

Case Study



PROJECT CREDITS

Owner

Phipps Conservatory & Botanical Gardens

Architect/Designers

The Design Alliance Architects
Pittsburgh, PA

Vitro Products

Solarban® 60/Starphire® glass
Sungate® 500 Clear/Starphire® glass

Glazing Fabricator

United Plate Glass
Butler, PA

Glazing Contractor

D-M Products, Inc.
Bethel Park, PA

The Center for Sustainable Landscapes is designed to be completely self-sustaining. *Solarban® 60/Starphire®* and *Sungate® 500 Clear/Starphire®* glasses by Vitro Architectural Glass (formerly PPG glass) contribute to an integrated energy management system with advanced low-e coatings that help control heat gain in the summer, trap furnace heat in the winter and maximize daylighting all year round.

Center For Sustainable Landscapes Phipps Conservatory & Botanical Gardens

PITTSBURGH, PA

PROJECT BACKGROUND

The Center for Sustainable Landscapes at Phipps Conservatory and Botanical Gardens in Pittsburgh is seeking to become one of the world's first certified "living" buildings. Developed in 2005 by the Cascadia Region Green Building Council, the Living Building Challenge requires buildings to generate all of their own energy with renewable resources, capture and treat all of their water on-site and use resources efficiently for maximum beauty.

Glass selection was critical to helping the Center meet the certification's rigorous standards for energy use, aesthetics, and human health and comfort. Richard Piacentini, the conservatory's executive director, said Vitro Architectural Glass (formerly PPG glass) products were specified for the project because "we wanted a low-e, high-performing glass that provided state-of-the-art solar and thermal control and energy efficiency, while admitting maximum daylight."

Chris Minnerly, AIA, LEED® AP, principal of The Design Alliance Architects, agreed. "One of the key aspects of glass selection is to balance the solar heat gain coefficient against the visible light transmission to get the best overall performance," he explained. "The glass assemblies had to have the best UV (ultraviolet) transmission in certain light spectrums to facilitate the growth of plants."



Center for Sustainable Landscapes

Phipps Conservatory & Botanical Gardens

Minnerly specified two triple-pane insulating glass units (IGUs) to meet performance requirements in different parts of the building. *Sungate*® 500/clear glass combined with *Starphire*® glass was installed above the sunshade and light shelves, while *Solarban*® 60/*Starphire*® glass was used below.

When combined with *Starphire*® glass in the specified triple-pane IGU, *Sungate*® 500/clear glass has visible light transmittance (VLT) of 63 percent and a solar heat gain coefficient (SHGC) of 0.51, which yields a light-to-solar gain (LSG) ratio of 1.24. *Solarban*® 60/*Starphire*® glass in the same configuration generates an LSG ratio of 1.90, based on VLT of 61 percent and an SHGC of 0.32.

Exceptionally low winter nighttime U-values of less than 0.20 for both configurations are designed to trap heat and keep the plants warm during Pittsburgh's cold winter months.

In addition to being constructed with Vitro Glass products, the center is designed as a long, window-lined rectangle to allow daylight to penetrate into the deepest parts of the interior space. Heating and cooling losses associated with the use of windows (instead of solid walls, which are more thermally efficient, but block sunlight) are offset by a thermal well system that captures about 70 percent of the center's heating and cooling energy from the ground's consistent 57°F temperature.

The remainder of the Center's energy demand is satisfied through solar energy generated by building-integrated photovoltaic cells. Other glass-related energy performance features include:

- Light shelves, louvers and overhangs to minimize summer cooling loads and contribute heat in winter;
- Translucent window shades to reduce nighttime heat losses; and
- *Brise-soleil* screens and internal shades to reduce summer cooling loads and glare from low sun angles.

The 20,000 square-foot structure, which also houses the conservatory's administrative offices and education and research programs, meets all of its energy and water needs without drawing a single watt from the grid or tapping water from the city of Pittsburgh.

In addition to achieving "Living Building" status, the Center for Sustainable Landscapes is designed to meet LEED® Platinum certification for sustainable design and SITES™ certifications for landscapes.

For more information about *Solarban*®, *Starphire*® and *Sungate*® glasses by Vitro Glass, visit vitroglazings.com, or call 1-855-VTRO-GLS (1-855-887-6457).



Sungate® 500/Clear glass combined with *Starphire*® and *Solarban*® 60/*Starphire*® glasses were specified for the Center for Sustainable Landscapes at Phipps Conservatory and Botanical Gardens, with the goal of satisfying the requirements of the Living Building Challenge. The building is also designed to meet LEED® Platinum certification for sustainable design and SITES certification for landscapes.

Piacentini said that the dedication to creating a revolutionary building using exploratory technology will set a new standard for green buildings. "This project helped us to fully understand how the built environment can become one with nature," he explained.

The Center for Sustainable Landscapes received more than \$9 million in support from Pittsburgh-area foundations, plus in-kind expertise, services and product donations from numerous regional businesses and professionals. "The best talent and organizations in the region's sustainable design and construction arena worked on this building," Piacentini exclaimed. "It has been amazing."