Living Up to the Challenge

A Pittsburgh conservatory looks beyond LEED to design a living building

By Rebecca Wilhelm

The Phipps Conservatory and Botanical Gardens has been a Pittsburgh landmark since 1893, when builder Henry Phipps wanted to "erect something that will prove a source of instruction as well as pleasure to the people."

This mission continues to drive development at the conservatory. As part of a multiyear expansion project, the Board of Trustees accepted the Living Building Challenge (LBC) for Phase III, a 20,000-sq-ft administration and education center called the Center for Sustainable Landscapes (CSL) and slated to open to the public next fall.

Aiming Higher

Phipps began the project with U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) Platinum certification in mind. "In the process of designing and building, we started to understand why there were certain requirements, and it really made sense to us," said Richard Piacentini, Phipps' executive director.

The "eye-opening event" that spurred Phipps to strive further than LEED was when Piacentini saw a worker laying tiles for the Welcome Center. When Piacentini inquired why the box indicated that the tiles were made in Turkey, the worker replied, "We already got that [LEED] point."

Seeking beyond-the-building solutions, Piacentini attended a "green" building conference in November 2006 and learned of the LBC. Jason F. McLennan, chief executive officer of the Seattle-based Cascadia Green Building Council, began developing the requirements for what is now known as the "living building" in the mid-1990s.

His concepts were developed into a codified standard—the LBC version 1.0, launched in November 2006. The criteria for the LBC exceeds LEED Platinum certification; when fulfilled, the 16 requirements lead to a building that generates its own energy and processes its own waste.

"It turned out we were already thinking along the lines of a living building," Piacentini said.

Along with the LBC and LEED designations, project goals include "financial sustainability, functional efficiency that encourages team collaboration, building as a teaching and research tool, transferability to the market and a model for 'beyond green,'" according to Sutter Wehmeir, designer for Andropogon Associates Ltd., the firm providing landscape architecture services.

Not a Drop

To meet the LBC, the CSL will be a net-zero water project, "meaning that 100% of all occupant water use must come from water collected or reused on site," Wehmeir said. Also, 100% of storm water runoff must be treated on site. Local code restrictions have led to exceptions in the LBC for potable water.

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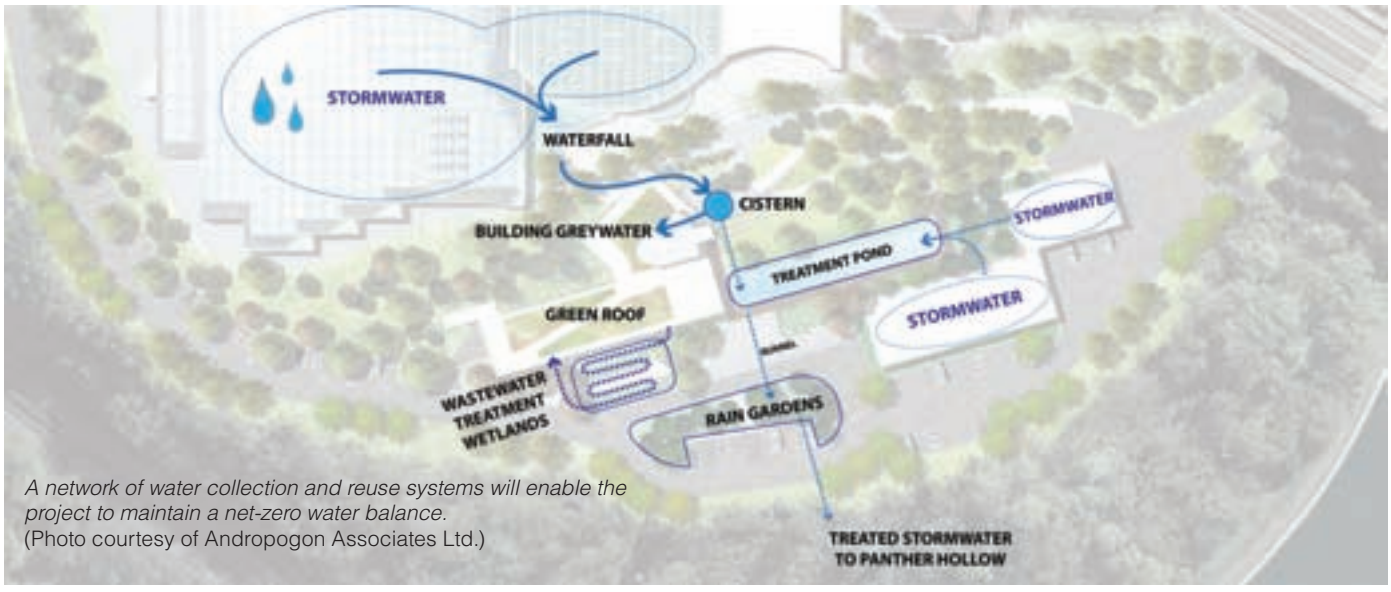

