cementitious materials, such as fly ash, silica fume and slag
- Regional materials – use of indigenous materials and reduced transportation distances (within 500 miles)
- Low-emitting materials – precast walls, floors and ceilings provide low indoor air contaminant surfaces
- Water-efficient landscaping – cisterns to collect rainwater or gray water
- Innovative wastewater technologies
- Materials and resource credit – bio-based release agents
- Innovative design credit – precast can be made to take on any shape, color or texture

When using precast, only the required concrete is used in the plant, and pieces are delivered to the site ready to be assembled. In most cases an estimated 2 percent of the concrete at a precast plant is waste, but since it is generated at the plant and not on a job site, 95 percent of that waste is used beneficially. In addition, precast structures are designed to optimize the amount of concrete used. Industrial byproducts such as fly ash, slag cement and silica fume are incorporated into the mix design as partial replacements for cement, reducing the amount of cement used in the controlled precast manufacturing environment. The small amount of concrete waste generated has negligible toxicity.

Reduce, reuse, recycle

A key factor in building reuse is the durability of the original structure. Building reuse generally means leaving the main portion of the building structure and shell in place when renovating. This helps the environment by conserving resources and reducing wastes and the environmental impacts of new construction. Construction and demolition waste contribute to solid waste going to landfills. In addition, the production of new building materials depletes natural resources and can produce air and water pollution.

Precast buildings are frequently renovated on the inside while maintaining the original building shell. Precast construction provides the opportunity to refurbish the building should the building’s use or function change, rather than tear down and start anew. Windows, floor coverings, partition walls, mechanical systems and plumbing can be replaced, and insulation can be added while maintaining the original precast frame and exterior walls. Older buildings often exhibit superior detail and craftsmanship. Some states, such as North Carolina, provide grants to renovate vacant buildings in rural counties or in economically distressed urban areas. Precast provides a long service life due to its durable and low-maintenance surface. Yearly maintenance should include inspection and, if necessary, repair.

In addition, precast concrete panels can be reused when buildings are expanded. Forms and formwork for precast concrete (molds) are reused. Wood or fiberglass forms can generally be used 40 to 50 times without major maintenance, while concrete and steel forms have practically unlimited service lives. Wash water from ready-mixed trucks or batch plant

operations can be recycled using recycling systems that collect wash water where it can be returned to the ready-mixed drum or batch plant for reuse. Demolished precast structures can be reused to protect shorelines. Fly ash, slag cement and silica fume are industrial byproducts that are used as a partial replacement for portland cement in concrete. These supplementary cementitious materials (SCMs) are industrial byproducts; their use as a partial replacement for portland cement significantly reduces the energy and CO₂ impacts of cement in concrete. If not used in concrete, these materials would take up valuable landfill space. Fly ash is commonly used at replacement levels ranging from 15 percent to 40 percent (depending on type); slag cement up to 60 percent; and silica fume up to 5 percent to 7 percent. When slag cement replaces 50 percent of the portland cement in a 7,500 psi concrete, greenhouse gas emissions per cubic yard of concrete are reduced by 45 percent.

What's the market saying?

There are certain barometer readings that indicate a movement toward LEED certification is required. While it is purely voluntary at the moment, there is strong indication that the rating system will become mandated by the federal government. The president has assigned Ed Pinero, a Federal Environmental Executive, to manage sustainable products in the United States. Pinero is clearly signaling that federal regulations related to carbon footprints are two to three years away, but they are inevitable. For now, the Office of Federal Environmental Executive is in an information gathering mode and desires to establish interagency work groups to develop action plans and proposed legislation.

Other organizations are studying the trends and have provided the following tables:

LEED accredited professionals (cumulative total at year-end)

2007	35,000+ (as of Sept 4, 2007)
2006	27,200
2005	22,302
2004	19,177
2003	5,978
2002	2,443
2001	527

Source: U.S. Green Building Council, October 2006

Who is doing LEED projects?

2006 Registration of LEED projects by ownership category

For-profit entities	36.2%
Nonprofit organizations	19.0%
Local governments	17.2%
State governments	10.0%
Federal government	6.2%
Individual	2.8%
Other	8.6%

Source: U.S. Green Building Council, October 2006

Building Design and Construction magazine just conducted a survey of design professionals to baseline where the "green" concept is headed in the construction industry. The following is an excerpt from this survey:

With regard to green building, which of the following apply to you and/or your firm?

