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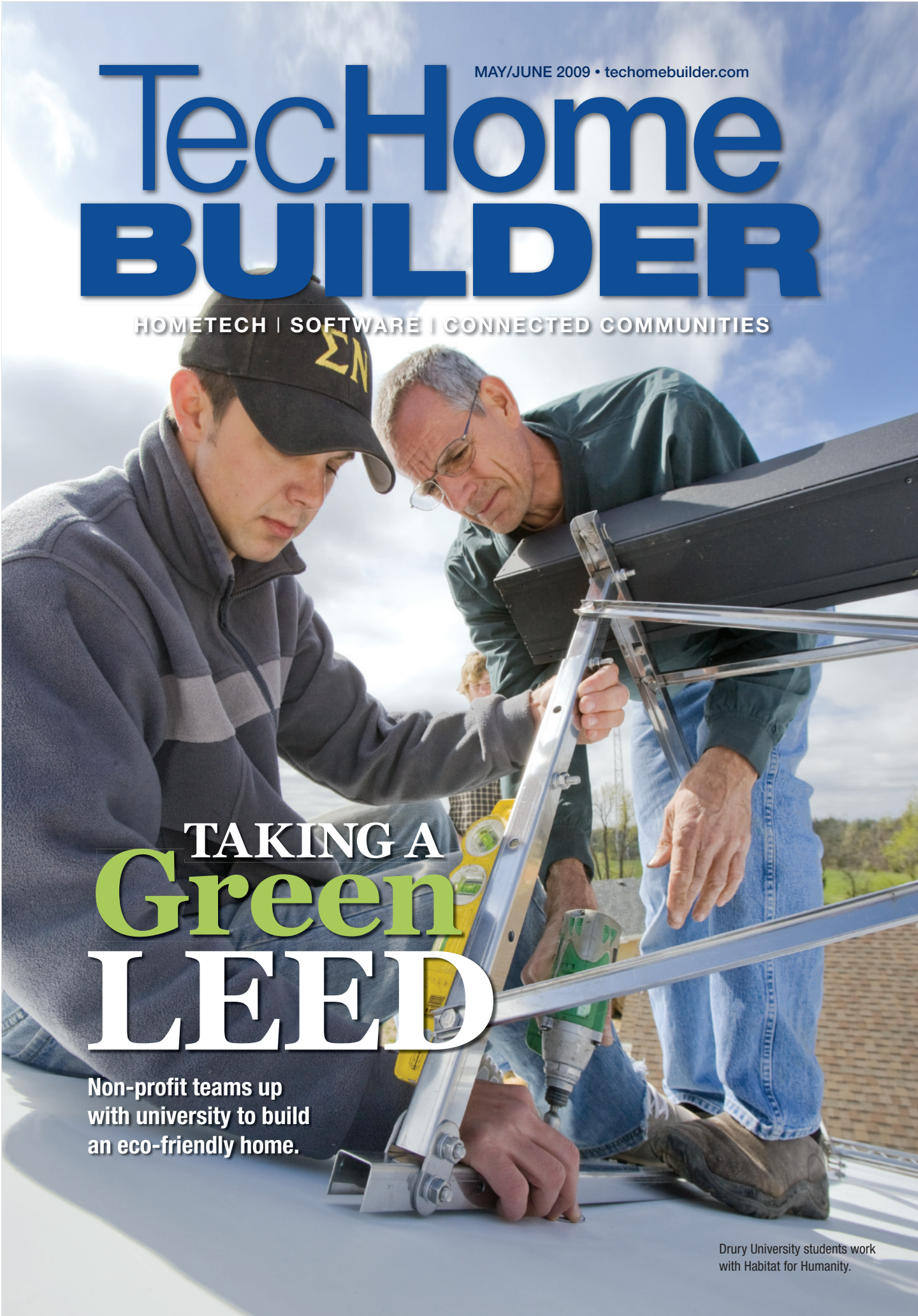

TAKING A Green LEED

Non-profit teams up with university to build an eco-friendly home.

Drury University students work with Habitat for Humanity.

Philanthropic Builder GOES GREEN

Drury University helps Habitat for Humanity build its first LEED Platinum-certified home, complete with solar and radiant heating. *by John Vastyan*

MANY OF US RECALL WHEN Habitat for Humanity began to make headlines more than 30 years ago, winning the involvement of President Jimmy Carter — he not only endorsed the organization, but also worked with it, hammer in hand. Since its inception in 1976, the not-for-profit Christian organization has built more than 250,000 houses, sheltering more than 1,000,000 people in more than 3,000 communities worldwide.

But the tides of change have found their way to Habitat for Humanity. As in any other facet of the construction industry, things are greening there, too.

Drury University's Sustainable Habitat House was completed in Springfield, Mo. last summer and has won recognition as the first-ever LEED Platinum-certified Habitat project.

"It's as green as it gets," says Traci Sooter, AIA, Drury associate professor of architecture. The home, she says, achieved the highest level of environmentally responsible and sustainable standards established by the U.S. Green Building Council (USGBC).

Traci Sooter, professor of architecture at Drury University, and students of her design/build course all stand together at the site of their "sustainable Habitat house."

A Learning Experience

Architecture students designed the home as part of Sooter's design/build course. They worked on the construction and saw the positive impact the house had on a Habitat for Humanity family.

