



SEGD Green Paper

Best Practices, Strategies, and Scenarios for Sustainability in Environmental Graphic Design

Sponsored by ASI with Nova Polymers, Dixie Graphics, and Accent Signage Systems

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Printed on recycled paper with soy-based ink

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INTRODUCTION

The SEGD Green Paper is the result of a collaborative effort by the SEGD Green Committee, a group of active SEGD members including designers, fabricators, and materials manufacturers. The committee began as a group of individuals working on their own, in areas such as leadership in other green organizations, development of green products, and development of green design practices in their own firms. This group pooled their unique talents to create the educational program outlined in this document.

During initial SEGD Green Committee meetings, it became clear that developing a “green guide” to environmental graphic design would be a huge challenge. How should we address other green organizations such as the U.S. Green Building Council? What about materials, methods, and innovations that have not been tested effectively? How do we educate designers and fabricators without offering prescriptive solutions?

The group decided to address these challenges by creating The SEGD Green Paper, designed to provide a strategic framework, resources, and inspiration for promoting sustainability in EGD. The SEGD Green Paper is the counterpart to SEGD's earlier publication, The ADA White Paper, and represents another benchmark in SEGD's continuum of providing educational resources to the EGD community.

PART 1 | The Green Revolution

When the first Earth Day was celebrated on April 22, 1970, many people assumed we would have everything shipshape within a decade. Thirty-seven years later, there is a growing consensus that we are approaching a worldwide environmental crisis. Fortunately, however, the green revolution has moved into the mainstream.

Americans continue to be the greatest consumers of energy and materials in the world. Our buildings alone consume 70 percent of our electricity, produce 65 percent of our waste output, devour 55 percent of our virgin wood resources, create 30 percent of our greenhouse gas emissions, and guzzle 25 percent of our potable water resources.

But we now also have more than 25,000 architects, engineers, designers, real estate professionals, environmental graphic designers, and others certified to design, build, and operate greener buildings and environments through the U.S. Green Building Council's (USGBC's) Leadership in Energy and Environmental Design (LEED) green building rating system. Hundreds of towns, cities, counties, and states are actively promoting the construction of new buildings and the retrofit of existing ones to green standards. A dazzling array of market incentives includes tax credits, expedited permitting, low-cost loans, and density bonuses.

Thanks to forward-thinking organizations that have opened up their books, we have the data that proves building and operating green translates to green in the bank. Numerous ongoing studies show that the wise selection of materials, site-specific energy-efficient design, and smart use of naturally available daylight, wind, and rain lead to buildings and environments that are significantly more cost-effective and healthier than those that are conventionally designed.

As members of SEGD, we have the potential to impact environmental graphics, packaging, signage, retail environments, and more. The majority of our projects live in architectural environments. By rethinking how we approach their design and fabrication, we can add to their sustainability. Through The SEGD Green Paper, SEGD is taking a leadership position in environmental graphics by providing resources on best practices, strategies, and scenarios for sustainability.

We would be wise to remember the words of German writer and journalist Hermann Löns, who said in 1908: “In the future, our main concern will no longer be whether we can travel to every place on earth. Our main interest will be whether it is worthwhile arriving there.” SEGD challenges you to join the green revolution and help ensure that, collectively, we create destinations that are worth reaching. And that we leave a healthy and hospitable environment for our children's children.

PART 2 | Key Green Issues for SEGD Members

The needs of the environmental graphic design community are different from those of the building community and, likewise, our sustainability issues are unique to the EGD field. Considerations such as longevity, materials selection, design and manufacturing processes, graphic quality and sustainability, and durability are key factors in green strategies to address EGD.

Longevity as a key driving factor

Most buildings and finishes are built to last 20 to 30 years or more. Environmental graphics generally have a much more variable lifespan, from as brief as a few days to as long as 50 years. Changes in longevity determine changes in strategy.

Selection of materials and processes as the key to longevity and sustainability

Most experts in sustainability believe that the use of green-certified materials is only one small part of a sustainable strategy. The most sustainable approaches are related to general material selection, the fabrication process, and final disposition.

Graphic quality and sustainability

Most environmental designers and their clients do not want to sacrifice graphic quality or aesthetic impact for sustainability. However, sustainability is not incompatible with high design.

Cost issues

Clients are concerned about green products and approaches driving up project costs and maintenance. Through careful management and appropriate material and process selection, green approaches can have a minimal impact on overall budgets. For more permanent environments, specifying sustainable systems such as energy-efficient lighting can result in long-term savings.

Relatively minor materials use vs. visibility in the built environment

In many cases, environmental graphics do not play a significant part in the overall material use in most buildings. However, EGD elements and systems are very visible to the public, providing direction, information, branding, and education, including opportunities to highlight an environment's green attributes and systems. In some environments (such as tradeshow booths, exhibits, and retail) EGD can drive the design, offering an opportunity to choose sustainable solutions for materials, lighting, and all other aspects of the built project.

Design and manufacturing process as a key area for change

Most designers are not aware of the manufacturing processes involved in the development, fabrication, and shipment of signs and other EGD components. This knowledge, unlike that in many other industries, is easily accessible. Designers should make an effort to participate in manufacturing decisions, recommending more sustainable processes and materials. The way a project is designed can be a significant contributor to sustainability. Knowledge sharing between designer and fabricator must be more integrated.

