Raise the Roof: Models and Incentives for Green Roof Design

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From Ireland’s traditional peat roofs dating back centuries, to the manufactured and distinctly modern vegetated roofs found in German cities today, green rooftops have long been appreciated in Europe. But in North America, the trend has been slow to catch on. This is changing, however, as concerns about climate change, water and air quality, and livable communities gain increasing prominence.

Riding a wave of green roof design and construction across the country, in April 2006 the American Society of Landscape Architects (ASLA) completed an innovative vegetated rooftop at its national headquarters in Washington, D.C. A defining feature of this new rooftop is two symmetrical berms that rise from a central walkway. Finished with galvanized steel decking and a palette of grasses, succulents, and perennials, these geometric berms speak to the idiosyncrasy of green roofs: a naturalistic landscape re-created several stories in the air. Unlike many other green roofs, however, this one does not conceal its architectonic nature.

At first glance, plants share equal billing with wood and steel. But in one of the project’s innovative strategies, the metal grating that dominates the walking surface floats three inches (7.62 cm) above low-growing vegetation. As these plants fill in, they are expected to reach through the grating, creating a novel interplay between contrasting materials. From a functional perspective, this approach to the ground plane fulfills two of the most common goals of green roofs: accessibility and maximal vegetative cover, providing environmental benefits such as stormwater retention, building insulation, and air quality improvement.

The two signature berms create a sense of outdoor enclosure while bringing the plants up to eye level. Up close, one can observe the adaptations—thick, waxy leaves that retain moisture, low stature to reduce exposure to desiccating sun and wind—that allow these plants to persist in some of the harshest environments, often clinging to a patch of rock or shallow, nutrient-poor soil in desert and alpine settings. This integration of specialized plants and building structures is one of the challenges and opportunities inherent in elevated landscapes. “Green roofs represent an exciting opportunity to bring living systems into the nonliving—the synthesis of the organic and inorganic,” says Steven Peck, founder and president of Green Roofs for Healthy Cities. Peck’s Toronto-based organization is a leading green roof information source and advocate.

Funded largely by his organization’s 72 corporate members, Peck leads a staff of six that essentially functions as the green roof industry’s representative association in North America. “We’re still in the very early stages,” says Peck of green roofs in the United States and Canada. “We did our first industry survey last year, which showed that 2.5 million square feet [232,257 sq m] of green roof were constructed by our members in 2005. By way of comparison, Germany averages 11 million to 12 million square feet [1.02 million to 1.1 million sq m] of green roof construction per year.”

When one considers that Germany’s population is roughly one-third that of the United States, Peck’s point is made. “About 70 to 80 cities in Germany have regulatory and incentive-based mechanisms to promote green roofs,” he says. “Their primary motivation is stormwater management, urban heat island reduction, and provision of green space. In Germany, a builder must provide a square footage of green space equal to the amount [he or she] dislocates through construction. Often, a green roof is a viable green space alternative.”

This is especially true of new construction, where cost can be significantly reduced by incorporating a green roof into the original building design. At ASLA’s headquarters, the installation of the green roof was timed to coincide with the replacement of the existing roof’s waterproofing. This offset the cost of a rather expensive project: $950,000. It should be noted, however, that this project was intended as a demonstration site to increase awareness of green roofs. As such, it was essential to provide access to the roof.
which required the construction of a new interior stairwell and landing that consumed roughly $600,000 of the overall project budget.

Another significant cost involved moving mechanical equipment to accommodate the design. Where a lower-profile project might simply design around existing elements, ASLA wanted this to be a demonstration project that would show how standard building equipment can be artfully incorporated into a green roof design. Major elements of the project such as the stairwell extension and relocation of the HVAC units would represent little additional cost if incorporated into the original design of a new structure.

According to ASLA, the cost of this project will be recouped over time through the longer life of the roof, reductions in heating and cooling expenses, and the added value to the building of usable roof space. Primary funding came from ASLA, with support from sponsors and product donors. The Chesapeake Bay Small Watersheds Grant Program and the Annapolis, Maryland–based Chesapeake Bay Foundation helped fund the project, in recognition of its demonstration potential and stormwater management benefits.

To promote green roof implementation and to encourage private sector participation, policy makers can draw upon a range of tools, such as density bonuses, fast-track permitting, green space allocation, grants, and tax credits, to offset initial costs and directly bolster green roof markets. For example, Chicago, which leads U.S. municipalities with over 3 million square feet (278,709 sq m) of green roofs under development, has established a suite of policies, including:

- a requirement that any building project receiving financial assistance from the city, or a planned development that exceeds certain size limitations, or is adjacent to water bodies, incorporate sustainable building strategies that often include a green roof;
- a Green Roof Grant Program that provides grants of up to $5,000 to assist with residential or small commercial (less than 10,000 square feet [929 sq m]) structures;
- a Green Roof Improvement Fund that offers matching funds up to $100,000 to put green roofs on downtown buildings, drawing $500,000 from the city’s Central Loop Tax Increment Financing District; and
- a permitting process that fast-tracks (less than 30 days) building projects that normally would have to go through a 60- to 90-day permitting process.

In addition, Chicago places a priority on leading by example. The city has built a green roof on its town hall and on several municipal buildings, including fire stations and the Chicago Cultural Center. Other cities such as Portland, Oregon, utilize density bonus programs, or
floor/area ratio, that allow developers to increase the floor area of a structure to the maximum zoning limitations and increase their potential for income when they implement green roofs. In Portland, additional green roof policies and incentives include:

- requiring all new city-owned buildings to be constructed with a green roof that covers at least 70 percent of the roof surface, and, where practical, installing green roofs on all roof replacements;
- a 35 percent reduction in the city’s stormwater management charge; and
- Green Investment Grants of up to $200,000 per project, which may include a green roof.

Toronto is another city that has advanced green roofs through innovative policies. The city has launched a pilot grant program that provides a CAN$3 subsidy per square foot (CAN$32.28 per sq m) of green roof installation up to CAN$20,000 per project. In addition, Toronto has set aside CAN$500,000 in next year’s budget to put green roofs on its own facilities, and has developed a Green Building Standard that requires green roof installation on 50 percent of new building rooftops. The standard is currently voluntary, with plans to make it a mandatory requirement in the near future.

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