



KATRIN SCHOLZ-BARTH: HUMAN RIGHTS CAMPAIGN HEADQUARTERS, WASHINGTON, D.C.

harvesting \$ from green roofs

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KATRIN SCHOLZ-BARTH: MONTGOMERY PARK BUSINESS CENTER, BALTIMORE, MARYLAND

Green roofs present a unique business opportunity with tangible benefits for developers.

though just a few years ago hardly anyone had ever heard about green roofs, today, American cities are competing for bragging rights for having the largest area covered by green roofs. So far, Chicago is leading the way with a claim of 1.6 million square feet of green roofs that are either installed, under construction, or in design—with many more square feet of green roofs planned. Atlanta, Boston, and Washington, D.C., have expressed interest in following suit on the East Coast, as have Portland and Seattle in the Pacific Northwest, and San Diego in southern California.

North American pioneers of green roofs led the way for their appearance coast-to-coast in the late 1990s. (See “Green on Top,” page 82, June 2001.) On the East Coast, pioneers include Charlie Miller, president of Roofscapes, Inc., in Philadelphia; the Harvard University Graduate School of Design in Cambridge, Massachusetts; the U.S. Green Building Council in Washington, D.C.; the

Extensive green roof plants grow low and do not need cutting. They spread to form dense vegetation, and once the entire roof is covered, maintenance is needed only once a year.



The Human Rights Campaign headquarters in the Dupont Circle area of Washington, D.C., has a 2,000-square-foot extensive green roof over the entrance gallery (above). A sign at street level (right) notifies passersby that there is a green roof located above and explains the benefits of green roofs.



Earth Pledge Foundation in New York City; plus Cape Cod, Massachusetts-based architect Malcolm Wells, who argued for earth-covered houses as far back as the 1970s. Pioneers in the middle of the continent include Mayor Richard M. Daley in Chicago and Green Roofs for Healthy Cities in Toronto. On the West Coast, Tom Liptan, environmental specialist and manager of the eco-roof program at the Bureau of Environmental Services in Portland, and Cornelia Hahn Oberlander, landscape architect in Vancouver, British Columbia, are the trailblazers.

The third annual Greening Rooftops for Sustainable Communities conference, held in Washington, D.C., in early May, focused on green roof policies, design, and research. Discussions of green roofs are becoming a staple in a variety of trade journals addressing a wide range of professions. This month, the U.S. Botanic Garden in Washington, D.C., opens a green roof exhibition that will run until October. The exhibit exclusively targets the residential market, which is still underrepresented in the growing green roof portfolio in the United States. In New York City, the Earth Pledge Foundation created the Viridian project to spark interest in green roof applications on residential homes, especially in urban, low-income neighborhoods. Partnering with developers who support affordable and low-

impact developments, the Viridian project fosters energy savings and environmental stewardship through the use of green roofs.

In contrast with the residential market, the commercial and institutional markets have already gotten their feet wet regarding green technology and are poised to make a real difference in how stormwater management will be addressed. Yet many developers either do not yet fully understand or do not appreciate the many benefits green roofs provide. Another possibility is that they do not trust the benefits that can be realized, because of a lack of contractor familiarity, lack of support by issuers of insurance or warranties, or lack of integration—for instance, simply adding a green roof at the end of a project to make it appear ecologically sensitive rather than using the green roof for stormwater credits. Effective communication of the value added by green roofs is crucial in order

for developers to be able to translate them into concrete benefits, such as return on investment and cash flow.

The ability of a developer to carve out an instant return on investment by using green roofs to accelerate the permitting process, to forgo expensive engineering structures, to save valuable land, or to increase the market value of the development may be a much greater driving force to consider green roofs than any promise for long-term or life-cycle savings. Regardless of the motivation, green roofs provide triple benefits, where the economy, the people, and the environment profit.

For instance, a car dealership in Baltimore County, Maryland, recently successfully defended to stormwater permitting authorities the design of a 28,000-square-foot green roof. The dealership wanted to maximize the display area for cars on the ground floor and address all stormwater permitting requirements elsewhere. The green roof satisfied all county stormwater quantity and quality re-



KATRIN SCHOLZEBARTH



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Elevation 314, a new mixed-use development in the Takoma Park area of Washington, D.C., has a 700-square-foot intensive green roof at grade over the building's parking garage, the first green roof permitted in the District of Columbia for stormwater management. Roof runoff is drained into the green roof, and excess water seeps out of weep holes into a bioretention area courtyard. A recirculating water fountain is fed by rainwater.

quirements and maximized the display area for cars by eliminating the need for lot space for a conventional stormwater retention pond.

The Montgomery Park Business Center in Baltimore, Maryland, an adaptive use of an old Montgomery Ward warehouse, has a 20,000-square-foot extensive green roof. The three-inch-deep green roof was installed in August 2002 over the original train shed, now an auditorium, sports club, and cafeteria. The developer committed early on to the additional expense for the green roof. In responding to a request for proposals from the Maryland Department of the Environment for a new headquarters office, the developer wanted to offer every sustainable site and design element feasible to secure the first anchor tenant. The developer realized a rare chance to instantly lease 20 percent of the 1.3 million-square-foot building and, hence, secure some cash flow.

Green-roof enthusiasts—for the most part made up of architects and landscape architects—have been somewhat slow in effectively communicating the benefits of green roofs to developers. The conventional notion is that green roofs are more expensive. This is true from a short-sighted point of view—extensive green roofs cost \$8 to \$10 per square foot, compared with \$4 to \$6 per square foot for a conventional roof—but developers who choose green roofs for their projects find that they can realize big savings. Developers who engage in low-impact development (LID) strate-

gies, one of which is use of green roofs, experience an accelerated and smoother permit review process, along with community support, which translate into saved time and earlier cash flow. The typical stormwater permit review can take up to 30 days, but many jurisdictions provide a one-week turnaround as an incentive for developers to include green roofs and other LID measures to relieve overburdened sewer systems.