Air and water quality impact in a large role

Environmental graphic design projects use chemicals, sealants, vinyl, and paints, all of which can have a direct impact on the environment. Manufacturing processes and chemicals can influence the longevity of the end products. Low-VOC (Volatile Organic Compounds) paints and water-soluble products can reduce negative effects as long as these products are carefully handled and contained during and after application.

Modularity as a key component of EGD leadership

Modular products and services can be among the most valuable areas of leadership for environmental graphic designers and fabricators. Modularity is also a key factor in sustainable design. Mechanical elements that allow signs to be more easily changed and broken down into their component parts simplify recycling.

Green building interpretation

Most LEED-rated projects require an interpretive exhibit communicating the green aspects of the project. EGD may be a small part of the building process, but an interpretive exhibit on the sustainable processes and materials used provides a big opportunity for environmental graphic designers.

10 Things You Can Do Now to be Green in EGD

The key is an ongoing strategy unique to the longevity, maintenance, and durability needs of an EGD project. But regardless of project specifics, EGD professionals can immediately improve the sustainability of any project by taking the following steps:

1. Don't segregate sustainability from design.
2. Specify locally sourced, sustainable materials that can be recycled.
3. Integrate green communication strategies.
4. Do more with less. Design for less waste.
5. Design easily recycled modular components.
6. Use screws instead of glues for assembly and mounting.
7. Use low-VOC paints and energy-efficient lighting.
8. Get to know one green product at a time.
9. Ask questions and share information on the SEGD Green Resource Guide at www.segd.org.
10. Integrate green standards for fabricators into RFPs.

PART 3 | Understanding Sustainable Rating Systems

There are many different, often competing, green rating systems by which to evaluate projects, products, and materials. Components may include sustainability through design, material selection, manufacturing, construction, siting/installation, and disposal. Some rating systems have been created by manufacturing trade organizations to promote products, evaluate materials, and encourage energy/water conservation. Others are from organizations that focus on architectural projects. Certifications may be encouraged by governmental tax credits and other incentives.

Because environmental graphics projects are usually part of an architectural environment, the following rating systems are most applicable.

LEED (Leadership in Energy and Environmental Design)

- ◆ Developed by the U.S. Green Building Council (USGBC)
- ◆ Largely adopted in the United States
- ◆ Voluntary standard to define high-performance green buildings, residences, sites, and neighborhoods
- ◆ Becoming a LEED-accredited professional (LEED-AP) requires passing a USGBC exam
- ◆ Includes rating categories for retail, schools, and healthcare environments
- ◆ Points are awarded for achievement in six categories:
 - Sustainable sites
 - Water efficiency
 - Energy and atmosphere
 - Materials and resources
 - Indoor environmental quality
 - Innovation and design process

- ◆ Projects/buildings are certified through a progressive rating system based on the total number of points awarded across all categories. Projects require significant documentation for evaluation, which can be costly. Rating is in one of four categories, from basic to innovative:
 - Certified
 - Silver
 - Gold
 - Platinum
- ◆ EGD designers and manufacturers can participate and contribute to the pursuit of certification credits in a number of categories as members of a project team. Some of the opportunities for EGD designers include:
 - Sustainable Sites
 - Light Pollution Reduction (SS Credit)
 - Energy and Atmospheres
 - Minimum Energy Performance-Lighting (EA Prerequisite 2)
 - Optimize Energy Performance (EA Credit 1)
 - Renewable Energy (EA Credit 2)
 - Materials and Resources
 - Construction Waste Management (MR Credit 2)
 - Resource Reuse (MR Credit 3)
 - Recycled Content (MR Credit 4)
 - Local/Regional Materials (MR Credit 5)
 - Rapidly Renewable Materials (MR Credit 6)
 - Certified Wood (MR Credit 7)
 - Indoor Environmental Quality
 - Low-Emitting Materials (EQ Credit 4)
 - Innovation and Design Process
 - Innovation in Design (ID Credit 1)
 - LEED Accredited Professional (ID Credit 2)

BREEAM (Building Research Establishment Environmental Assessment Method)

- ◆ Developed in England
- ◆ Primarily adopted in Europe and the EU
- ◆ Based largely on research and life cycle analysis data on specific building systems and types
- ◆ Assesses buildings against a set criteria; the score is based on assessments made at various times in the design through construction process. This score falls within a band providing either a Pass, Good, Very Good, or Excellent rating.

GreenSource

- ◆ Not a rating system; this website and magazine are published by McGraw Hill Construction
- ◆ A good source for researching green products, current thinking, and innovative approaches to sustainable strategies

Third-Party Certification Entities: How Green are Your Green Materials?

- ◆ Forest Stewardship Council certifies sustainable forest management and wood harvesting.
- ◆ Greenguard Environmental Institute verifies low-emitting interior products and materials.
- ◆ Scientific Certification Systems certifies recycled content and low-emitting materials.
- ◆ Green Seal certifies low-VOC paints and adhesives.

