The Plaza At PPL Center: A Study In Green

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In January 2002, contractors broke ground on a 1.5-acre lot in downtown Allentown, PA, to construct an office building for PPL (Pennsylvania Power & Light) Corp.'s overflowing energy marketing and trading department. The proposed building would be only a few steps from the company's art-deco-style headquarters across the street, but miles apart in design. It would be a "green" building, designed to use far less energy than buildings of similar size.

The Decision To Go Green

Headquartered in Allentown, PPL Corp. is a worldwide energy and energy-service provider, with customers in Pennsylvania, the United Kingdom and Latin America. Revenue in 2002 totaled about $5.4 billion. The EnergyPlus unit markets energy to wholesale customers in the U.S., much of which is produced by PPL-operated plants. Despite the complexity of its operations, PPL adheres to an environmental policy that seeks to reduce waste and pollution, and to find sustainable electrical generation and other ways to conserve energy. The policy provides PPL a framework to conduct its business in an environmentally responsible manner.

The Plaza at PPL (above, lower left); Peter Cleff and Roeland Hoeke in the building's HVAC room (above, upper left); and a tree in the building's enclosed winter garden that straddles the 5th and 6th floors (above right).

"PPL decided on a green building for several reasons," says Peter Cleff, manager of energy operations for PPL EnergyPlus and PPL's manager for the green building project. Perhaps most important, he says, is that "environmental responsibility is a fundamental core value." But the green building also made economic sense. Cleff says that from groundbreaking to occupancy, the 252,000-sq.-ft., eight-floor Plaza at PPL Center took 15 months to build. Opened in 2003, its construction costs of $50 million (which included design, construction and tenant fit-out) were "in line or cheaper than what it would have cost to erect an average office building," says Cleff, adding that energy conservation provides a quick payback. Electricity savings alone, he says, are expected to exceed 6 million kwh per year, compared with a conventional building. "Electricity consumption for the Plaza at PPL Center has so far been 30% less than ASHRAE's High-Perfor-mance Building Standard," says Cleff, "and that standard exceeds conventional building performance by 20% to 40%." PPL also believed it was in the company's best interest to construct a building that would be good for its employees. "Green buildings are healthy and productive

places to work," says Cleff. "Their features building should lead to better worker productivity and health. These benefits can help you attract and retain your workforce."

Green Features

The building's sleek form looks modern, almost European in design, but how is it green?

"You can't just claim a building is green," says Cleff. "You must meet standards and provide documentation, and you get points by meeting requirements in each category." The total number of points determines a facility's LEED leadership in energy and environmental design rating. This refers to a set of standards adopted by the U.S. Green Building Council (USGBC), a non-profit group based in Washington, D.C.

LEED standards guide and measure green-building performance in five main areas: site planning; the safeguarding of water and water efficiency; energy efficiency and renewable energy; conservation of materials and resources; and indoor environmental quality. There are four LEED ratings: certified, silver, gold and platinum. The Plaza at PPL Center was awarded a gold. Following are some of the ways the building obtained that distinction:

Lighting. Walking into the Plaza at PPL Center, a visitor is greeted by a warm, orange glow created by rays of sunlight streaming through a central atrium. The feature is a signature of Robert A.M. Stern Architects, the New York City-based firm that designed the building. The atrium illuminates the central entrance area, as well as surrounding corridors and offices. The effect is called "daylighting," one of the many features of a green building. Daylighting serves two purposes: It reduces lighting costs and provides a healthy environment for occupants.

"Hallmarks of the LEED building are energy conservation and daylighting," says Cleff. "You get points for the amount of natural light you use." Because photometric sensors dim or switch off artificial lighting when there is sufficient natural light, electricity costs are reduced. Because of this feature and occupancy sensors that turn off lights in all unoccupied spaces, the building's lighting load is low.

And because most of the building's exterior is glass, the 150 employees seated in the 37,000-sq.-ft. trading floor on the seventh floor, for example, are bathed in natural light. Anybody sitting there can not only see a window, but can enjoy a panoramic view of the region.

The building's center atrium serves a key green function by directing natural light throughout the facility's eight floors.

