


It's Just Our Nature.<sup>SM</sup>



ecological  
Building Solutions<sup>SM</sup>

PPG Glass, Coatings and Paint for Sustainable Design



*"Study nature,  
love nature,  
stay close to nature.  
It will never fail you."*

—Frank Lloyd Wright (1869-1959)



## Sustainable Building

### A New Century of Architecture

Today's architects occupy the leading edge of a growing global environmental consciousness. While the industry's earlier masters were celebrated mainly for the extraordinary design and functionality of their work, the contemporary practitioner is now focused with equal intensity on creating structures that harmonize with the delicate ecosystems they occupy.

Concepts such as *sustainability*, *renewability*, *reclamation*, *upcycling* and *lifecycle analysis*, only marginally understood a decade ago, have become common to the architect's vernacular.

Today, these terms are being codified into a new canon of architectural standards. Perhaps the most widely recognized standards are those administered by the United States Green Building Council (USGBC), whose LEED (Leadership in Energy and Environmental Design) Green Building Rating System™ has gained primacy among governmental agencies, municipalities and major corporations eager to benefit from sustainable building.

The American Society for Testing and Materials (ASTM) also has established ASTM E 2129. This is another recognized standard designed to assess the "sustainability of elements or products" used in commercial and residential construction, as well as a building's overall design efficiency, its impact on the habits of its occupants, and its influence on the surrounding climate.

The ASTM E 2129 standard addresses the potential environmental sustainability of a building project according to five major criteria, encompassing *Materials*,

*Manufacturing*, *Operational Performance of Installed Product*, *Indoor Environmental Quality* and *Corporate Environmental Policy*. Rather than establishing specific standards within each of these categories, ASTM E 2129 poses a series of questions. Answers to those questions demonstrate to what degree a structure adheres to the principle of sustainable building.

While LEED does not certify individual building products, it does recognize that the selection of such products can play a vital role in making a building LEED compliant. PPG manufactures a variety of glass, paint and coating products that can help architects earn LEED certification for their projects. These products also positively address sustainability issues outlined in the ASTM E 2129 standard.

### A Global Commitment

While the growth of *green* building is a relatively new phenomenon, PPG's commitment to environmental responsibility is long-standing. For decades, PPG has been committed to making products and pursuing business practices that help sustain a healthy global environment.

In fact, most PPG building products transcend the LEED standard by addressing long-term economic, quality and manufacturing issues that impact the environment, yet fall outside LEED performance parameters. Many of these issues, such as corporate environmental policy, are addressed in the ASTM E 2129 standard.

On the corporate level, this commitment is articulated through PPG's EHS (Environment, Health and Safety) policy, which fosters partnerships with governmental agencies and environmentally focused groups around the world. These partnerships support programs and meet strict standards for resource conservation, habitat preservation, and cleaner air and water.

A strong environmental awareness also pervades PPG's research and product development efforts, which span numerous industries beyond the architectural field.

For instance, PPG pioneered the development of technologies that help automakers eliminate lead from primer coatings, purge chrome from rinses, cut VOC (volatile organic compound) emissions, stifle the corrosion of metal, and save energy by lowering curing temperatures for automotive paints and coatings.



*Employee volunteers from PPG plants in San Juan del Rio, Mexico, and Monroeville, Pa., catch, tag and release Monarch butterflies to study their migration patterns from Pennsylvania to their winter homes at el Rosario Monarch Reserve, near San Juan del Rio. The effort, which also involves local students and teachers, is part of the North American Monarch Watch project.*

---

Together with 27 other companies in China, PPG's Tianjin, China, coatings facility is a member of the United Nations' Environmental Program (UNEP) Cleaner Production effort.

Our engineers and scientists also have produced environmental advances that intersect with human activity in nearly every moment of daily living.

The result is a vast reservoir of technical knowledge and engineering expertise that enables PPG to translate the environmental advances it makes in one industry into exciting new products that serve another.

## The Benefits are Clear EcoLogical<sup>SM</sup> Glass for Architecture

Glass is one of the architects' most versatile tools. Fused from raw materials that are abundant and inexpensive, glass is a low-maintenance material that has the capacity to retain or deflect the sun's energy, while protecting building occupants from wind, rain, snow and other disruptive environmental forces.

Architects also treasure glass's transparency, which can frame a dramatic view or present limitless color, shape and reflectivity options. Along with its decorative potential, architectural glass also performs two important functions that are critical to sustainable building, LEED and the ASTM E 2129 evaluation process.

### Spectral Selectivity

For sustainable building projects, the ideal architectural glass is one that permits the greatest amount of natural light to enter a building while limiting, to the furthest extent possible, the thermal effects of infrared energy and solar heat gain.