Clean Air and Water Act

Cities, states, and institutions can establish their own clean air and water policies. These policies generally focus on two areas: low VOC in paint, adhesives, and materials, and proper disposal of VOC materials during fabrication and construction.

Advocacy Groups

- ◆ Many cities and institutions require specifications on the ability to recycle and dispose.
- ◆ In many parts of the Southwest, dark-sky advocates promote low-light sources for signs to reduce light pollution, which interrupts astronomical observation and bird migration.
- ◆ Clients are demanding efficiency, longevity, and disposability.
- ◆ Clients are demanding more specific data regarding the energy efficiency of lit signs, the longevity of signs, and the ability to dispose of signs without adversely impacting the environment.

PART 4 | Strategies for Green EGD

The SEGD Green Paper proposes five strategies to incorporate sustainability into environmental graphic design projects, products, and methodologies. These strategies are not meant to provide a specific guideline for the use of a material, but are intended to provide a framework for asking questions about specific processes and approaches. These strategies, combined with the Green Audit described in Part 5, provide the framework for the SEGD Green Resource Guide, an updatable web-based resource for materials, methods, and projects that utilize green approaches (available at www.segd.org).

Key Decision: Determine Longevity

The five strategies for green EGD are built around a central theme in environmental graphic design, signage, and exhibition design: longevity, or performance over time. Determining how long a design object is meant to hold up over time and with constant use in its specific environment will determine the most appropriate materials and methodologies. Longevity is determined by answering the following questions:

How can you design for longevity?

Longevity may be a consideration in achieving sustainability. Projects meant to survive for long periods of time should incorporate materials that will not weather or degrade quickly in the environment. Short-term projects can include a wide variety of materials that are easy to salvage, recycle, or reuse.

How long is the object's useful life?

The lifetime of an object is the key factor in developing an environmental strategy. Long-life objects must be designed to decompose slowly and with minimal harmful effect on the environment and surrounding surfaces. Recyclability and waste management take a secondary role unless the object is meant to be changeable. Long-life objects need user educational programs to ensure quality management and maintenance over a long period. Short-life objects require more extensive planning for reusability and recycling, along with greater instruction on how to accomplish these goals.

Where is the object located?

For an object to be sustainable it must fit properly into its intended environment. Many outdoor environments are particularly harsh on graphics and signage systems. If the object cannot survive its intended lifespan, frequent replacement will destroy any other gains in sustainability. Flexible sign systems enhance sustainability by incorporating changeability, which adds to the life of the system.

How often will the object be changed, assembled, or disassembled?

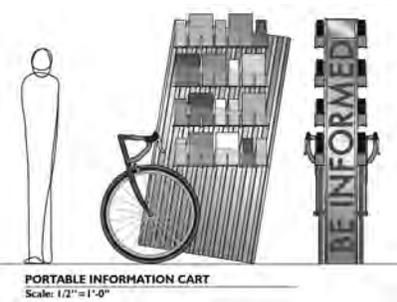
Changing information requires a much greater degree of planning to ensure long-term sustainability. Some objects merely serve as a long-term frame for temporary graphics. Different levels of change will require different environmental strategies. Mounting and modular assembly strategies can greatly facilitate change over time.

If the project is temporary, how will it be disposed of or recycled?

If a project is meant to have a limited lifespan, a plan needs to be in place for the salvage, reuse, or recycling of materials. This affects many considerations, including selection of materials, finishes, manufacture, and assembly/disassembly.

What is the application?

While there is no specific LEED policy or code on longevity, it should be considered in projects that are exposed to the elements and extreme wear and tear. Often, longevity requirements are at odds with recyclability and clean air issues, but are at the heart of environmentally sound design.



Tempe Transportation Center Sign Program (Thinking Caps)
Longevity is the key strategy behind sustainability. How long a project is intended to last influences the design and materials specified. The sign program for the Tempe Transportation Center uses 100% recycled elements, but is designed to last a long time with its simple use of easy-to-find materials (like old bicycle tires and LED boards) and flexibility in placement and storage.

Strategy 1: Air and Environmental Quality

The purpose of this strategy is to select products and processes that contain reduced levels of VOCs, which emit pollutants into the air. VOC levels can be reduced during the final sign or exhibit installation process or during the manufacturing process. Materials that require harmful chemicals during fabrication or installation should have extensive specifications in place dictating the appropriate disposal of chemicals.

VOC rules are part of the federal Clean Air and Water Acts of 1990, but states vary in enforcement. For example, California, New York, and Illinois have very strict enforcement, while Utah has minimal enforcement. VOC rules are also strictly enforced by many institutions, including universities and hospitals. Standard paint uses 5.5 to 6.5 pounds VOC per gallon, while low-VOC paint may use 3.5 pounds per gallon. California mandates 2.8 pounds per gallon. There are also VOC-free paints.



Coraflon and Powder Coating (PPG Industries)
New powder-coating techniques and paints achieve low-VOC standards with minimal paint use. Coraflon by PPG is an example of a no-VOC coating used in architectural and sign applications, such as those at the William J. Clinton Presidential Library.

