

THE GREEN PAGES

Rooftop gardens can reduce need for air conditioning



By RUTH HEIL
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We may have beaten the Soviet Union to the moon, but we have lost to the Germans in the race to the roof. As a result we are missing out on a \$77 million-a-year industry, and our cities are hotter and flood more easily.

Our European friends have conquered many urban environmental issues by transforming over 50 million square meters of previously unused, uninhabited rooftop into vegetation-covered open space. Meanwhile, America's total green roofs equal less than one half of 1 percent that of Germany's.

Pennsylvania did rank among the top 10 states in a 2007 Green Roof Industry Survey, thanks to 146,000 green square feet from our neighbors in Royersford and Philadelphia. Then in 2008, Highmark Blue Cross Blue Shield unveiled a 22,000-square-foot mammoth in Pittsburgh.

Germany originated the green roof practice a century ago as a solution to the damaging effects of solar radiation on roofing materials. The idea is to cover an impervious surface with water- and solar-energy-absorbent shade. According to Penn State's Center for Green Roof Research, a flat black roof can reach 160 degrees on a summer day, while a green roof remains at or below ambient tem-

perature. The savings in air conditioning ranges from 6 percent to 30 percent. Highmark is hoping for 12 percent.

The design of a modern-day green roof includes a growing medium placed on top of layers of filter, drainage, waterproof and root-repellent material. Insulation and a vapor control barrier sit under that, and then the whole project is held up by structurally sound support. So while the idea is a simple one, the installation is best left to the experts.

Highmark's roof cost \$600,000, but it should last at least twice as long as a conventional one. While less expensive alternatives exist, (inverted systems, high-reflective materials and rainwater cisterns) none offer the air and water quality improvements nor aesthetic and psychological benefits that a vegetated roof can.

Environmental benefits

Because benefits have been proven in studies, green roofs are potentially eligible for grant money and they provide credit towards LEED certification. In addition to energy use, a green roof can also reduce or offset:

- Carbon emissions, if woody vegetation is used;
- Acid rain in coal mining areas;
- The Urban Heat Island Effect;
- Waste from re-roofing material; and
- The amount of pollutants washed into nearby streams.

Developers of new construction appreciate even greater benefits through the reduction of:

- HVAC requirements;
- Retention basin and parkland offset requirements; and
- Potential community resistance to a project.

All this aside, the greatest single benefit of a living rooftop is the reduction of stormwater runoff.

Easton, for instance, knows all too well how rainfall flows immediately off a conventional roof, swelling sewers and enraging streams and rivers.

On a green roof, at least one inch of that rain can be absorbed and eventually evaporated. During more significant rain events, the runoff is delayed, relieving immediate pressure on overburdened septic systems.

Psychological benefits

Elaborate roof-garden projects were once left only to high-profile hotels and private apartments. Today's green roofs need not be such exquisite gardens.

Imagine an urban restaurant where you can dine outside in a unique garden setting, above the noise and confusion. Plants grow nearby, supplying the kitchen with heirloom tomatoes. Or imagine taking a work break in the midst of a mini-ecosystem or even playing a bit of golf.

According to Dr. Robert Berghage of Penn State, "There is research evidence that green views are important for our well being — for

example, hospital patient outcomes are improved where there is a green view — the same can probably be said for employees."

People are curious about these urban habitats. They may have heard of the concept, but likely have never seen one.

A business that wants to draw people in can use this curiosity to its advantage. A company that makes this investment will be viewed as one with a serious concern for improving the health of its community.

As Berghage noted, "There are more and more landscapers, designers, contractors and roofers with green roof experience. Most of the major roofing manufacturers have a green roof system now."

For more information about green rooftops, contact Healthy Roofs for Healthy Cities (www.GreenRoofs.org), the US Green Building Council (www.usgbc.org), Roofscapes Inc. (www.RoofMeadow.com) or Dr. Berghage's research center at horticulture.psu.edu/node/386.

President Kennedy pushed us to the moon. President Obama is pushing us towards investment in innovation once again. Let us learn from Germany and begin to explore our rooftop frontier.

Ruth Heil is a freelance writer based in the Montgomery County community of Green Lane. She can be reached at info@streamlineos.com.

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