

## A New “Green” to Think About

By Sandra McCullough

Those who have attended building, architectural, or cleaning gatherings and conventions during the past few years have witnessed a topic consistently on everybody’s lips: Green. The incorporation of environmentally preferable engineering, designs, and products is taking several building-related industries by storm—especially those involved with schools, offices, and medical centers.

However, one newcomer to the “Green” subject - Green roofing systems - is starting to make an impact. Although it has been widely available, promoted, and used in other parts of the world for a number of years, industry professionals are just recently gaining a clearer awareness of Green roofs. Apparently, just as



with Green Cleaning, it has taken several years for industry professionals to better understand the logistics surrounding Green roofing systems. This includes further clarification on how they are installed, maintained, and the benefits that can be derived.

The following FAQs present common concerns of Green roofs and help provide a good overall understanding of what they can mean to

cost-conscious facility managers, who are interested in long-term savings.

### **What exactly is a Green roof?**

Green roofs, which date all the way back to biblical times and were usually installed for aesthetic reasons, involve the placement of vegetation on top of buildings. Today, there are scores of examples, but a great many are actually roof gardens, or what we in the Green roof industry call, “intensive” roofs. They are mostly installed to provide building occupants with a quiet, pleasing retreat from the busy city below.

### **Where are Green roofs most common?**

Today, all types of facilities worldwide are installing Green roofs. In the United States, Green roofs are found on office buildings—both high-rise and low-rise—stores, schools, and universities. We are also seeing them on several government buildings. For instance, Chicago’s City Hall, along with many other city-owned properties, now has a Green roof. And other cities, such as Seattle, Portland, and Boston have several Green roofs installed on public- as well as privately-owned buildings.

However, they are even more common in Europe, especially in Germany. In fact, there are currently more than 100 million square

feet of Green roofs installed in Europe. We also find them on facilities in Japan and other major Asian cities.

**You mentioned earlier that some Green roofs are called “intensive” Green roofs. How many types of Green roofs are there?**

There are actually two major types of Green roofs and two types of Green roofing systems. An intensive Green roof is much like the roof garden discussed earlier and quite similar to what you might have in your own backyard. With this type, as much as 40 inches of soil is placed on top of the roof. Then, a variety of plants, bushes, flowers, and even trees are planted into the soil. Often, they have walkways, sitting areas, and can be quite beautiful. However, just like any garden, these roofs require a considerable amount of attention, typically by experienced landscapers.

The other type of Green roof is called “extensive.” Instead of 40 inches of soil, an extensive roof usually has just two to six inches. And, in place of flowers, bushes, and trees, low-maintenance plants, such as succulents (we refer to as sedum), along with grasses and other smaller plant species are planted. The plants selected are very hearty and often can thrive in damp or dry environments as well as cold and very warm temperatures. And, unlike intensive Green roofs, these roofs require very little maintenance. After the initial installation, some maintenance may be required—particularly weeding and essentially monitoring the vegetation’s growth. After

these initial steps, this roof type just has to be checked every three or four months.

### **Can you elaborate on the two types of Green roofing systems?**

Yes, some Green roofs are referred to as *built-in-place* systems. With this system, the Green roof is built right on top of the building. Soil is hauled up to the roof where workers spread it evenly so the vegetation can be planted. Once this is completed, scores of landscapers and workers plant the vegetation into the prepared soil. Many facilities have used this system and it can work very well; however, it is labor intensive and can take weeks to complete. And, there is always the risk someone could get hurt working on top of a building.



The other type of Green roof system is referred to as a *modular* system. With the modular system, the roof is essentially assembled at the nursery. The soil and vegetation are planted into modules made of 60 percent recycled plastic. The

modules come in three different sizes: 40x40, 2x2, or 2x4.

Additionally, triangular modules are now available. The flexibility of the different sizes offered helps meet different, unique roof requirements.

The planted modules are then transported to the rooftop where they are laid out, one next to the other. The process tends to be very quick, with 3,000 to 4,000 square feet installed per day. Additionally, it requires few workers, tends to be less expensive than a built-in-place roof, and safer to install.

### **Are these modules heavy?**

Actually, they are surprisingly lightweight. Per square foot: a two-inch saturated module weighs about 10 pounds per square foot; a four-inch saturated system weighs about 15 pounds per square foot; and an eight-inch saturated system is approximately 28 pounds per square foot. Although the roof should be assessed, in most cases, the present roof can accommodate the additional weight of the two-inch module at a minimum.

### **What if the roof or an HVAC system, for example, needs attending to?**

As for HVAC repairs and other mechanicals placed on the roof, a walkway is usually provided for easy access as well as plenty of space around them for servicing. However, maintenance with a built-in-place system can require removing the plants and soil and then re-installing them after the maintenance/repair is completed.

The modular system tends to be much easier to work with. The modules can be picked up and placed aside. Once the area is repaired, they can be put back into place.

## **What are the benefits of installing a Green roof?**

There are many benefits to Green roofs and because you just asked about roof repair, we can address that first. A Green roof dramatically reduces the temperature variations on a roof. In the heat of summer, a roof can reach temperatures well above 170 degrees Fahrenheit. In the cold of winter, it could drop to minus 10 degrees or colder. These hot and cold extremes in temperature are one of the major factors in a roof's deterioration.

With a Green roof system, the roof may stay about 60 to 80 degrees when a typical roof is 170 degrees and remains at a fairly constant 30 degrees in the winter when a typical roof temperature can swing between minus 10 to 50 degrees in a *single* day.

Additionally, the Green roof is not exposed to ultraviolet rays, which deteriorates roofing membranes. Because of this, in many cases, we have seen the lifecycle of conventional roofs with a Green roof on top increase by as much as 20 years.

Then there is the issue of storm water. After a significant rainfall, water runoff on roofs can become a problem. Many cities are concerned about the amount of stormwater entering their combined sewer systems and the inability to treat this large influx of water. Because of this, they often require new buildings to install retention systems.

These systems often add significantly to the initial cost to construct a facility and present a continuous O&M costs as well. A Green roof

helps absorb storm water, minimizing the roof runoff by as much as 75 percent. Tests with the modular system, discussed earlier, have found it can absorb up to 99 percent of a 1-inch rainfall.

This not only is a cost savings, it is an environmental savings as well. According to studies by the University of Wisconsin, by the time typical storm water runoff enters a city's sewer system, it can have 10,000 to as much as 20,000 e-coli per 100 mils—as much as 20 times what is considered safe (235 mils per 100).\*

This contaminated runoff can eventually enter local waterways and rivers where it can affect the health of plants and animals, the availability of beaches for swimming during the summer, and even enter the food chain. By reducing the amount of runoff from roofs, stormwater the opportunity to collect contaminants from roadways and ultimately is minimized, if not eliminated.

Most facilities that install a Green roof will also find a reduction in heating and cooling costs. Due to their insulating properties, Green roofs have consistently reduced heating and cooling costs by as much as 25 to 50 percent for the floor directly below the roof.

**Do you believe Green roofs will become more commonplace in the future?**

Yes I do. First of all, there are more financial incentives available to install Green roofs. A number of cities and municipalities have implemented financial incentives, including tax and density bonuses.\*\*

But also, adding a Green roof can earn a facility as many as six or seven points toward LEED certification. More and more facilities, new and old, are finding that LEED certification provides a variety of benefits. Because of this, and since the modular Green roof system is so easy to install, we can expect to find many more in the coming years.

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\* Source: Studies conducted by Sandra McLellan, Assistant Scientist, the University of Wisconsin, Milwaukee.

\*\*Check with your municipal planning department to learn more about Green roof incentives in your area.