Strategy 2: Resource and Waste Management

Resource and waste management occurs during many stages in the life cycle of built objects. Considerations include sourcing local materials; specifying materials with recycled content; designing within standard material dimensions to limit waste during manufacturing; removing harmful chemicals in the fabrication process; reusing or recycling packing and other materials during installation; and planning for eventual end of life of the object itself. One of the best strategies is using less material in production.

Requirements in this area usually come from the client and institution, most likely involving installation and end of usable life decisions. This factor arises frequently in exhibitions and displays that are broken down regularly, requiring the use of extensive packing and shipping materials. LEED focuses on the selection of materials with recycled content, including special accommodation for upcycled materials and materials from sustainable forests.



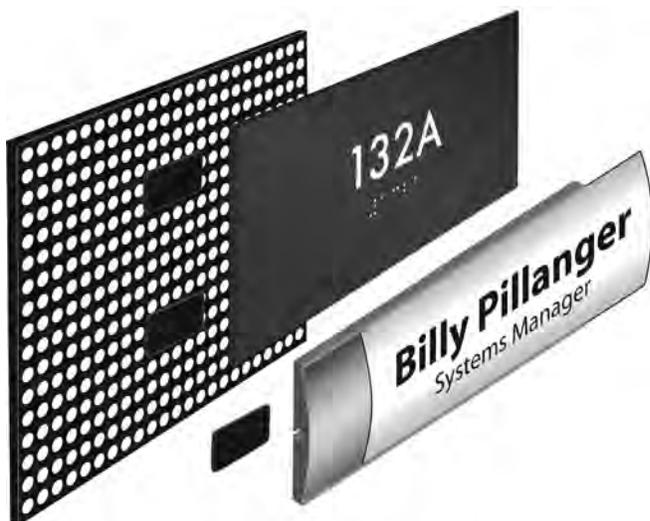
Precision Signs

The fabrication process is one of the areas where sustainable methods can have the biggest impact. Gary Anzalone of Precision Signs, also vice chair of the New York Green Building Council, has turned his shop into an area of experimentation for green processes. Clear disposability guidelines, labels for returning manufactured items for recycling, use of mechanical connection techniques rather than adhesives, and low-VOC paint processes are some of the methods they have implemented.

Strategy 3: End of Usable Life Management

The salvage, reuse, and recycling of materials and project components allows them to be converted from their present form to another use at the end of their usable life. Some materials can be upcycled or converted to an equal or higher use (for example, soda bottles become banners) while others are downcycled (e.g., wood signs or shipping crates become wood chips). Determining a strategy for end of usable life management and documenting this strategy ensures that the elements of an EGD project don't end up in a landfill.

LEED focuses on having a salvage, recycling, and reuse plan in place when selecting materials. Fabricating elements with modular components that use mechanical fasteners instead of adhesives facilitates disassembly and recycling or reuse.



Infinity modular sign system (ASI)

Modularity is an effective approach to sustainability, as it allows signs to be repeatedly changed and updated, then broken down to simplify recycling of the individual parts. The key to the Infinity modular system is a special perforated chassis that, combined with a patented pin registration system, ensures durability even after multiple modifications.

Strategy 4: Energy and Lighting Efficiency

Energy efficiency is embodied in a material or process that uses less than conventional amounts of energy when manufactured, installed, and used. Energy efficiency is impacted by lighting efficiency, the minimization of light bleeding into the air, and energy used in shipping and delivery of materials.

LEED addresses energy efficiency, including regulations for sourcing local materials and installation, energy conservation, and energy use during manufacturing. Clients are demanding this information as part of audits to spot potential cost savings. LEED also covers lighting efficiency; LEED points are given to low-energy illumination systems such as LEDs and photovoltaic-powered systems.



Solar Street Sign (MSD Visual)

Solar power is an ever-improving technology that will revolutionize municipal sign lighting in cities. This solar street sign has internal LED illumination, a thin-line amorphous/crystalline solar cell module with built-in rechargeable battery pack, and a smart control system. It can hold a charge for up to 19 days, even with no sun. Not only do solar-powered signs use no generated electricity, they save materials by requiring no digging or rearrangement of utilities.

Strategy 5: Education and Interpretation

The sustainable aspects of a project are often not immediately apparent to the average user. Providing an interpretive exhibit or educational signs and materials that outline the green aspects of the project not only serves as a record of accomplishment, but also provides an advocacy model for designers and manufacturers who want to advance specific technologies and methodologies. Educational manuals and exhibitions also provide a record of the sensitive maintenance and update of the design over the life of the system or environment.

One LEED Innovation Design point is earned for providing interpretive or educational content describing how the project serves the environment. Many building owners and clients want to exploit the attention they receive for backing a green building approach, and green educational program requirements are written into more and more RFPs.



Big and Green: Toward Sustainable Architecture in the 21st Century (Pure + Applied and James Hicks)

This exhibition not only interprets leading green architectural processes, it also practices what it preaches. Graphic images are printed on DuPont™Tyvek® instead of foamcore. Materials such as silk, cardboard tubes, and reusable hardware are used instead of the normal mix of glued, laminated, and permanently assembled materials.

