

a green thumb

BY RICK HALE, BRIAN PARTYKA AND BILL POLEATEWICH



AN AUTHOR WIDELY KNOWN FOR HER BOOKS about horticulture has added a new chapter to her work. While not being strictly about plants, the chapter's still green. Barbara W. Ellis, author of a series of *Taylor's Gardening Guides* about everything from perennials, bulbs and annuals to growing North America's favorite plants, decided on the most socially responsible course of action while renovating her newly purchased home in Chestertown, Md. • "My husband and I are very into saving open spaces and recycling," Ellis says. They also shared an interest in utilizing renewable energy for their new home. By choosing green materials, including a cool metal roof with a solar thermal system and integrated photovoltaics, Ellis and her husband, Peter Evans, are creating their perfect dwelling, which should be complete this fall.

**A GARDENER
EXPANDS
HER LOVE OF
GREEN TO
HER HOME**

Before: Homeowners Barbara Ellis and Peter Evans liked the location of their new home but not the house itself. The home was deconstructed to the framing.



SOLAR OPTIONS

Ellis, who rarely does anything halfway, went all out on the design of the energy-saving features of her home. She and Evans, who have renovated a number of properties, liked everything about the Chestertown house except the house itself.

"It really needed a lot of work," she says, adding they took it apart all the way to the framing. "We really loved the location. You can see water from all four sides of the house, but the house itself was in really bad shape. It was built in the '70s and, among other things, needed insulation, especially on the north side where my office is."

Because nearly all the original structure was located within the 100-foot (30-m) critical area for the Chesapeake Bay, this renovation needed to stay within the footprint of the original house and not increase the amount of impermeable surface for the property. For this reason, the architect added a second floor and a deck above the living room.

When it came to green features for the home, it wasn't so much a question of where to start as it was what to include. Ellis and Evans, who is retired, are both keen on green. Ellis said they liked the idea of providing some of their hot water and

electric needs with solar solutions but had no background in solar, even given their experience renovating houses. Thanks to an Internet search, Ellis and Evans were able to locate a solar thermal system manufacturer that helped design the project and coordinate all the pieces.

Rather than using only one technology or even two, the Chestertown home merges three technologically advanced and energy-efficient roof systems. It features a solar thermal water and radiant-floor heating system, thin-film PVs and an Energy Star-rated cool metal roof in slate gray.

SYNERGY AT WORK

The Chestertown home's roof characterizes building systems of the future where waste and excess for one system is converted and used as a resource for another system.

The metal roof's cool pigments allow the building envelope to stay cooler because 41 percent of the sun's heat energy is reflected back into the atmosphere. The other 59 percent of the heat that hits the Chestertown home's roof is absorbed into the roof system and transferred into a hidden solar thermal water system, minimizing the amount of heat flux into the building envelope.

Thin-film amorphous PV cells are adhered to the metal roof panels prior to installation. The panels then are installed in a typical manner, which makes installation simple for the roofing contractor.



THE CHESTERTOWN HOME MERGES THREE TECHNOLOGICALLY ADVANCED AND ENERGY-EFFICIENT ROOF SYSTEMS. IT FEATURES A SOLAR THERMAL WATER AND RADIANT-FLOOR HEATING SYSTEM, THIN-FILM PVs AND AN ENERGY STAR-RATED COOL METAL ROOF IN SLATE GRAY.



MATERIALS AND SOURCES

Solar thermal water and radiant-floor heating systems, complete turnkey design and implementation support / DAWN SOLAR SYSTEMS INC., Brentwood, N.H., www.dawnsolar.com

Thin-film photovoltaics / UNI-SOLAR, Auburn Hills, Mich., www.uni-solar.com

Cool metal roof / DREXEL METALS CORP., Ivyland, Pa., www.drexmet.com

Energy-efficient pigments / AKZO NOBEL, Arnhem, the Netherlands, www.akzonobel.com

Lighting program / LITETOUCH, Salt Lake City, www.litetouch.com

Recycling network / THE FREECYCLE NETWORK, Tucson, Ariz., www.freecycle.org

Electrical connections are run along the roof's ridge and plugged into an electrical bus, which feeds into an inverter and is connected to the electrical meter by an electrician. Pulling the energy from the sun, this BIPV system allows Ellis and Evans to generate some of the power used in their home, reducing the amount of energy consumed.

The solar thermal water system incorporates a proprietary arrangement of components that occupy a 1-inch (25-mm) layer under the roof. (This system can be installed under any portion of a building envelope.) Because it is hidden, there is more available area on the roof for PV cells. The heat absorbed through the metal roof system is collected with a heat transfer fluid and stored in a 328-gallon (1242-L) solar storage tank before being distributed into the building. These systems supplement conventional space- and water-heating systems by reducing the amount of conventional energy required by the building and, in the summer, cooling the building.

The solar thermal products work synergistically with the roofing industry's cool-roof finishes and PV laminates by converting the roof assembly from a passively

cooled system to an actively cooled system. Solar energy in the form of heat that is detrimental to the building's performance and PV performance is harvested by the thermal system and transferred off the roof portion of the building envelope into the building's domestic hot-water and radiant-floor heating system.

For the Chestertown home, the 5.7 kilowatt grid-tied PV system and matching solar thermal radiant-floor and water-heating systems have the capacity to generate the equivalent of 15,040 kilowatt hours per year while offsetting 21,507 pounds (9755 kg) of carbon contribution annually.

GREEN TEAM

/ **OWNERS** / Barbara Ellis and Peter Evans / **ARCHITECT** / Max Ruehrmund, Chesapeake Architects, Chestertown, Md., www.chesarch.com / **GENERAL CONTRACTOR** / Roy A. Mears Construction, Chestertown, (410) 778-5506

KEEN ON GREEN

Ellis and Evans integrated several other green aspects into their home that are designed to reduce energy. One is a computer-driven program that enables the homeowners to turn on a series of lights for a specific purpose by flipping one switch. That program also features lights that run on 90 percent power and turn on slower, putting less stress on the lights.

In addition, triple-pane casement windows minimize heat loss and provide a tight seal when winds howl off the Chesapeake Bay. Ceiling fans in every room and open windows and doors will provide much of the cooling needed during spring and fall. In addition, two remote-controlled skylights equipped with rain sensors are located above a ceiling fan at the highest point of the roof. The skylights and fan will pull heat out of the house efficiently. Ellis, Evans and the general contractor plan to use soy-based foam insulation for walls, ceilings and under the house.



Once the house is complete, Ellis' garden will be green in more ways than one. Native shrubs, trees, perennials and other plants will be a major feature of the garden. Ellis is replacing as much lawn as possible with ground covers and a meadow to reduce the amount of fossil fuel used to maintain the landscape. Rain barrels will provide a portion of the water required to get plants established. Once natives are established, they will grow with natural rainfall.

During the course of Ellis' research into the green-building industry, she found The Freecycle

Network, a nonprofit organization that helped her redistribute unwanted materials from her previous home. The organization consists of individual groups around the world who give and receive goods for free in their own locales.

"People came from all over and took everything away," she remembers. "We saw people from all walks of life—we had people who obviously were in need come by and take stuff. We also had people who were just interested in collecting older home materials."

Once the house is complete, Ellis can get back to the other green aspect of her life—her gardening. 🌱

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An advertisement for Safecoat AFM paints. The background is a close-up of a paint can with a green lid, and a white daisy flower is partially visible on the right side. The text is arranged in a clean, professional layout.

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