

ECONOMIC GAIN THROUGH ENVIRONMENTAL INNOVATION

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Green roofs grow the bottom line by Jim Lindell - 1.24.07

Usually when we hear or read about green roofs, what is most often discussed is the benefits green roofs offer. Indeed, green roofing systems do significantly decrease storm water run-off, reduce energy costs, dramatically extend the life cycle of the existing roof, and provide sound insulation, among other features. However, what is less often examined are the economic details of green roofs: how much they cost to install and maintain and whether these costs can be recouped — a return on investment (ROI) — in a reasonable amount of time because of their benefits.

Unfortunately, an analysis of these costs and the potential ROI is not clear. One reason for this is that two types of extensive (four inches of soil or shallower) green roofing systems are popular today. The pros and cons of each system can vary by the type of plants and soil used, type of existing roof where the green roof is installed, geography, and climate, as well as a host of other variables. However, both systems share some commonalities. These commonalities include:

- A membrane is placed over the existing roof to prevent leakage.
- Some type of root barrier and drainage system is employed.
- Growth media, such as soil or other growing medium, are added.
- Plant media, such as sedum, grasses, or similar vegetation, are planted.

Built-in-place vs. modular systems

Green roofs generally cost from \$8-\$40 per square foot to install. One reason the prices vary so greatly is that there are two basic kinds of green roofing systems: built-in-place and modular.

The built-in-place system is the earliest form of green roof. Developed in Germany in the early 1960s, this system has served the industry well for decades, but tends to be expensive to install because it often requires customized designs, occasional roof retrofitting to support the

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green roof, and specific planning for each installation. A matting and drainage system usually must be installed over the existing roof along with a root barrier and moisture-retention layer. This can be costly because the growth and plant media must be assembled and planted by teams of workers and landscapers working directly on the roof. Many of these issues, and their potential impact on the cost to install a green roof, came under review in 2001 after a 20,000-square-foot green roof was installed on Chicago's City Hall. Planners and installers examined the entire installation process from start to finish with the goal of making it more streamlined, faster, less labor-intensive and less costly. What evolved from this examination is now referred to as the modular green roof system.

With the modular system, many of the structural components needed to install a green roof on top of the existing roof are eliminated because the plant and growth media are placed in modules made of recycled plastic. The modules, which come in varying sizes and depths, are designed to protect the existing roof by providing built-in root barrier and drainage systems.

The modules, pre-planted with soil and growth media, are delivered directly to the job site by the landscaping company in charge of the project. The modules are then installed on the roof. As much as 4,000 square feet can be installed in one day. Most projects take less than a week for complete installation.

Although the benefits of both systems are similar, the ways the systems are designed and installed can have a major impact on the cost to building owners. Of course, the higher the installation costs, the longer it takes to see a significant ROI.

Maintenance Costs

The maintenance costs for both types of extensive green roof systems tend to be relatively minor. If the proper plant and growth media have been selected, the plants will usually thrive with little or no maintenance, requiring an occasional weeding and possibly irrigation, depending on climatic conditions in the green roof's location. Usually, irrigation is necessary only when the roof is first installed or under the driest of conditions.

However, should the existing roof or any roof mechanical systems need repair or attention, the maintenance costs can mount. With the conventional built-in-place system, portions of the roof may need to be dug up when roof repairs are needed, and then be restored. In addition, locating the source of a problem can prove to be more difficult with this system, adding to repair and maintenance costs.

With the modular system, only the modules in the service repair area need to be picked up and reinstalled once repairs are completed. The plant and growth media are left undisturbed, saving time and costs.

Other maintenance costs can apply to both systems as well. These include:

- Unwanted wildlife: Occasionally birds and other animals will build a home in the green roof. This can damage or require replacement of planting materials. Selecting vegetation less attractive to wildlife generally alleviates this problem.
- Irrigation: The roof may require more irrigation and attention if the wrong plant species or growth media has been installed. The problem can be averted by working with landscape professionals familiar with the local climate and geography.
- Color and season changes: Occasionally, if the roof is visible to other buildings or building occupants, property managers might want to change the growth media for aesthetic reasons to adjust to different seasons. Obviously, this will incur extra costs.

ROI

Unlike some environmentally-preferred products and projects that aim to provide long-term benefits, including a tangible ROI, green roofs are under close scrutiny with a number of studies and research activities currently in progress. One of the most extensive involves the University of Wisconsin, which installed a 6,500-square-foot modular green roof system three years ago. The university is analyzing how effective the green roof has been at reducing storm water run-off (which can reduce the cost and expense of elaborate drainage systems to carry

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storm water away), how much energy savings it has provided and how effectively it has increased the life expectancy of the existing roof. The findings of this study should prove very helpful to all interested in green roofing systems.

However, as we await their reports, the City of Chicago has found that by installing a green roof, the city is saving as much as 10 percent annually in air-conditioning and energy costs due to the more moderate temperature of the roof. A similar study of several Chicago facilities conducted by Weston Solutions, Inc., Westchester, Penn., reports that by converting 50 percent of the city's roofs to green roofs, more than \$100 million, or 720 megawatts of energy, could be saved annually.

In another study, the Gap Inc. (NYSE: GPS) nearly 10 years ago installed a green roof at its headquarters near San Francisco. The company says through energy savings alone, the roof will pay for itself in another year.

Savings like these have indirect but substantial benefits as well. If a project manager knows that the cooling needs of the facility are diminished due to the green roof installation, the building owner can reduce the size of the air-conditioning equipment necessary to cool the building, another cost savings.

Because their benefits in reducing storm water run-off have been proven, more and more cities are adopting regulations that provide an impetus — in the form of tax rebates and credits — for developers and building owners that install green roofs. This alone is helping to make the installation of green roofs economically advantageous. In addition, developers do not need to install as elaborate — and expensive — water-management systems into their buildings, another cost savings. Taking all of these benefits into account it appears that the economic benefits of green roofs can be significant and prove valuable to building owners.

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