THE EMERALD PALACE: SUSTAINABLE BUILDING COMES OF AGE

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IF YOU THOUGHT SUSTAINABLE BUILDING WAS ONLY FOR THE BIRKENSTOCK SET, THINK AGAIN. It is cool to be green; and engineers, architects and manufacturers involved with the building industry are boasting about their sustainability achievements. The Condé Nast building, a Manhattan skyscraper completed in 1999, became an instant icon when it permanently changed the way people think about green building. *Architecture Week* regularly features top sustainable building projects around the world. Even the National Association of Home Builders, widely considered among the most conservative organizations in the business, has embraced the movement.

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A sustainable building, according to the Sustainable Buildings Industry Council, is one in which the site, design, construction, occupancy, maintenance and deconstruction of the building promote energy, water and material efficiencies, while providing healthy, productive and comfortable indoor environments and long-term benefits to owners, occupants and society as a whole. In other words, the entire life cycle of a proposed building, from design to dismantling, is analyzed for its environmental and health impact.

developed a system for designing, constructing, operating and certifying green buildings. Known as LEED (Leadership in Energy & Environmental Design) Green Building Rating System, it is the standard today.

While many firms have LEED-certified architects, WESKetch, located in Millington, New Jersey, is the first firm in the state to require all its architects to become LEED-certified.

The USGBC has already certified twenty projects across the country, including a Pottery Barn store

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American Institute of Architects (AIA): www.aia.org, 800.AIA.3837, infocentral@aia.org

National Association of Home Builders (NAHB): www.nahb.com, 800.368.5242, info@nahb.org

Natural Resources Defense Council (NRDC): www.nrdc.org, 212.727.2700, nrdcinfo@nrdc.org

Northeast Sustainable Energy Association (NESEA): www.nesea.org, 413.774.6051, nesea@nesea.org

Sustainable Buildings Industry Council (SBIC): www.sbicouncil.org, 202.628.7400, SBIC@SBICouncil.org

United States Green Building Council (USGBC): www.usgbc.org, 202.828.7422, info@usgbc.org

WESKetch Architecture: www.wesketch.com, 908.647.8200

"It's the only responsible thing to do," says William E. S. Kaufman '90, an award-winning architect featured on "This Old House." An entrepreneur more focused on the bottom line than on hugging trees, he has staked the reputation of his firm, WESKetch Architecture, on sustainable building. "This is the future of building and we're going to be the experts," he adds.

When sustainable building began to catch on, it became clear that measurable standards were needed. The United States Green Building Council (USGBC), established in 1993, stepped in and

in California, a research facility for Emory University in Atlanta, corporate office space in Texas, a financial services center in Pittsburgh, even an elementary school in Seattle. In fact, if Deane Evans has his way, the red brick school building will soon be relegated to history.

"Schools can be smart, great places to be. They can feel better than they used to," says Evans, research professor, executive director of the Center for Architecture and Building Science Research at NJIT and author of *High Performance School Buildings: Resource and Strategy Guide*

(Washington, D.C.: Sustainable Buildings Industry Council, 2001).

Studies reveal students perform better in buildings designed with sustainable guidelines in mind. Evans likes to call such schools "high performance" for that reason. Increasing the use of daylight and reducing the need for electric lights is often a key design component. But it really takes a whole system approach, according to Evans, to really create a sustainable building.

"People think if they change the lights or use a recycled carpet or get a better air conditioner, they are creating a sustainable building. All contribute, but the secret is getting them to work together. Playing the systems off one another is the way to reduce costs over the long run," he explains, "since the higher cost of a sustainable feature like daylight can be offset by the reduced cost of fewer electric lights."

When WESKetch set out to design a golf resort in Montana, Kaufman says, "We could have simply made beautiful buildings." Instead, his firm researched the history of the land and studied the property. They focused on solar orientation to capture natural heating opportunities and analyzed how cold air drains from the property. The information helped them avoid a c-shaped building on the down slope of the site. "That would have created a cold air lake against the building, increasing heating costs," he explains. Also considered was how the construction would disturb the land. "We try to let the building dance within the natural landscape," says Kaufman. It's a way of thinking that colors every project he works on.

Finding contractors who abide by the special materials specified in sustainable building projects and clients committed to using them is another story. "Most people don't care," remarks Inda Sechzer '91, project manager at the Maplewood, New Jersey, architecture firm of John W. James. She explains alternate materials can add several thousand dollars to a job. Moreover, contractors often hire unskilled workers and balk at using alternate methods that may require skilled labor. They simply suggest to clients a way to save the money and the deal is sealed.

Large corporate clients can be even harder to convince. "Businesses often are structured in ways that make it difficult to value the benefits of sustainable building," explains Evans. "There's someone in one corner of the company balancing a budget for

SUSTAINABILITY AT NJIT

Sustainability is so intertwined with the work and history of NJIT that it is one of the university's four research goals. (The others are information technology, materials science and engineering, and applied life sciences.) As Provost William Van Buskirk explains, "It's really a natural evolution of the development of environmental research at NJIT."

