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Habitat for Humanity goes green

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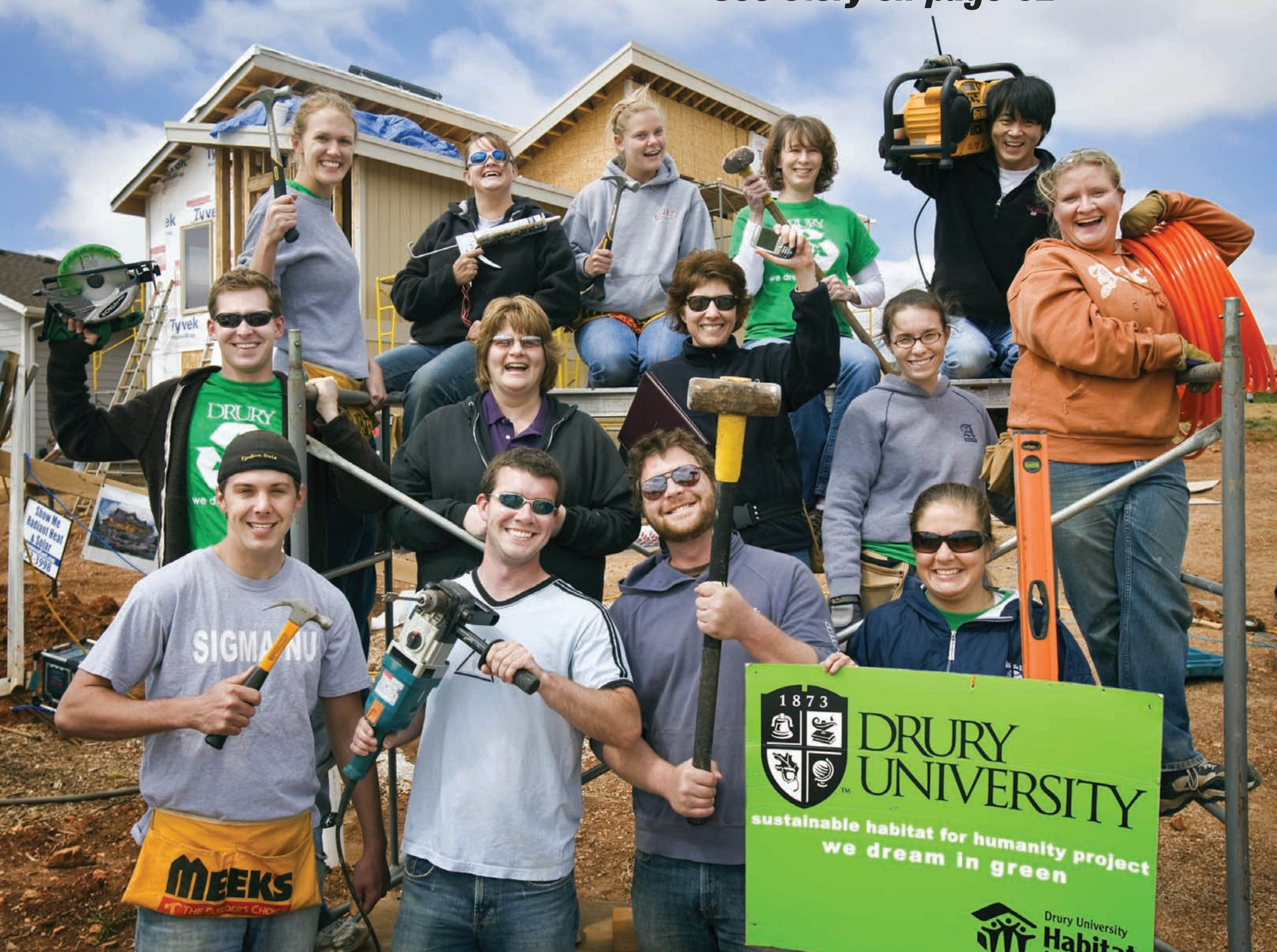


First LEED Platinum Habitat for Humanity home combines solar & radiant

Many of us recall when Habitat for Humanity began to make headlines more than 30 years ago, winning the involvement of President Jimmy Carter who not only endorsed the organization but worked with a 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.