PART 5 | The Green Audit

The purpose of the Green Audit, based on an audit by Naomi Pearson of Pentagram, is to articulate the green strategies employed and provide a consistent format for documenting green projects, processes, and materials for future reference. This sample audit includes a list of materials and methodologies that the SEGD Green Committee has identified as potential resources for green projects.

In developing a Green Audit, it is helpful to look at the growing number of green resources that go well beyond websites and guides. Consider materials libraries such as Material ConneXion, green building suppliers, trade magazines, vendors, sustainability presentations, and recommendations from other design professionals. Include traditional EGD materials, but also consider non-traditional materials that may require creative thinking but could be appropriate for the right project.

This audit is one example of how information can be analyzed, collected, and tailored to each user or company's needs and industry type. Recommended steps in the development of a sample audit follow.



Bamboo Substrate with Glass Panel Sign (Naomi Pearson and Visual Graphic Systems)
This demonstration sign illustrates multiple green strategies. It includes the use of a natural, rapidly renewable material with a low-VOC binder, a solvent-free direct print process, and recyclable and low-VOC modular materials. The keys to sustainability are the materials, the ease of disassembly for flexibility over time and recycling, and use of green adhesives.

Step 1: Focus

Describe the focus of the Green Audit, including its framework and goals, such as:

- ◆ A project utilizing green materials and methods
- ◆ A green project integrated into a larger project
- ◆ A specific green methodology
- ◆ A green product
- ◆ A comparison between two methodologies, materials, or scenarios

Step 2: Longevity

Describe the lifespan and performance of the project, material, or methodology being established under the following conditions:

- ◆ Indoor or outdoor environment
- ◆ Wear and tear during use
- ◆ Maintenance and cleaning

Step 3: Strategies

Describe the effectiveness of the project, methodology, or material based on performance specifications in one of the key strategies. It is important to analyze weaknesses as well as strengths, as most of these materials or processes are strong in one area and weak in another.

The following is a list of strategy areas and associated materials and methods that have been utilized (but not analyzed). This information has been gathered from other organizations and may not be pertinent to all EGD applications. Also, there are far more materials and methods than could be included here.

Air and Environmental Quality

- ◆ Low- or no-VOC paints and stains
- ◆ Water-based adhesives
- ◆ Long-lasting paints or finishes for exterior environments

Properties of Finishes Used

- ◆ Powder-coat paint application (low-VOC, applied with electrical charge and no solvents)
- ◆ Anodizing (water-based chemicals, recyclable by-products)

By-Products of the Manufacturing Process

- ◆ Eco-conscious disposal of vapors, chemicals, and scraps
- ◆ Maximization of sheet material dimensions, minimization of scrap waste
- ◆ Product shipment with minimal, eco-friendly packaging
- ◆ Recycling of excess material or waste produced during manufacturing
- ◆ Eco-conscious engraving process
- ◆ Chemical etching with sustainable waste disposal plan
- ◆ Re-use of chemicals used in chemical engraving
- ◆ Mechanical engraving
- ◆ Water jet

Eco-Conscious Printing Processes

- ◆ Dye sublimation inks (heat transfer process instead of toxic solvents)
- ◆ UV-curable inks
- ◆ Organic-based inks (e.g., corn-oil-based BioVu™ inks, other vegetable oils, linseed oil, soy oil)
- ◆ Water-based inks

Clean Air and Water Standards

- ◆ No or low-VOC content, including adhesives (e.g., Plyboo® Plywood, Evergreen Polyester, glass, metal)
- ◆ Materials approved in an independent third-party sustainability assessment
- ◆ FSC-certified materials (e.g., PaperStone)
- ◆ SmartWood approval of materials and methods
- ◆ Rainforest Alliance approval of materials and methods
- ◆ Greenguard Environmental Institute approval of materials and methods
- ◆ Green Seal approval of materials and methods (e.g., EcoSpec by Benjamin Moore)
- ◆ Healthy building materials

Resource and Waste Management/Recycled Content

- ◆ Aluminum 5052 or 6061
- ◆ Stainless steel 304 or 316
- ◆ Plastic (e.g., Tenite cellulosic plastics, 3form's Ecoresin™)
- ◆ Composite (e.g., PaperStone, Agriboard, 3form's 100 percent)
- ◆ Yemm & Hart polymer sheets, QuikaBoard®
- ◆ Rubber (e.g., ECOsurfaces)
- ◆ Natural fabric (e.g., Eco Fab)
- ◆ Wood (e.g., PureBond, Quickbond)
- ◆ Wheatboard (not recycled)
- ◆ Bamboo (not recycled)
- ◆ Precast concrete
- ◆ Paper
- ◆ Cardboard
- ◆ Glass

Recyclable

- ◆ Metal (e.g., steel, aluminum, brass, bronze, copper, zinc, gold leaf)
- ◆ PET plastic
- ◆ HDPE plastic
- ◆ Composite (e.g., Quickbond, Cemstone)
- ◆ Photopolymer
- ◆ Polycarbonate (e.g., Lexan)
- ◆ Concrete