The emphasis is felt at the New Jersey School of Architecture, where Deane Evans presides over the Center for Architecture and Building Science Research. Dedicated to examining the interaction between the built environment and society, the center's research goals include developing environmentally friendly technologies and creating more efficient and effective environments to meet human needs through the optimal use of available resources.

In addition, students in Erv Bales' new seminar on sustainable building were so enthusiastic they suggested incorporating the certification process for rating buildings according to LEED standards into the course.

NJIT's Multi-Lifecycle Engineering Research Center turns environmental responsibility into competitive advantage. Its three-pronged focus includes reengineering discarded materials into innovative products with a longer life and more environmentally friendly end; and creating better technologies for everyone. Reggie Caudill, the center's director and an expert in recycling electronics, recently pioneered a method for taking the cathode ray tube glass from discarded television sets and computer monitors for use as x-ray room wall coverings. In addition, Sanchoy Das and Paul Ranky, both professors of industrial and manufacturing engineering, are developing methods, processes and software tools to enhance recovery, recycling and environmentally friendly disposal of electronic equipment.

Led by Daniel Watts, who holds the first Panasonic Endowed Chair of Sustainability, the Sustainable Green Manufacturing Program is housed in the Otto H. York Center for Environmental Engineering and Science. Current projects include examining weapon components to reduce their environmental impact; analyzing the effects of hazardous materials on the environment; and reducing the use of hazardous materials on the production line.

The Department of Civil and Environmental Engineering, led by John Schuring, professor of civil and environmental engineering, boasts many faculty members working on sustainability-related projects. Among them are Jay Meegoda, an expert on the reuse of contaminated soils; Thomas Hsu, who works to retrofit bridges by bonding high strength carbon filaments to the beams and columns to improve earthquake resistance; Methi Wecharatana, who uses recycled fly ash, a residue from coal-fired power plants, in structural concrete; and M. Ala Saadeghvaziri, who just completed a study on using recycled plastics for highway barriers, noise walls and glare screens.

building materials and a different person on the company's other side trying to meet a budget for long-term maintenance costs. An astute owner will balance both sides of this construction cost/maintenance cost equation. The result will be buildings that are cost effective to design, build and operate — buildings that are high performance," concludes Evans.

Kaufman has encountered this resistance, but says the contractors he works with are used to his philosophy and don't question his material choices anymore. He brings everyone, from builder to contractors, into the process at the outset to ensure everyone understands his reasoning. And Kaufman's clients fully understand the benefit of sustainable building – that's why they come to him.

His favorite current project, the Edgewater, is known affectionately as the Emerald Palace for its sophisticated green building qualities. It is an eight-thousand-square-foot private residence built in the European craftsman tradition with handmade local products. For every piece of equipment that adds to the project's cost, Kaufman offers his client a detailed cost-benefit analysis.

For example, this enormous house will cost only about two hundred dollars each month to heat. Designed to last seven generations, it has a geothermal heating/cooling system supplemented with in-floor radiant heat. The building envelope stores the maximum amount of thermal mass benefiting the heating and cooling process. The home takes advantage of available daylight. Also, there is no fiberglass insulation or PVC material since Kaufman believes there is a cancer risk associated with each.

In fact, everyone interested in sustainable building winces at the popular use of PVC for everything from piping to vinyl siding. By law, PVC can be used only for waste, not for pipes that supply drinking water. That's a red flag for Sechzer. She notes, "If you can't drink from it, imagine what it's doing to the environment and what a hazard it is for long-term use inside your home?" She predicts PVC will be just like lead and asbestos, and, like Kaufman, refuses to use it on any project.

Global warming and climate change have forced environmental responsibility into our consciousness, notes Erv Bales, research professor of architecture, who has worked extensively with the United States Environmental Protection Agency on Energy Star products and was a member of the USGBC drafting team for the LEED guidelines. He adds that the oil supply clearly is limited. Concern for wood to build homes is in the news. He believes that all such issues come together in the concept of sustainability. He points out recycling programs have made environmental concerns an everyday matter for the general public. And sweeping regulations passed during the Clinton/Gore administration require all new federal buildings and materials to meet sustainability guidelines. Because of this legislation, any architectural or engineering firm hoping to win government contracts must be conversant with sustainable building techniques.

Technology and scientific know-how have also changed dramatically. As Deane Evans explains, thirty years ago insular thermal windows like those used in Kaufman's Emerald Palace simply weren't available. The dramatic advances in computer modeling enable architects and engineers to take key measurements about how heat flows around a room or in and out of walls. And clients have more confidence in the aesthetics of their homes because sneak previews are available.

Aesthetics and technology are no longer the barriers they once were. While high up-front costs can deter those on a budget, they don't intimidate high-end homebuyers. With government and industry driving the market toward green buildings, sustainable building may finally be coming of age. ■

SUSTAINABLE BUILDING AT A GLANCE

There are five elements to analyze in determining if a building is sustainable:

- _Land use
- _Land impact
- _Energy and water use
- _Materials/solid waste
- _Occupant health and well being