Volunteers spent more than 5,000 hours working on the house, and Sooter used every opportunity to teach them about the home and the practice of sustainability. "My architecture students learned how to take a plan and construct it at full-scale," she says. "And they saw how a community can come together to achieve a common goal; they'll take that into their careers."

The residential sector contributes greatly to climate change and is responsible for 21 percent of U.S. carbon dioxide emissions, according to Michelle Moore, an executive with the USGBC. "Green homes like the Drury University project are an immediate and measurable way that individuals can make a difference for the environment," she says, "one family at a time."

Anna Codutti, director of development for Habitat for Humanity Springfield, says the group hopes the project will serve as a model for affordable green builds nationwide. "It's been an amazing experience working with Drury students and professors, to turn the idea of creating an affordable, sustainable residence into an actual Habitat home," Codutti says.

Amy Pinegar and her children moved into the home this past summer. The house is located in Habitat for Humanity's Legacy Trails subdivision north of Springfield.

"This house may look different from the other homes in the subdivision, but it's a great visual representation of what Habitat is trying to do with the community as a whole," Codutti says. "Legacy Trails is a low-impact development, designed chiefly to show developers the affordability and long-term benefits of environmentally-friendly infrastructure."

Drury University architecture students, along with Alex Green of Watts Radiant, tied a solar array into the home's radiant heating system.

Solar Heat Integrates with Mechanical System

On the home's roof is a 30-tube vacuum solar array that feeds a heated propylene glycol antifreeze mix directly into an 80-gallon, twin-coil indirect water heater. The glycol solution circulates in the super-insulated tank's lowest coil, exchanging heat with the large volume of contained domestic hot water (DHW), which, in turn, shares its heat with the uppermost coil that supplies heated fluid into the home's two radiant heat zones.

During summer months, the vacuum tube array provides temperatures of 160°F or higher. During winter months, the solar array may heat the propylene glycol solution to about 110°F. Data from the past couple months of home occupation show that the solar heat system will provide 60 percent to 70 percent of the heat needed for domestic water — hot water used for clothes washing, dishes, showers and baths. "Overflow" heat from the solar array is expected to meet about 10 percent of the home's radiant heat needs during winter months.

"We knew that radiant heat with solar tie-in would be the very best, most comfortable and efficient means of keeping the family warm and cozy inside," explains Alex Green, director of research and development at Watts Radiant. Accordingly, says Green, two radiant heat zones were installed in the house.

The first zone is comprised of four 250-foot, ½-inch loops of Onix EPDM synthetic rubber tubing, encased in the home's insulated concrete basement slab. The loops circulate fluid at about 110°F into the 900-square-foot slab. Two of the 250-foot loops each warm a bedroom; the remaining two loops heat the downstairs great room, kitchen and entry area.

The second zone is made up of two 300-foot, ½-inch loops of RadiantPEX cross-linked polyethylene plastic tubing that feed warmth to the 400-square-foot upstairs area of the home. These loops were attached to the upper level's subfloor by joist bay staple-up with extruded aluminum plates. One of the loops

"My architecture students learned how to take a plan and construct it at full-scale."

—Traci Sooter, AIA, Drury associate professor of architecture

feeds warmth to a bedroom and bathroom; the other PEX loop supplies heat into a bedroom and office area.

As backup heat for the domestic water system, a squat, 40-gallon electric water heater was installed. In addition, an electric boiler was installed as backup heat for the radiant heat system.

A "Platinum" Result

To help meet USGBC Platinum certification, the home also has thermal pane, low-e windows, recycled plastic carpeting in bedrooms, low-flow dual-flush toilets, composite decking material, pervious concrete driveway and spray-foam insulation.

Also, the yard is landscaped with native plants, which are drought resistant and require little maintenance. Rainwater is managed through rain gardens. All appliances and light fixtures are Energy Star compliant.

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—Alex Green, Watts Radiant

Condutti, for one, considers the project a success. "We learned a lot through the process," she says, "and I know it meant a lot to Amy Pinegar that the students were so eager to involve her during all stages of the project."

Sooter agrees. "This was an especially rewarding experience for Drury students and staff alike," recalls Sooter. "We look forward to our next hands-on, green-build project." THB

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Builders' Hot Products for Eco-Heat

Habitat for Humanity's Legacy Trails subdivision home, located just north of Springfield, Mo., included a radiant heat system with solar tie-in. Key technology in the home's hot water and radiant heat systems include:

- **Watts Radiant products.** Solar HydroControl panel, radiant tubing, radiant heat manifolds and aluminum heat dispersion plates.
- **Caleffi hydronic controls.** Solar pump station (circulating glycol fluid to the solar tank's base coil) and pre-insulated stainless steel SolarFlex tubing (transporting high-temp fluids from the panel to the indirect water heater).
- **Heat-transfer products.** Namely, an 80-gallon solar tank.
- **Crete-Heat underslab insulation system.** Two-inch foam with formed tubing runs and vapor barrier.
- **Electro Industries boiler.** It's a 6-kilowatt electric radiant wall hung boiler.
- **Apricus panel.** A 30-tube solar thermal panel.

Watts Radiant supplied the Habitat house with a solar HydroControl panel, radiant tubing, radiant heat manifolds and aluminum dispersion plates.