Natural Material

- ◆ Cork
- ◆ Cotton (organic, non-bleached)
- ◆ Wood
- ◆ Silk
- ◆ Glass

End of Usable Life

- ◆ Rapidly renewable source
- ◆ Biodegradable (e.g., wood, cork)
- ◆ Minimally processed (e.g., wood, plant products, stone)
- ◆ Maximized material use (e.g., eliminate substrates, minimize physical substance)
- ◆ Ease of disposal of by-product waste during fabrication (e.g., aluminum, hardwoods, photopolymer, phenolic digital prints)

Assembly/Ease of Disassembly

- ◆ Mechanical hardware used instead of adhesives
- ◆ Easy-to-remove adhesives for material recycling
- ◆ Recyclable materials easily disassembled for recycling

Energy and Lighting Efficiency

- ◆ Daylighting
- ◆ LED (Light Emitting Diodes)
- ◆ Fluorescent lighting (low mercury levels, long lasting, low energy) T8, T5, T2, T12
- ◆ Ceramic halide lamps (65-115 lumens per watt, more efficient than incandescent, fluorescent or mercury vapor lamps)
- ◆ Internally-illuminated signs
- ◆ Fiber optics (low-energy controllable lighting feature)
- ◆ DALI (Digital Addressable Lighting Interface) or dimmer (set at 80 percent)
- ◆ Dark skies consideration (minimal light pollution, minimum impact on bird migration)

Material Source

- ◆ Locally sourced materials
- ◆ Local fabrication
- ◆ Materials sourced within a 500-mile radius of site (as specified by LEED)
- ◆ Signage fabricated within a 500-mile radius of site (as specified by LEED)
- ◆ Re-use of existing signage materials
- ◆ Use of reclaimed materials (e.g., bricks, wood, hardware, panels)

Modularity/Flexibility

- ◆ Adoption over time, minimizing the need for replacements
- ◆ Re-positionable elements (e.g., GeITac)
- ◆ Removable/adjustable modular parts, allowing for modification
- ◆ Energy in production
- ◆ Minimize energy used in production (e.g., hardwoods, photopolymer acrylic, Lexan, anodizing, powder-coating)
- ◆ Minimize energy used for material manufacture (e.g., zinc, steel, Smile Plastics)

Education and Interpretation

- ◆ Manual and guidelines for material disposal or recycling
- ◆ Integration of an exhibition on green benefits/approaches
- ◆ Packaging of materials to explain green qualities
- ◆ Educational outreach efforts

Step 4: Challenges

Describe any potential conflicts that one of the green strategies may have with another. Also identify specific conditions under which the green process or methodology would have the best effect. For example, some materials may be environmentally sensitive only under certain conditions and in combination with certain other materials; these should be listed.

Step 5: Comparison (Optional)

Compare different materials, products, and approaches. Comparisons provide a framework for understanding how different approaches operate under different conditions.

PART 6 | EGD Scenarios using Green Practices

The following scenarios illustrate how the five green strategies described in Part 4 and the materials and methodologies comparisons in the sample audit from Part 5 can be used in real-world applications.

Each example describes how strategies were considered and ultimately resulted in a more sustainable approach to the design and fabrication process. Not all strategies apply to all projects, and important considerations such as client goals, budget constraints, and materials availability must be factored into the decision process and the ultimate solution.

Green Project: prAna Tradeshow Exhibit

prAna, a yoga and climbing apparel designer/manufacturer with a deep sense of responsibility to nature, the earth, and sustainability, took a risk in redefining its tradeshow exhibit experience. Gensler's design for prAna's 2,400-sq.-ft. tradeshow exhibit space is a delicate balance of the organic and the sophisticated. The exhibit structure reinforces prAna's mission through the use of sustainable, recycled, and natural materials and fabrication techniques. The "permeable" quality of its hemp rope walls, the use of informal stage platforms and seating, and rolling plywood display walls provide the flexibility to comfortably accommodate up to 300 people.

The Gensler design team and manufacturer MSL Productions employed several green strategies in the design and fabrication of the prAna booth:

- ◆ *Longevity.* Tradeshow materials must be durable, but the total life of the prAna booth was only nine months. Where possible, sustainable materials were selected based on how much potential abuse they would experience in the tradeshow environment, costs, and quick turnaround times for design/manufacture and recyclability. Gensler sourced readily available natural hemp rope to surround the booth and provide a semi-permeable glimpse into the space.
- ◆ *Air Quality.* The booth's few hard display walls were made from natural finished plywood and a repurposed shipping container, eliminating the need for plastic laminate and adhesives typically employed in tradeshow exhibit fabrication. Air quality was further enhanced by using a low-VOC paint finish on the repainted metal container and assembling most of the booth components with fasteners rather than adhesives.
- ◆ *Resource, Waste Management, and End of Usable Life.* The entrance sidewall was actually a repurposed 40-ft. shipping container split in half. It served as background for a display platform and a perch for the company's partners to present their programs. This unit doubled as the shipping container for the booth components, significantly reducing crating and transport waste. The shipping container steel, wood components, and hemp rope walls were completely recycled at the end of the booth's life.
- ◆ *Energy Efficiency.* Lighting design included color-corrected compact fluorescent lamps to reduce energy consumption, though some energy-intensive incandescent spot lighting was used for focal display emphasis. A mesh screen hanging over the space blocked out the sodium vapor lighting coming from above the booth.
- ◆ *Challenges.* Tradeshow booths are not the most ecologically minded creations. They are designed to be transported across great distances and then disposed of at the end of their use. But the prAna booth traveled to a number of conventions, and most of its components were recycled when it was retired. By virtue of its design, it was voted "best of show" at the Outdoor Retailer Summer Market '06 and became a powerful example of how the tradeshow construction industry and sustainability can successfully coexist.