	2006	2004	2003
Firm has attempted at least one project based on green-building principles	45%	47%	49%
Firm has completed at least one project based on green-building principles	36%	41%	34%
Firm has sought certification (LEED, Green Globes) for at least one project	24%	19%	14%
Firm has achieved certification (LEED , Green Globes) for at least one project	20%	13%	11%
Respondent is a LEED accredited professional	13%	16%	4%
Others in my firm are LEED accredited professionals	37%	35%	25%

Base: 872 Base: 400 Base: 332

Source: Building Design & Construction White Paper Surveys, 09/03, 09/04, 09/06

Baseline of Green Building Trends by Industry

Retail (i.e. Wal-Mart, Lowes, Target, Starbucks, banks)	Volume Certification
K-12 Schools	LEED for Schools, launched in January 2007
Industrial Buildings (i.e., automotive)	Ford, Honda, Toyota and GM plants turning to LEED designs
Housing	Healthier house – but is it green?; LEED for homes is coming; NAHB and HBA programs
Restaurants/Chains (i.e., McDonald's)	Consume a lot of energy;
Hospitality/Hotels	LEED for Retail – concerns Indoor air quality concerns: allergies, asthma, irritants;
Colleges and Universities	Green Seal certification 4,216 universities and colleges, 15 million students; greening the campus movement; AASHE – Association for the Advancement of Sustainability in Higher Education
Healthcare	Green Guide for Healthcare; daylighting gaining traction

Source: Source: U.S. Green Building Council, October 2006

Federal agency green building policies

In lieu of government-wide mandates, many agencies and departments have implemented their own green building policies. In fact, the agencies and departments with the most construction activity and largest number of buildings all have policies that address sustainable design and construction. Several agencies have indicated that sustainable design principles shall serve as the foundation for planning, programming, budgeting, construction, commissioning, operation, maintenance and decommissioning of new buildings and for major renovation and alteration of existing buildings and facilities. Many of these policies emphasize the need for energy efficiency, water conservation and life cycle costing. Also, in accordance with policy within some agencies, award programs and training materials have been developed to encourage and raise the awareness of green building. An increasing number of agencies and departments are turning to the USGBC's LEED rating system as the basis for their green design and construction activities.

Some agencies require LEED Certified as a minimum requirement; others encourage LEED Silver as a goal. Many agencies have stated that at least 20 percent of all major construction shall be selected as LEED pilot projects with increasing percentages of projects until fiscal 2009 when all construction projects are to be capable of achieving LEED certification. However, while several federal agencies are embracing LEED as their standard of performance, neither LEED nor any other system has yet been adopted government-wide.

Where will this LEED?

The information mounting around this topic should make precasters feel anxious about the future. No one wants to be mandated into action. The strategy has to be to tell the truth (good or bad) on where we stand. The industry must communicate that "green practices" are our standard practices. The message needs to be across the board without any geographical pockets of acceptance. "Green" precast products and manufacturing should not be viewed as a value-added service but should be looked upon as a core competency of this industry. We cannot just walk into a specifier's office and claim that precast products will gain them 21 LEED points. The points will have to be substantiated through metrics (cement conservation; blast furnace slag and fly ash usage; aggregate conservation; habitat loss; water conservation; life cycle assessment; durability; and others). The fact is that the industry has performed well in these areas without much fanfare. The precast industry is capable of honesty and advocacy on where we stand. We are equally up to pulling away from a technical base response and advocating certain environmental positions. Producers can easily show that we are capable of balancing our environmental awareness in the areas of manufacturing, transportation and operational practices. Look within your own operations.

While the concept of global warming has now been widely accepted, its effects on our climate are still a hot topic for debate within scientific and political circles. An improvement in efficiency is a win-win trend; however, and we do not need to wait for the end of the debate on climate impact to get behind it. The fact is that it's good business. More efficiency means more productivity, better profits and reduced impact.

The choice is ours: Have someone dictate what to do or become proactive in highlighting the truth about precast products. Can we do better? Yes!