



Green roof manufacturers make planting easier with pre-vegetated mats that are installed like sod but comprised of hardy, drought-tolerant plants called sedums. This version from Xero Flor America comes in depths ranging from 2½ to 4 inches.

# Living Architecture

Taking a top-down approach to green building with roof gardens

Written by ELAINE ROGERS

A fresh patch of greenery and flowering shrubs may inspire thoughts of bare feet gently crushing feathery blades of grass or tiptoeing around tiny blooms, but typically, it wouldn't qualify as something to write home about. Its location on a rooftop, however, might draw a few stares.

Riding on the momentum of America's green movement, vegetated roofs are appearing in commercial settings and on large corporate structures throughout the nation. Mid-Atlantic sites are plentiful and range from the Good Samaritan Hospital in Baltimore, Md., to the U.S. Food & Drug Administration in Washington, D.C., and Ashbury Park Nature Center in Erie, Pa. Although considered more of a pricey novelty in the private sector, residential rooftop gardens are sprinkling the horizon too, and those who specialize in "greening" buildings from the top down predict they'll reshape how we think of roofs and roofing materials in the next few years.

Greg Long, RLA, design director of Capitol Greenroofs in Arlington, says approximately 80 percent of his business is focused on improving existing facilities' energy performance by installing vegetated roofing assemblies.

"The growth of the industry has been surprisingly fast," says Caroline Nolan, media spokesperson for the nonprofit organization Green Roofs For Healthy Cities (GRHC). "It's a complex process, and I don't think it will ever be really affordable for everyone, but interest in green roofs is definitely

growing and echoes the expanding interest in green building in general."

Today, American policy makers are promoting the trend with tax credits for installing green roofs in states like Maryland and civic alliances in New York and other big cities designed to green up the urban sprawl. According to Nate Johnson, a green roof consultant with Philadelphia-based Roofscapes, Inc., the developing industry caters almost exclusively to the commercial market. He explains, "It's expensive, and contractors make less money for smaller green roof projects, while time requirements aren't substantially less than for a large one. But it's just a matter of time."

An organization appropriately named Greenroofs.com, LLC, says statistics show a 25-percent increase in green roof construction between 2006 and 2007. Like solar heat and other eco-friendly technologies, the field has a long way to go, but arguments for bringing roof gardens home for the long haul are strong.

## Breathe Easier

With summertime's average temperatures in major urban areas on the rise, municipalities report increased electricity usage and pollutants like ground-level ozone. In contrast to a typical heat-absorbing roofing material, a rooftop layer of grass will never get hotter than 77 degrees, and environmental designers report that green roofs can cut a building's heat loss by 50 percent while reducing air conditioning costs by 25 percent. A few degrees drop in roof temperature

translates to a 10 percent reduction in the building's air conditioning needs, and for a single-story structure, that statistic increases to 20 to 30 percent.

The Environmental Protection Agency notes that making use of elevated surfaces for additional greenery decreases the heat-island effect in cities, cooling temperatures by several degrees in both urban and suburban areas. Johnson says even partial coverage or a green roof applied to a small addition positively impacts electric bills, and Nolan adds that "green walls" created with trellises and climbing vines against a building's exterior help as well.

Outdoors, rooftop plantings and vines along a building's surface increase humidity levels by capturing and holding precipitation in the foliage, and plants also absorb carbon dioxide from automobile emissions, providing an air-cleansing effect. Green roofs diminish stormwater runoff, absorbing high levels of rainwater, while the excess percolates through vegetation layers and is cleansed of heavy metals and other harmful particles before reaching drainage outlets.

Experts frequently note the psychological benefits of green spaces and interaction with nature. Birds and butterflies visit green roofs up to 19 and 20 feet high, and there's the time-tested emotional benefit of the sounds, motion, color and scenery of nature amid the numbing gray palette of a cityscape.

## Weighing In

The biggest issue for homeowners investigating the potential of rooftop



## Green Roofs at a Glance

- There are two roof garden varieties — extensive and intensive. The latter boasts soil depths of a foot or more in order to accommodate trees and larger plants. Typically requiring regular maintenance and even entailing footpaths and seating areas, they tend to be limited to large, commercial-sized structures and civic projects. Extensive green roofs, more appropriate for homes, are usually wide and shallow, although these still involve 2 to 8 inches of soil in addition to an infrastructure with a filter membrane, a drainage layer, waterproofing, insulation and structural supports.
- Besides the benefits of having an extra spot for greenery, the rooftop soil or “growing media” protects roofing materials from sunlight, extending the life of the roof and putting less discarded materials into landfills.
- For those with addresses bordering major highways, airports and other sources of industrial noise, the insulative qualities of going green upstairs has a quieting effect, with soil, plants and an air layer between the green roof assembly and the building reducing indoor sound levels by as much as 40 decibels.
- A vegetated roof can be installed on sloped surfaces, but installation on a steeper pitched roof is more difficult.

Minimize your bills and maximize the beauty of your urban setting with a layer of living plants overhead. Green roofs aren't always a financially viable option, but growing numbers of homeowners are recognizing the merits of roof gardens and accentuating concrete exteriors with container plants and water features.

plantings is whether or not the home's structure can support it. Anyone who has tilled a garden knows that soil is heavy, so it's no surprise that a roof may need reinforcement before the successful implementation of a green roof plan. Most residential roofs are not strong enough to support the extra weight. Johnson estimates that every inch of "growing media" depth adds 6.75 pounds per square foot, so a green roof with only a 3-inch depth would add 18-20 pounds per square foot "when saturated."

