The Green Building Advantage

Green Roofs are the Way to Grow

By Mark Gaulin

Even if you've never considered a green roof, once you examine the energy and environmental benefits they can provide, the green roof idea is one that will quickly grow on you. A green roof, or 'vegetated roof,' is a plant-filled roof top garden that offers an attractive and energy-saving alternative to a conventional rooftop. Green roof systems are created by adding layers of growing medium and specially selected plants over the top of an enhanced traditional roofing system. Different than a rooftop garden because the plants are actually part of the rooftop, green roofs can double the life span of conventional roofs, and provide energy savings by reducing heating and cooling costs while adding beauty and useable space.

GREEN ROOF TYPES AND PLANTS

The two main types of green roofs are extensive and intensive. The most common type, an extensive green roof, is a vegetated roof which adds a low weight increase of only 16 – 35 lbs/square foot when fully saturated. This lightweight green roof is comprised of organic and inorganic materials and specially selected hardy, low-maintenance plants. After installation and planting, ongoing maintenance typically consists of only two visits per year to weed invasive plant species and to conduct normal roof inspections.

An intensive green roof is primarily aesthetic, and provides sustainability and urban beautification through use of a wider variety of plants, including shrubs and trees. An intensive green roof requires a deeper growing medium and increased

weight. Maintenance requirements, especially watering, are more demanding and often an irrigation system is specified.

Depending upon climate and other green roof variables, including wind, light, and temperature, there are a variety of plants that will suit many different green roof situations. Most are hardy and easy to grow. Sedum plants are often specified for their hardy succulent character, and variety of colors and densities. They will vary from region to region.

EUROPE AND JAPAN TAKE THE GREEN LEAD

While green roofs are a relatively new concept in North America, green roofs have become very well established in Europe and Japan, thanks to government legislation and financial support at the state and municipal levels. In Germany alone there are nearly 150 million square feet of green roof space with incentives being provided by more than 75 local government groups. And in Tokyo, any building with a rooftop area greater than 1,000 square meters must incorporate a green roof plan for a minimum area equal to 20% of the total roof.

CHICAGO FOLLOWS SUIT

Mayor Richard M. Daley has made a commitment to making Chicago the most environmentally friendly city in the United States and began the initiative recently with its City Hall green roof. In fact, the American Society of Heating, Refrigerating and Air-Conditioning Engineers [ASHRAE] conducted a study on Chicago's City Hall Green Roof, which showed that there was a direct correlation between decreased ambient air temperature and cooling energy use. For every one degree drop in Fahrenheit temperature, there was a 1.2% drop in cooling energy use. Not surprising, when you consider that on a 90 degree day, while a green roof maintains a surface temperature of only 95 degrees, a dark roof surface temperature is a blistering 160 degrees.

The study suggests that if, over a period of ten years or more, all of the buildings in Chicago were retrofitted with green roofs, (30% of the total land area), this would yield savings of $100,000,000 annually from reduced cooling load requirements in all of the buildings in Chicago. The cooling would also slow the chemical processes that produce ground level ozone, nitrous oxides and smog, and help offset the production of sulphur dioxides from coal fired utilities.

Chicago is working to provide incentives for new buildings and any buildings receiving tax-increment financing [TIF] support are required now to have a green roof element to their construction and building plans.

Chicago has made a further commitment to the green initiative through its Chicago Center for Green Technology which houses green building concepts and technology as well as hosting seminars and educational programs for the public. Recently, suburban Chicago-based Tecta America Corp. one of the nation's leading roofing contractors participated in the Building & Design Exchange at Chicago's McCormick Place. The show, which focused on green building technologies, featured a simulated TectaGreen green roof system with more than 1,000 live sedum plants. The plants were donated to Greencorps Chicago, a program of the Chicago Department of Environment and the Chicago Center for Green Technology at the close of the show. Greencorps distributes plants to community gardens and Chicago Public Schools.

Tecta America has been instrumental in the implementation of their proprietary TectaGreen green roof design and usage in numerous large-scale commercial roofing projects nationwide.

"Green roofs can save millions of dollars in energy consumption, improve air quality and reduce green house gas emissions. We're committed to making

green roofs an important part of our future commercial roofing efforts," said Tecta America's Marketing Manager, Jamie Hoffman.

SEEING GREEN

That's good news for the environment, and good news for city inhabitants since green roofs can work to reduce urban heat islands (UHI) which the EPA defines as a metropolitan area which is significantly warmer than its surroundings. On hot summer days, urban air can be 2-10°F [2-6°C] hotter than the surrounding countryside. Green roofs can work to reduce urban heat islands, minimize heat-absorbing surfaces, provide improved air quality, as well help with storm water retention and filtration.

Green roof layers protect roof membranes from extreme temperature fluctuations and ultraviolet radiation, and can also improve site utilization by reducing the impervious surface area of a building to increase potential square footage for construction. Green roofs can also conform to the rigorous Green Building Rating System standards and can qualify for Leadership in Energy and Environmental Design (LEED) certification for tax benefits. The LEED program was created to provide a national standard for the building industry.

As green roof plants capture and hold rain water, water stored in the soil media and green roof retention mat layer is released through evaporation. Where jurisdictions demand lot-level storm water charges, zero runoff policies, or a requirement for storm water management ponds, the ability to retain storm water may result in direct and indirect financial incentives. By reducing impervious surface area through green roofs, sewage treatment facility plants are less burdened during heavy storms because green roofs absorb water and are able to reduce the amount of rain water which enters the system.

THE BOTTOM LINE

Overall, the benefits of a green roof from an energy and environmental perspective cannot be rivaled. However, since the initial cost of installation can be anywhere from one and a half times to twice as expensive as another type of roof, cost is often a consideration for developers. It is important to keep in mind that since only a portion of a rooftop is typically designated green, when estimating additional costs, it should be considered per square foot, and not by overall roof cost. Generally, given the increased life expectancy and minimized maintenance costs, coupled with energy savings and tax/building incentives; over time, green roofs end up costing about the same price as a traditional roof. And, the long-term environmental benefits are priceless.

-- Mark Gaulin is Tecta America's Magco division President. Recently elected President of the National Roofing Contractor's Association, Gaulin is a long-time proponent of green roofs.