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Raising the Roof

Vegetation above us could be very cool

By Margo Pierce

In Greater Cincinnati, summer is smog alert season. But it doesn't have to be. While car manufacturers shout protests about manufacturing more fuel-efficient vehicles and politicians debate scientists about the merit of alternative fuels and damaging what's left of our unpaved eco-system with oil drilling, a revolutionary approach to addressing environmental issues has been growing overhead.

One economically viable and socially responsible alternative isn't just reducing pollution but is also feeding the poor, lowering energy bills and making concrete jungles a more pleasant place to work and live. It's called "green roofs."

Unlike the traditional roof garden of potted plants scattered around a gravel-covered roof with a picnic table and some ashtrays, a green roof is a rooftop covered with plants, which takes the place of standard roofing material such as shingles, according to Virginia Russell, associate professor of landscape architecture and leadership in energy and design (LEED) at the University of Cincinnati.

"An extensive green roof is 100 percent vegetation," she says. "At the other end is intensive; that's more like a roof garden. When you say 'roof garden' to me, that means people. You might have walkways, you might have benches, you might have lighting. You're going to have trash cans, you're going to have things that make people comfortable and safe that take up space that might have been given over to vegetation."

Alpine Cincinnati

The user-friendly green roof has different requirements and benefits. What they have in common is a waterproof membrane that covers the roof, with "growing medium" on top of that. Russell doesn't recommend shoveling dirt from the back yard onto the top of the garage to start your herb garden.

"Bad idea," she says. "Don't try this at home. A lot of (growing medium) is actually engineered soil."

Depending on the plants chosen, the soil will be a mixture of organic matter, lava or pumice rock or extruded clay that creates a lightweight yet porous foundation in which plants will grow. The bugs, fungus and disease that can attack plants on the ground will attack them 10 stories up, so the soil must be specially formulated to keep the green roof healthy and as low-maintenance as possible.

"A lot of people would like to use native plants because it's true to the environmental movement," Russell says. "In this region, you have to think of this as an alpine environment: really cold in the winter, a lot of wind, ruthless summer. A green roof, if installed properly, becomes its own ecosystem. You're putting life back."

That green ecosystem is more than just turf; it's usually a variety of trees, bushes, flowers and evergreens that gobble up carbon dioxide and convert it to oxygen. It also removes pollutants from the air, in addition to scrubbing a lot of particulate matter out of rainwater. With proper planning, precipitation can provide most, if not all, of the water plants will need, resulting in less water being dumped into stormwater sewer systems.

Enough green roofs can also help reduce the temperature in a city, known as the "urban heat effect." A reduced number of surfaces absorbing and radiating heat, along with other initiatives, such as planting more greenery at the street level, mean lower, cooler temperatures on the hottest summer days.

The green roof also provides a thick layer of insulation that dampens the level of outside noise -- particularly helpful when a building is located in an airport flight path -- and keeps heat out during warmer months, while trapping it inside during cooler months. This insulation can also extend the longevity of a roof up to 40 years by protecting it from exposure to extreme temperatures, destructive UV rays and hail.

The cost savings of a green roof is just one component to sustainable design, according to John Stoughton, a third-year architectural student at UC.

"In order for sustainable design to be successful, a project must have social, environmental and economic benefits," he says.

Stoughton believes the "fun factor" is a bonus for dwellers.

Fellow student Mark Sauer, in his third year in urban planning, elaborates.

"A green roof provides people the environmental benefit and a place to put a garden or spend time outdoors," he says.

'Just imagine'

Sauer thinks Over-the-Rhine provides a unique opportunity to apply green building principles, including green roofs, in an urban, historical district.

Both students were in Russell's class designing affordable green housing in Over-the-Rhine. Other cities use rooftops to grow vegetables that can help feed low income residents, just one example of how an entire community can benefit from creating new green space.

Before a single seed can be planted, the structural integrity of any building -- existing or in design -- must be evaluated, so that the weight of the green roof can be sustained over time. Working with a qualified green roof provider to identify the purpose of the green space and desirable plants will dictate the weight of the garden and essential support.

Potential issues such as leakage and maintenance also impact the selection of materials and green roof layout. No longer scarce, green roof retailers now provide consumers a variety of choices, including sensors that help accurately pinpoint leaks.

Russell suggests businesses and homeowners ask for references of three similar projects before signing contracts until certification standards are in place. There are lots of great classes available for training but a national standard for a certificate is still being developed.

The cost of a green roof can range from \$14 to \$40 per square foot and up, according to the frequently asked questions page at www.greenroofs.com, billed as the "green roof industry portal."

Russell says the cost of a green roof is dropping and could be competitive with other roofing materials if state and local building codes would incorporate green building requirements by supporting sustainable design and retrofitting existing structures. Incentives such as tax breaks for green elements that reduce pollution and reduced fees for relieving the strain on public services such as sewer systems would also give sustainable design a boost.

Because larger buildings have a greater impact on the environment and services, their design and construction ought to include steps that mitigate those issues. Maybe any flat roof over a certain size could be required to include a green roof.

"Just imagine if every big box (retail store) had to do that," Russell says. ©

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