A network of water collection and reuse systems will enable the project to maintain a net-zero water balance.
(Photo courtesy of Andropogon Associates Ltd.)

Rainwater Harvesting

FAQs

What is rainwater harvesting?

The term refers to the process of collecting and storing rainfall and runoff for beneficial use.

Rainwater harvesting systems vary in type and capacity: A residential downspout-to-barrel setup generally accommodates about 50 to 100 gal of water, while large-scale commercial and industrial cistern networks can hold tens of thousands of gallons.

In nonpotable applications, treatment via a first-flush filter, screen or similar device can help purify the water, if desired, and the accumulated supply may be extracted or distributed for tasks such as landscape irrigation, toilet flushing and vehicle washing. If harvested rainwater is to be used for drinking or in certain home applications, special treatment is required.

Why is the practice important?

Harvesting rainwater reduces communities' reliance on surface water and groundwater supplies—an especially valuable outcome in areas experiencing population booms and water shortages.

By lessening the amount of storm water running off impervious surfaces, the technique also reduces sewer system demand, soil erosion and pollutant loads reaching receiving water bodies.

Finally, treating less water—much of which will be used in nonpotable applications—to potable standards helps conserve resources and alleviate costs.

How can a community get its residents and businesses involved?

In areas where law prohibits the practice, gathering public support for regulatory reform is the first step.

Where rainwater harvesting is permissible, public outreach is key to realizing the aforementioned benefits. Workshops, handouts, Web resources and advertising campaigns are among the many educational outlets to consider.

Many communities lead by example, harvesting rainwater at municipal facilities and making the public aware of that fact. Incentive programs, too, encourage citizen and local business involvement by providing post-installation rebates or tax breaks.

Where can I learn more?

Tap the following resources for more information:

- International Rainwater Catchment Systems Assn. (www.ircsa.org)
- American Rainwater Catchment Systems Assn. (www.arcsa.org)
- North Carolina State University (www.bae.ncsu.edu/topic/waterharvesting)

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"The goal is that not a drop of storm water will ever reach a Pittsburgh storm sewer," Wehmeir said, explaining the technologies the CSL will employ to achieve the net-zero water requirement:

- An underground cistern will collect runoff for graywater use in the CSL from the nearby glass-roofed Production Greenhouse.
- A subsurface constructed wetland system will treat blackwater from both the CSL and the adjacent Buildings and Grounds facility.
- Wastewater effluent is treated to tertiary standards and returned to the cistern that supplies the CSL.
- Best management practices include a green roof and a lagoon with a recirculating biofilter that treats runoff without chemicals and provides a habitat.
- Additional rainfall is infiltrated in a series of rain gardens and through porous pavements.

Seeking a Creative Balance

Building in uncharted green territory highlights the need for creative solutions. Sticking to the $11.8-million construction and landscaping budget was important in order to demonstrate the market transferability of sustainable design, but it also required innovative budget solutions from the design team.

The LBC requires the energy for pumping water from the constructed wetlands back to the graywater cistern to be produced on site by renewable sources; this requires more photovoltaic panels or more energy efficiency from other components. Furthermore, because the LBC limits shipping distances for materials, the design team has had to search for locally manufactured or salvaged materials.

Even more important than singling out particular design details of the project is emphasizing the systems approach that has encouraged closing loops, according to Wehmeir. While each component is important, the success of the project and the living building goal, he said, "relies on all components operating in concert and as efficiently as possible from day one." SWS

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