A glass's ability to balance this "spectral ideal" is quantified by its Light to Solar Gain ratio (LSG). Any glass that achieves an LSG of more than 1.25 is considered by the U.S. Department of Energy (DOE) to be *spectrally selective*. This designation became especially significant when the DOE, following a study by the Lawrence Berkeley National Laboratories (LBNL), recommended that all commercial buildings in the U.S. be glazed with *spectrally selective* glass.

Not surprisingly, PPG was a trailblazer in the development of these critical products more than 50 years ago. The company supplied the first spectrally selective glass to New York's landmark Lever House Building in 1952, the first major skyscraper to use tinted glass as a design and environmental control element. PPG also made history 30 years later when it debuted the first Low-E coated product, *Sungate*® glass.

Today, the technologies that originated with these two products are industry standards. The glass featured on the Lever House Building, now known as *Solexia*™, is part of PPG's inspiring *Oceans of Color*™ collection. With LSGs ranging from 1.28 to 1.34, *Oceans of Color* represents the world's most unique and best performing line of spectrally selective tinted glasses.

Meanwhile, PPG's original *Sungate* technology has evolved into two of the industry's most effective and widely specified products, *Solarban*® 60 and *Solarban*® 80 Solar Control Low-E Glasses.

*Solarban* 60 Low-E Glass and PPG's other low-emissivity architectural glass products are especially important to architects seeking to manage infrared heat gain while capitalizing on the benefits of natural daylight. These

versatile, high-performance products can be combined with clear glass—or a complete range of earth- and ocean-inspired tints—to offer clients an unsurpassed selection of aesthetic and solar control capabilities.

Through their exceptional amalgamation of light transmittance and solar control engineering, PPG architectural glasses help architects satisfy LEED prerequisites in nearly every LEED environmental category, but especially those related to energy performance, daylighting and views, and thermal comfort.



*From the luminous emerald-green tint of Atlantica™ glass to the glittering aqua-blue of Azuria™ glass (shown above), the Oceans of Color™ collection offers architects both a stunning palette and the industry's highest performing spectrally selective tinted glasses. For even greater performance, these tints can be combined in an insulating glass unit with PPG Solarban® 60 glass to produce LSG ratings of up to 1.86.*

### The Glass is Always Greener

Lower heating and lighting costs aren't the only way PPG glass enhances the environment. We're making positive contributions through our manufacturing practices as well.

PPG was a leading pioneer in oxygen-fuel furnace technology and one of the first companies to install it on a float glass production line in North America. Today, this technology is in operation at two major PPG glass production facilities.

Thanks to this extraordinary advancement, PPG has cut the amount of fuel needed to make finished glass by more than 15 percent. Carbon dioxide emissions at these two plants also have been reduced by 10 percent and emissions of nitrogen oxide have been lowered by 50 percent. Finally, more than 70 tons of annual hazardous waste has been eliminated from the production cycle in these two facilities alone.

### Recycling

Buildings also can earn LEED credits based on the amount of their recycled content. All PPG glass products contain a minimum 20 percent of post-industrial recycled glass.

What's more, every PPG glassmaking plant is equipped with extensive systems to recover and store discarded glass. Otherwise known as "cullet," these materials are combined with other batch materials during the melting process. A full 100 percent of the unused glass PPG produces internally is recycled into production.

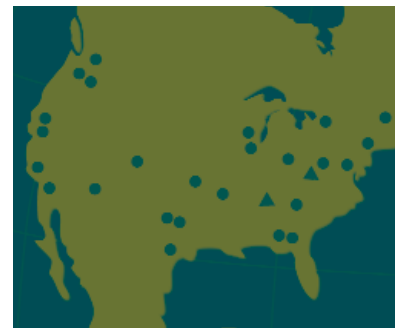
Finally, many of PPG's glass products are shipped in reusable steel cases. As a result, the amount of disposable packaging that accompanies architectural glass products has been reduced from 75 percent to 10 percent.

## Local Sourcing

### PPG Certified Fabricator® Program

At least 20 percent of a project's building materials must be manufactured within a 500-mile radius of the construction site, according to LEED mandates. ASTM E 2129 also advocates efforts to minimize the use of nonrenewable energy in the delivery of building products to the building site.

PPG's Certified Fabricator® Program (CFP) is a network of highly trained and qualified suppliers with fabricating plants throughout the United States. They specialize in the fabrication of high-performance solar control and spectrally selective glasses, such as *Solarban* and *Oceans of Color*.