"These systems can work for a variety of different housing stock and building prototypes," Long says. "I just remember to tell my clients to have a registered architect and a structural engineer as part of the design team when preparing your initial feasibility studies. ... I won't even begin any design work without having a structural evaluation letter in hand."

When it comes to plantings, typical offerings are sedums or low-growing herbaceous plants with shallow rooting and drought tolerance. Many of these display fleshy leaves and clusters of white, yellow or pink flowers. Shallow soil depth discourages weed growth, and the sedums are usually self-limiting in size so mowing isn't required.


"Sedums are succulent ground cover," Johnson says. "They grow on rocks in extreme heat and cold with shallow soil, so they fit right in with conditions on a roof."

These plants are typically sold at local garden centers, Long points out, and he recommends checking out the book "Green Roof Plants: A Resource and Planting Guide" by Edmund C. Snodgrass (Timber Press).

Long says there are more than 300 different plants that can be used in the

Mid-Atlantic region. "Designers should keep in mind that the roofs are a very hostile environment, and they should downzone all their plants to Zone 1 using the USDA's hardiness zone maps. For the Northern Virginia area, I do not like to use any plants zoned higher than 6," he says.

Cost is another barrier, with green roofing materials slated at \$10 per square foot and easily stretching to \$40 once the waterproof membranes and other supportive layers are added to the mix. Finding a contractor familiar with the process has its challenges as well. "I don't think people should think about building a green roof in terms of making a decision between using a regular roofing material or building a green roof," Johnson says. "The decision should be, 'Do I want a green roof?' because that will go on in addition to the regular roof."

Despite high dollar amounts and limits to how many local specialists are willing to take on residential installations, green roof advocates say they are worth the time and trouble. "It's an intersection of plants and buildings toward the healing of our environment with restorative, healthier, more livable homes and communities," Nolan says. "Living architecture is a really, really interesting area. We get better air and lower energy costs. The homeowner wins. The planet wins. Everyone wins." 

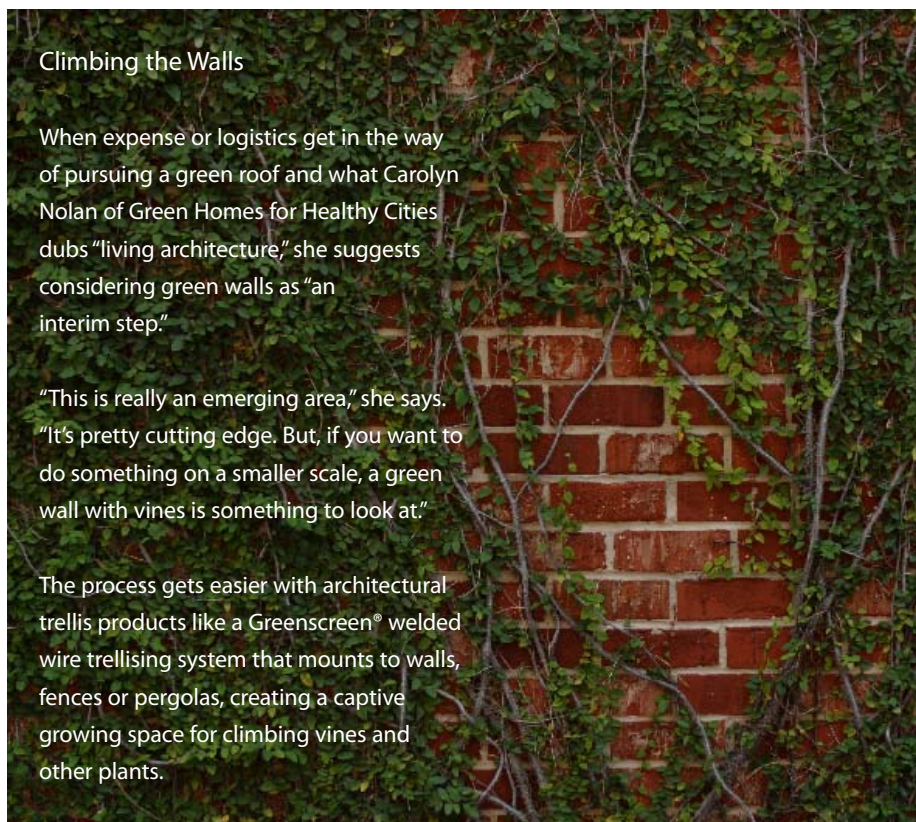
Read this and other features online at [www.solutionsathome.com](http://www.solutionsathome.com).

## RESOURCES

Capitol Greenroofs (Arlington)  
[www.capitolgreenroofs.com](http://www.capitolgreenroofs.com)  
 301-452-1144

D.C. Greenworks  
[www.dcgreenworks.org](http://www.dcgreenworks.org)  
 202-518-6195

Green Roofs for Healthy Cities  
[www.greenroofs.org](http://www.greenroofs.org)  
 416-971-4494



### Climbing the Walls

When expense or logistics get in the way of pursuing a green roof and what Carolyn Nolan of Green Homes for Healthy Cities dubs "living architecture," she suggests considering green walls as "an interim step."

"This is really an emerging area," she says. "It's pretty cutting edge. But, if you want to do something on a smaller scale, a green wall with vines is something to look at."

The process gets easier with architectural trellis products like a Greenscreen® welded wire trellising system that mounts to walls, fences or pergolas, creating a captive growing space for climbing vines and other plants.