"A green feature related to daylighting is that 90% to 95% of the occupants have a direct view of a window," says Cleff. "The building has a lot of natural light. It is like sitting in a box of sunshine." Adding to the feeling of "openness," are 15-ft. ceilings. But to ensure that the light does not cause glare on computer screens, the building features brise-soleils (French for "break sun"), which are permanent canopies located outside the building, as well as window shades, adjustable from the inside.
HVAC system. The building's glass skin posed a challenge for the heating and cooling system. According to Roland Hoeke, P.E. for Allentown-based H.T. Lyons, the project's mechanical engineers, the building uses high-R-value glass. But the potentially costly issue of reducing summer heat build-up both from the glass and the demands of the building's 600 employees encouraged them to study several HVAC systems. They settled on a central air-handling system in the basement of the building with a unique ice-making and storage feature. "The chillers make ice at night in the summer, store it, then use the ice and the chillers to air-condition the space," says Hoeke. The design allowed them to use 50% smaller chillers, he says, and the savings have already been significant.
Air quality. Concern about indoor air quality began in the building's construction stage, says Hoeke. "Green building design not only encourages high indoor air quality post-construction, but requires the team to be conscious of air quality during construction." Open ends of fabricated duct were wrapped so dust could not enter the duct systems during construction. Two weeks before occupancy, the building was flushed with 100% outdoor air to ventilate materials that could off-gas after installation. Known sources of indoor pollutants, such as pressed wood, sealants, certain carpeting, and certain paints and cleaning products were avoided altogether. Low-VOC emitting and formaldehyde-free materials, like the R-134a refrigerant, which is free of CFCs and HFCs, were used instead.
To maintain day-to-day indoor air quality, the building features high-efficiency filters, an energy-management system, and a humidification system. Hoeke says the building uses two sets of filter banks, as well as CO_2 sensors that monitor gas levels. "When CO_2 gets to a certain level, the ventilation system introduces more outside air on real-time need," says Hoeke. "We bring in about 20% of fresh outside air on a regular basis." The energy-management system advises the operations and maintenance staff when filters should be changed. The building also exhausts 16,000 CFM (cu. ft. per minute) of air and must introduce at least this level of outdoor air for ventilation, says Hoeke.
"We added a large humidification system to the central air-handling unit, which is more common for a high-tech laboratory or health-care facility than an office building," he says. To maintain air-ventilation levels and save on costs, an energy-recovery unit, located on the roof, preheats or precools outdoor air with energy recovered from the exhaust air. Storage areas for hazardous materials such as cleaners, copier toner and other products, are ventilated directly outside.

PPL manager Pete Cleff views the building's budding 12,000-sq.-ft. roof garden.

Additionally, occupancy sensors in conference rooms and private offices not only control lights, but also the HVAC system for those rooms. "When a room is not occupied, the sensors turn off the HVAC," says Hoeke. "For rooms unoccupied much of the time, this is a significant energy-savings feature that occurs automatically through the building's energy-management system."

Other notable features. By using a variety of water-saving features, including waterless urinals, the PPL building uses 40% less water than it would if traditionally equipped. According to Cleff, the use of waterless urinals alone saves 500,000 gal. of water per year.

Recycling is also a major aspect of the building. Not only was more than 90% of the construction, demolition, and land-clearing debris recycled, inhabitants daily recycle paper, cardboard, bottles, cans, magazines and newspapers.

And for both practical and aesthetic reasons, gardens adorn the south façade of the building and the roof. Two enclosed winter gardens provide work space and also contribute to natural light, control glare, and improve indoor air quality. The 12,000-sq.-ft. roof garden will showcase varieties of sedum perennial plants, which require little water and care, according to Cleff. On the practical side, this garden provides a layer of insulation, and extends the life of the roof membrane by protecting it from ultraviolet rays, changes in temperature, and abrasion. It also absorbs rainwater, which reduces stormwater runoff. The garden changes colors throughout the year, for the enjoyment of employees.

"One of the biggest compliments we can give this building is that it is a very green building, but the occupants don't have to change how they normally work," says Cleff. To the delight of town planners, the benefits of the PPL building have also migrated to the community. Until the construction of PPL green building, there hadn't been business development in downtown Allen-town for nearly 10 years. Since completion of the building, however, an upscale lunch shop behind the building and a bank in the building have opened. Construction is also nearly finished on a new office building across the street, and a second, Class A office building has been announced, with construction to start soon. Construction is in progress on a restaurant/brew pub across the street, and more restaurants are planned.

The building's attractive south-side public plaza has also rendered the site a hub of activity and central meeting place. "The open plaza has become a magnet for children who run through the fountain," says Cleff. Outdoor tables for restaurant patrons are also planned.

"It's a spectacular building," observes Cleff. "Not only did we meet our green goals,

we met our functional requirements as a business." It's clearly a win for everyone.

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