*PPG high-performance solar control glasses are available through any of 25 PPG Certified Fabricator locations, as shown by circles, and through two PPG Certified Commercial Window Fabricator locations, indicated by triangles. Such broad geographic coverage affords architects the ability to source glass within the 500-mile radius of nearly any construction site, as required for LEED certification credit.*

By purchasing glass from a local *CFP*, architects not only receive the highest possible level of quality and performance from their glass supplier, but they also can claim additional credit toward LEED certification, depending on the percentage of glass material used in their project.

## The Color of Green

### EcoLogical<sup>SM</sup> Paints and Coatings

Indoor air quality is one of the prime areas of emphasis for LEED and ASTM E 2129. Both standards reward products that reduce or eliminate the emission of VOCs in interior spaces. VOCs are common by-products of many commercial adhesives, sealants, paints, coatings and carpets, not just during their initial application, but throughout their entire life span.

## Pittsburgh<sup>®</sup> Paints Pure Performance<sup>™</sup>

### An Environmental Masterpiece

For architects and their painting contractors, the choice used to be difficult. Specify a VOC-free paint that meets strict environmental codes or one that actually stands up to the wear and tear of life in a school, hospital, home or commercial office building.

Today the choice is easy, thanks to *Pure Performance*<sup>™</sup> by Pittsburgh<sup>®</sup> Paints the first high-quality, zero-VOC, low-odor interior latex paint. Since its introduction in 2002, *Pure Performance* has secured its place among an elite pantheon of environmentally progressive products, becoming the first paint ever to earn Green Seal's Class A Certification.

While the LEED guidelines merely require an interior coating to meet a minimum standard for VOC emission, the demands for Green Seal certification are much more rigorous, encompassing a broad range of issues related to energy usage, chemical composition, manufacturing processes, packaging, design, disposal and other lifecycle considerations.

Along with the Green Seal certification, *Pure Performance* also was named one of the top ten "green" building products of 2002 by the GreenSpec Directory and *Environmental Building News* magazine.



*PPG is a two-time winner of the Governor's Award of Environmental Excellence from the Commonwealth of Pennsylvania. Pure Performance<sup>™</sup> paint earned the honor in 2002, while the company's Meadville, Pa., glass facility was recognized in 2003. The plant was among the first in North America to install an oxygen fuel furnace on its float glass production line, which produced significant reductions in greenhouse gas emissions and energy consumption.*

The formulation of *Pure Performance* has led to advances in the development of other low-emission coatings. Interior primers and coatings such as Pittsburgh® Paints *Speedhide*® Commercial Interior Latex and *Pitt-Tech*® DTM (direct-to-metal) Industrial Enamel Primer/Finishes are both LEED compliant.

They also meet Green Seal's GS-11 environmental standard for paints, which are even more stringent than LEED's.

## Beyond LEED

### Durable Exterior Coatings

#### Duranar® SPF Coatings for a Cool Roof. Look at that Color!

The LEED Rating System addresses exterior paints and coatings, but only in terms of their ability to control and deflect heat. For architects specifying pre-finished metal roof panels, that typically meant a limited spectrum of tint choices, from the colorless to the bland.

Now architects wishing to express a more creative vision in their roofing have an ally in PPG's *Duranar*® SPF coatings. Formulated with a proprietary infrared reflective coating technology, *Duranar* SPF coatings allow architects to brighten rooftops with a bold selection of colors, including medium and dark tones, while reaping the heat-reflective benefits demanded from LEED certification guidelines.

These "cool roof" coatings do more than just look good. They also cut cooling costs, extend roof life expectancy and aid in the reduction of heat-related smog. *Duranar* SPF coatings comply with ENERGY STAR® reflectance limits established for low slope and steep slope coated metal roofing products.



### adidas Village

*Converted from an inner-city hospital in Portland, Oregon, adidas Village embraces the principles of sustainability as expressed through thoughtful site selection, the renovation of existing building stock, the reuse of existing building materials, maximum daylight and exceptional energy efficiency. Colorful panels, coated with PPG Duranar and Megaflo coatings combine with PPG architectural glass to communicate a vision of style and creativity intrinsic to one of the world's best known retail brands.*

---

### A Better Way to Make Coatings

PPG's Kaleidoscope Work Cells make coatings in five- to 1,000-gallon batches, the most commonly ordered batch quantities, with a highly precise, computer-controlled dispensing and formulating system. This new and highly innovative process "closes the loop" by recycling and reusing waste products generated during manufacturing. These work cells also are strategically located near coating facilities to enhance our ability to meet customer demands, as well as the LEED mandate for proximity to building construction sites.

Metal roofs coated with high-performance *Duranar* or *Megaflon*<sup>®</sup> coatings outlast many of the buildings they top. If a building with a *Duranar*- or *Megaflon*-coated metal roof is being renovated, that roof can be reused and applied toward the LEED credit earned for extending the lifecycle of existing building stock.