One example is Elevation 314, a new mixed-use development in the Takoma Park community in Washington, D.C. Elevation 314, built on a tiny site presenting many constraints and challenges, is bordered by train tracks to the south, a busy street to the northwest, and existing residences on a higher elevation to the north. The site was an unattractive, impervious concrete cover used as a parking lot, yet green building principles were used at a very competitive cost of \$110 per square foot.

Aside from creation of attractive living and retail space using renewable and recycled materials, it was the developer's on-site water management plan that allowed the project to make economic sense on a first-costs basis. The development uses an intensive green roof and a central bioretention courtyard for on-site stormwater quality and quantity control, the first such permitted stormwater management plan in the District of Columbia. The area of impervious surface cover was reduced by more than 25 percent by adding the courtyard and the green roof to the previously 100 percent impervious concrete parking lot that had sat idle for 25 years. These landscapes function both hydrologically and ecologically and eliminated the need to install underground sand filters costing \$30,000 apiece to satisfy D.C. Department of Health stormwater regulations.

Portland has created an incentive program to entice developers to consider green roofs. With a sewer system that combines stormwater and wastewater, Portland faces many critical issues related to stormwater management and, hence, combined sewer overflow. The city's aspiration to protect groundwater, salmon (newly listed as an endangered species within the city), and the Willamette River (six downtown miles of which have been registered as a federal superfund site), as well as to reduce the burden on its aging sewer infrastructure, will make it more challenging for developers to comply with new stormwater requirements and regulations. Recognizing that green roofs are an excellent technology to address stormwater problems, the city has created two incentives that will make it easier for developers to provide them—a floor/area ratio (FAR) benefit, now in place, and a stormwater utility fee, which will take effect in the near future.

The FAR bonus grants an increase of three square feet of floor space for every square foot of green roof, with a minimum re-



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quirement that 60 percent of the roof be green. For a 10,000-square-foot green roof, floor space can be increased by 30,000 square feet, with income from the additional floor space presumed to offset the increased first cost. The FAR bonus is the most attractive incentive so far for developers, some of whom are starting to bank FAR credits for use on other buildings, adding yet another indirect benefit.

During the second annual Greening Rooftops for Sustainable Communities Conference in Portland a year ago, the city presented research showing the financial benefits of green roof applications in an old industrial district in Portland, Oregon, where every suitable roof would be turned into a green roof. Annual cost savings included \$500,000 in utility fees and \$250,000 in reduced energy costs.

A number of indirect benefits help to maximize the return for green roof investment. For example, how valuable is green space? What is its worth in a city? How does a view of nature affect spaces that tenants, businesses, and organizations decide to occupy? Developments that preserve nature, mature trees, and vegetation or offer new green spaces are selling and renting faster and are more profitable than others, and many organizations realize that their stakeholders support office space that reflects and helps fulfill an organization's mission. In addition, developers who have chosen green roofs for their projects receive attention in the press. For example, New York City's Solaire is the first high-rise residential building with a green roof and was awarded a Green Roof Award of Excellence at the 2004 Greening Rooftops for Sustainable Communities Conference. The Solaire's 293 units all leased within five minutes



Montgomery Park Business Center in Baltimore, Maryland, has a 20,000-square-foot extensive green roof, which helped the developer to secure the lease of the Maryland Department of the Environment, the first anchor tenant, which, in turn, helped the developer's cash flow.



KATRIN SCHOLZ-BARTH

of being offered in part because of its green features, including the green roof.

So, what is the best way to assess whether a green roof makes economic sense? A developer should consider a green roof under the following circumstances:

- to gain extra lots to meet density requirements;
- if extra land does not exist for a retention pond to comply with stormwater regulations;
- if extra land does not exist to fulfill an open-space requirement;
- if extra land does not exist to allow sand filters;
- to save \$30,000 each on sand filters; or
- to save time requesting a variance in permit hearings and public meetings.

To design, specify, and build a cost-effective green roof, it is important to formulate specific performance goals. The American Society for Testing and Materials (ASTM) Green Roof Task Group, a subcommittee of the Building Sustainability Committee, is currently developing standardized design guidelines for green roofs in North America.

Green roofs, a single design element, contribute in many ways to mitigating and reducing the environmental footprint of buildings. The U.S. Green Building Council has adopted and incorporated green roofs into the Leadership in Energy and Environmental Design (LEED) green building rating system. LEED credits can be earned through the use of green roofs to reduce stormwater runoff and to mitigate urban heat islands. Indirectly, green roofs also aid in earning additional points—for instance, in boosting energy efficiency by reducing the heat exchange through the roof.

Will the green roof mainly be used to earn stormwater credits, to maximize energy savings, or to restore and reconnect fragmented urban ecological systems? Having an understanding of performance goals will help in the design process, and to make it a straightforward procedure to select the layers necessary to achieve those goals. A green roof consists of waterproofing, root resistance, growing media, and plants. However, a special water-retention layer can be added to boost the retention capacity and to eliminate the need for irrigation. Roofing manufacturers also offer green roof systems that consist of additional layers that do not always aid in meeting the intended green roof performance goal.

Green roofs have become a reality in the United States over the past two years, and their use should accelerate as building professionals gain greater familiarity with green roof technology. ■

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