For the prAna tradeshow booth, Gensler and MSL Productions used sustainable, recycled, and natural materials and fabrication techniques. Hemp rope walls provide a permeable space divider and a repurposed shipping container doubles as a sidewall and the booth's packing crate.

Green Material: Recycled/Recyclable Polypropylene

Products such as EcoSpun are created from the 100 percent recycled polyester of soda bottles as well as other recycled post-consumer products. The bottles are refined and purified, chopped up, and spun into fiber strands called Ecophab™. These strands are then woven or knit at one of two mills in the United States. Banners, awnings, and other fabric/alternative structures are some of the product's applications in EGD. It is important to specify soy or water-based inks with EcoSpun, as solvent-based inks compromise the recycling process.

- ◆ *Longevity.* Since this product is new, there is not a great deal of research on longevity under outdoor conditions. Some fabricators have commented that the material does not wear well under the harshest outdoor urban conditions, including ultraviolet light and pollution. It is most often used indoors, where air quality is the biggest factor. The material is flame retardant and has strong tensile strength, so it holds up well in interior conditions that require extensive rolling and mobility.
- ◆ *Air and Water Quality.* EcoSpun contains no chlorine or other halogens. It is non-toxic, producing neither dioxin nor other highly toxic materials. It is produced by a clean manufacturing process, with production waste recycled. The base material is non-toxic and does not contain chlorine or halogens. Water-based inks can make a clean banner with no out-gassing, albeit with a potential for weathering and runoff in outdoor environments.
- ◆ *Resource, Waste Management, and End of Usable Life.* Upcycled, the material is produced from soda bottles and other plastic recycled items. It is a polyester directly derived from these items. Banner material made from this material is disposed of in the same way as plastic bottles, as part of curbside recycling available in most jurisdictions. It is important to tell your specific recycling center that this material can be taken along with clear plastic bottles.
- ◆ *Energy Efficiency.* This low-energy process consumes less energy than the manufacture of paper substrates.
- ◆ *Education.* It is important to include information on recycling with instructions on the use of the material, since its appearance is not visibly different from other (non-recyclable) materials.
- ◆ *Challenges.* There are very few environmental conflicts from this material as long as water-based inks are used during the printing process. It has yet to be tested under all real-world conditions, but for temporary interior applications, it is considered effective and environmentally friendly.



For the Minnesota State Fair's Eco Experience Exhibit in 2006, Banner Creations used Ecophab, a fabric made from recycled soda bottles.

Resources

Banner Creations
1620 Central Ave., Ste. 151
Minneapolis, MN 55413
800.326.3524 or 612.871.1015
www.bannercreations.com

Master Image Technology (MIT)
25100 Normandie Ave. Unit B
Harbor City, CA 90710
310.534.2072
www.mitglobalmedia.com

Green Banners
P.O. Box 9
Forestville, CA 95436
707.887.1332
www.greenbanners.com

Green Product: AcornEco aeoz Sign Series

In 2006, Acorn Sign Graphics developed the AcornEco series of eco-friendly sign solutions. The series was designed with the following principles in mind:

- ◆ Modular components
- ◆ Eco-friendly substrates
- ◆ Recyclable content and components
- ◆ Minimum use of adhesive and paints

The goal was to use environmentally friendly and innovative materials in the design and fabrication process while meeting the intended purpose of a wayfinding solution.

- ◆ *Longevity.* Over the lifespan of a building, there are typically multiple design changes to the building's interior elements and signage. The AcornEco aeoz sign system was designed with components that meet the typical design life cycle. NovAcryl-ECR photopolymer panels are used to create the tactile portion of the sign, which has a lifespan of 5-10 years. All other components, including the mounting system, aluminum pucks/strips, and bamboo backplate, meet or exceed the 5-10 year life cycle.
- ◆ *Air Quality.* This sign system incorporates materials that do not outgas high levels of VOC once installed in an interior. Color is applied to the tactile images with low-VOC heat transfer foil. No adhesives are used.
- ◆ *Resource, Waste Management, and End of Usable Life.* The amount of waste produced in the fabrication of the sign system and its components, including the photopolymer panel, is minimal. The effluent from the photopolymer is 100 percent biodegradable. The NovAcryl-ECR photopolymer panel incorporates 3form's Ecoresin, which has 40 percent post-consumer recycled content and can be recycled after its use in this system through 3form's Reclaim recycling program or through other plastic supplier recycling programs. The aluminum puck/strip can be sent to a recycling facility to be up-cycled or can be re-purposed.
- ◆ *Energy Efficiency.* The AcornEco aeoz system incorporates low-energy materials, such as bamboo for the backplate and a photopolymer/PETG base for the tactile element. Although the aluminum pieces have many advantages on the recyclability front, aluminum as a whole is considered a high-energy material due to the high temperatures required to manufacture and recycle the raw material.
- ◆ *Challenges.* There are many challenges associated with developing eco-friendly sign solutions. Some products are more green than others. For example, some bamboo materials are more sustainable than others. Another challenge is reducing the use of adhesives while designing ways to combine components and then securely mount the system to the walls. Most important is the balance between optimal design and an affordable product.