## Corafion™ ADS Coatings

### Breathing New Life into Old Building Panels

Architects restoring weathered exterior building panels can find an environmentally progressive solution in *Corafion*<sup>™</sup> ADS (Air-Dried System). This revolutionary line of colorful fluoropolymer coatings can be field-applied to exterior building elements such as aluminum panels, walls, roofs, doors, window frames, column covers and handrails.

*Corafion* ADS not only earns LEED points for extending building life, but it delivers economic benefits, too. A proprietary cross-link formulation allows *Corafion*-coated panels to last as long and look as good as any factory-made panel. Because of this long life span, building owners may be able to treat renovation costs as a capital investment (rather than a maintenance expense), which can be amortized over an extended period of time.

*Corafion* ADS coatings are the latest evolution of the *Duranar* coatings technology originally developed by PPG more than 30 years ago.

## MegaSeal™ Floor Coatings

### Are you looking for a green floor?

Or a green flooring solution? PPG offers both with its breakthrough line of *MegaSeal*<sup>™</sup> Flooring Systems. A zero-VOC option for industrial floor coating, *Megaseal* self-leveling epoxy is available in an unprecedented rainbow of colors.

The introduction of *Megaseal* Tint Bases means architects can enliven spaces in schools, hospitals, restaurants and retail spaces, while delivering to their clients all the hardworking benefits of a seamless, hygienic, low maintenance industrial floor.

# Environmental Sustainability Then and Now

## Frank Lloyd Wright's Fallingwater®



*Soaring windows frame a magnificent woodland landscape. A steady torrent of crystal clear water tumbles into the quiet cool of a sun-dappled stream.*

*The place is Mill Run, Pennsylvania, home of Frank Lloyd Wright's architectural masterpiece, Fallingwater®. Assembled high on a rocky, water-filled crevice more than 60 years ago, this famed structure presaged the architectural sensibilities of the early 21st century... a time when the modern practitioner is compelled to reconcile the human need for inspired dwellings with an equally powerful compulsion to preserve the environmental sanctity of the places that surround them.*

*At PPG, we are pleased not only to serve as a leading sponsor and technical consultant for the restoration of Fallingwater, but also as a proven developer and advocate of environmental progressive building products.*

## David L. Lawrence Convention Center



*The David L. Lawrence Convention Center in Pittsburgh is currently the world's largest LEED certified building. A varied collection of PPG glass, paint and coatings, including Duranar® fluoropolymer coatings, Solarban® 60 Solar Control Low-E Glass and Pittsburgh® Paints Pure Performance® zero-VOC, interior latex paint harmonize both inside and outside the structure to complement its dazzling riverside setting.*

## PNC Firstside Center



*Shimmering like a jewel on a former brownfield site along Pittsburgh's Monongahela River, PNC Firstside Center was the largest building to earn the Silver LEED version 2.0 rating from the USGBC. A soaring central atrium, skylights and light wells combine to flood more than 90 percent of the structure's 650,000 square feet of working space with abundant natural light. Sungate® 500 Low-E glass and panels, skylights and louvers coated with PPG's Duranar® and Polycron® III coatings contribute substantially to the building's environmental sustainability.*



## Architectural Credits

Page 3 Atlantis Resort  
Paradise Island, The Bahamas  
Wimberly Allison Tony & Co.

Page 6 adidas Village  
Portland, Oregon  
BOORA Architects

Page 8 Photograph of Fallingwater  
used with permission of  
Western Pennsylvania Conservancy

Fallingwater® is a trademark and a  
registered service mark of the  
Western Pennsylvania Conservancy

Page 8 David L. Lawrence Convention Center  
Pittsburgh, Pennsylvania  
Rafael Viñoly Architects

Page 8 PNC Firstside  
Pittsburgh, Pennsylvania  
L.D. Astorino Companies



1.888.PPG SPEC

Glass: [www.ppgglazing.com](http://www.ppgglazing.com)

Industrial Coatings: [www.industrial-coatings.com](http://www.industrial-coatings.com)

Paint: [www.ppgaf.com](http://www.ppgaf.com)

© 2003 PPG Industries, Inc. Megaseal, Pitt-Tech, Pittsburgh Paints Pure Performance, and Pittsburgh Paints Speedhide are registered trademarks of PPG Architectural Finishes, Inc. Atlantica, Azuria, Duranar, Oceans of Color, Solarban, Solexia, Sungate, PPG Certified Fabricator, PPG and the PPG logo, are registered trademarks and EcoLogical Building Solutions, and "It's Just Our Nature" are service marks owned by PPG Industries. Megaflon is a registered trademark of Ameron International Corporation.



Green Building Alliance  
Gold Sponsor



CM101 (11/03)