Resources

Acorn Sign Graphics
4109 W. Clay St.
Richmond, VA 23230
800.770.4744 or 804.726.6999
www.acornsign.com

PART 7 | Taking a Leadership Role

After years of progress in green design by the architecture, industrial design, and graphic design communities, SEGD has begun developing its own educational program on green materials and methods based on the unique needs of SEGD members. SEGD's leadership position within the design and fabrication community focuses on the following goals:

- ◆ *Educating the environmental graphic design and fabrication community on green design approaches*
SEGD will promote methodologies and strategies rather than specific products, although specific product recommendations will be included with the strategies as examples.
- ◆ *Educating the fabricator community on meeting higher sustainability standards*
Through the RFP process and the fabrication oversight process, SEGD designers can have a big influence on the manufacture and delivery of projects. Manufacturers that adopt new technologies and techniques can reduce the negative impact of their manufacturing process on the environment.
- ◆ *Promoting areas of leadership that environmental graphic designers can provide to the larger design community*
SEGD members can play a major leadership role in specific areas of green design, including exhibition of green methodologies and modularity of elements.
- ◆ *Promoting the SEGD Green Resource Guide*
The SEGD Green Paper is a strategy guide for SEGD members on green design and how they can play a role in increasing the sustainability of their projects. It is available in paper format and on the SEGD website, www.segd.org. Available only on the web, the SEGD Green Resource Guide includes projects, products, and methodologies for green EGD. It uses the Green Audit format to describe how these programs fit within the EGD green strategy and provides a range of specific material and product recommendations. It also contains additional web resource links, information on products, and research.
- ◆ *Promoting green education*
SEGD provides a continuum of educational programs and resources for the EGD community. Green educational initiatives will focus on integrating green design into projects and using EGD to take a leadership role in architectural projects. Programs will include the SEGD annual conference, regional seminars, teleconferences, and SEGD publications.

SEGD's success in developing a leadership role in sustainability will require the ongoing innovation of designers, fabricators, and manufacturers in developing and promoting green practices. Sustainability is not a product or application, but an ongoing professional approach that permeates every aspect of the way projects are developed, designed, and implemented.

PART 8 | Resources

SEGD's Green Resource Guide (available at www.segd.org) is a web-based resource for green materials, processes, and products specific to the EGD community. The following list includes other important resources.

Advanced Buildings

Guide to best practices for building technologies and methodologies
www.advancedbuildings.org

ARCAT

Material resource website containing information on green materials and specifications
www.arcata.com

Architects/Designers/Planners for Social Responsibility

Advocacy group on behalf of the design community
www.adpsr.org

Building Green

Publisher of the Environmental Building News and resource guides on green materials and products
www.buildinggreen.com

Building Research Establishment Environmental Assessment Method (BREEAM)

BREEAM assessment methods and tools are designed to help construction professionals understand and mitigate the environmental impacts of the developments they design and build.
www.breeam.org

Construction Materials Recycling Association

Promotes and educates on the recycling of building materials
www.cdrecycling.org

Forest Stewardship Council United States

National chapter of the international FSC (www.fsc.org); coordinates responsible forest management standards, provides public information about and promotes FSC certification of wood products
www.fscus.org

Global Green USA

Advocacy group that focuses on environmental causes
www.globalgreen.org

Good to be Green

Member-oriented website focused on green products and construction services
www.goodtobegreen.com

Greenguard Environmental Institute

Certifies products and processes in building construction
www.greenguard.org

GreenSource magazine

Quarterly publication resulting from collaboration among Building Green, Architectural Record, and McGraw-Hill Construction

www.greensource.construction.com

Green Building Pages

Sustainable building materials database and design tool

www.greenbuildingpages.com

Green Ideas Environmental Building Consultants

Consultants with specialties in EGD

www.egreenideas.com

Green Seal

Independent nonprofit organization that promotes the manufacture, purchase, and use of environmentally responsible products

www.greenseal.org

Material ConneXion

Organization focused on selecting specific green materials for environmental graphic design projects (fee-based service)

www.materialconnexion.com

Scientific Certification Systems

Third-party provider of certification, auditing and testing services, and standards

www.scs-certified.com

Sustainable Design Resource Guide

Green guide to the specification process

www.aiacolorado.org/SDRG/intro/index.html

Sustainable Products

Group dedicated to identifying specific sustainable products in construction

www.sustainableproducts.com

U.S. Green Building Council

Non-profit organization dedicated to sustainable building design and construction; developers of the LEED building rating system

www.usgbc.org/LEED



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SEGD is the global community for people who work at the intersection of communication design and the built environment.