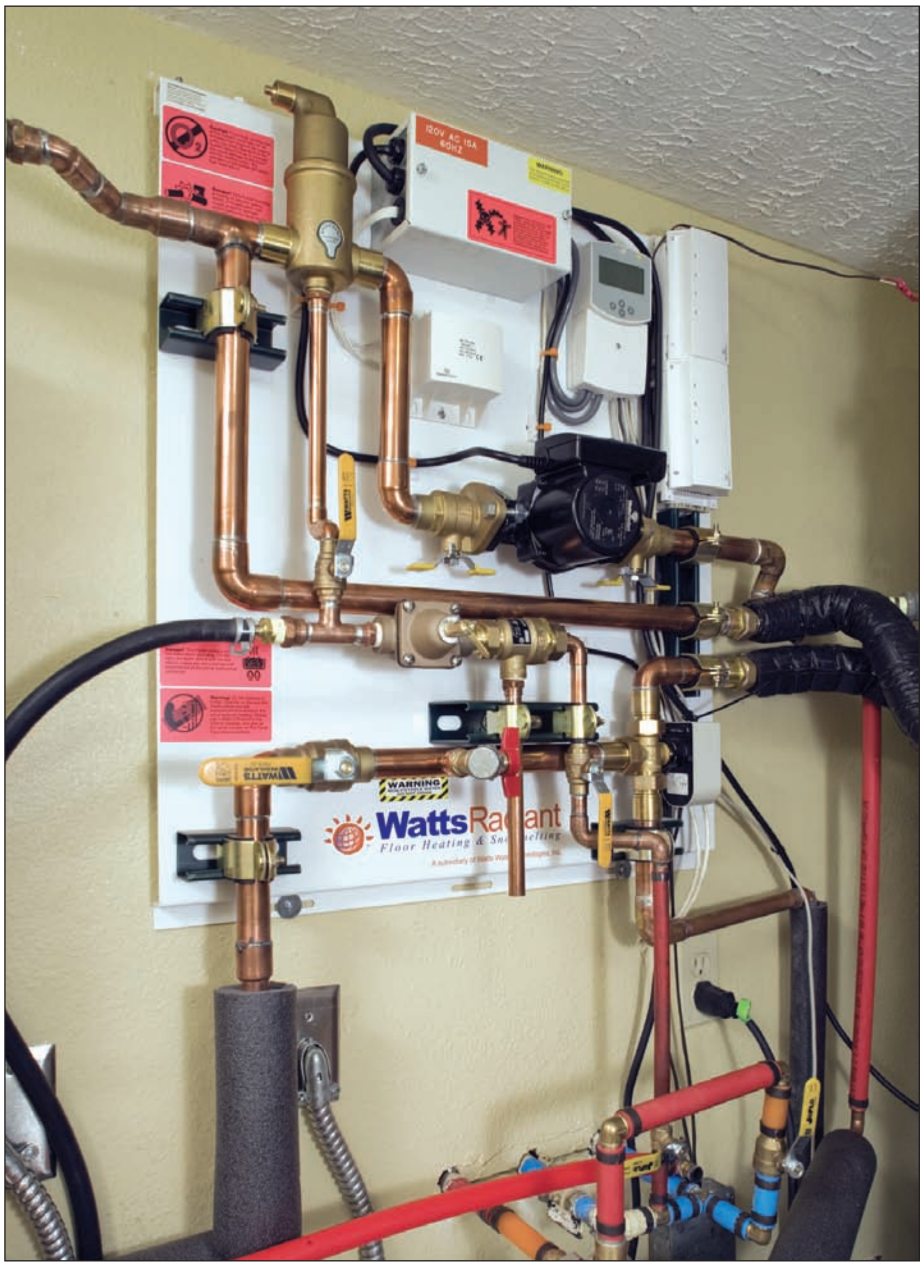
Drury University's Sustainable Habitat House was completed in Springfield, Mo. this summer, and has won recognition as the first-ever LEED Platinum-certified Habitat project.

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

A learning experience

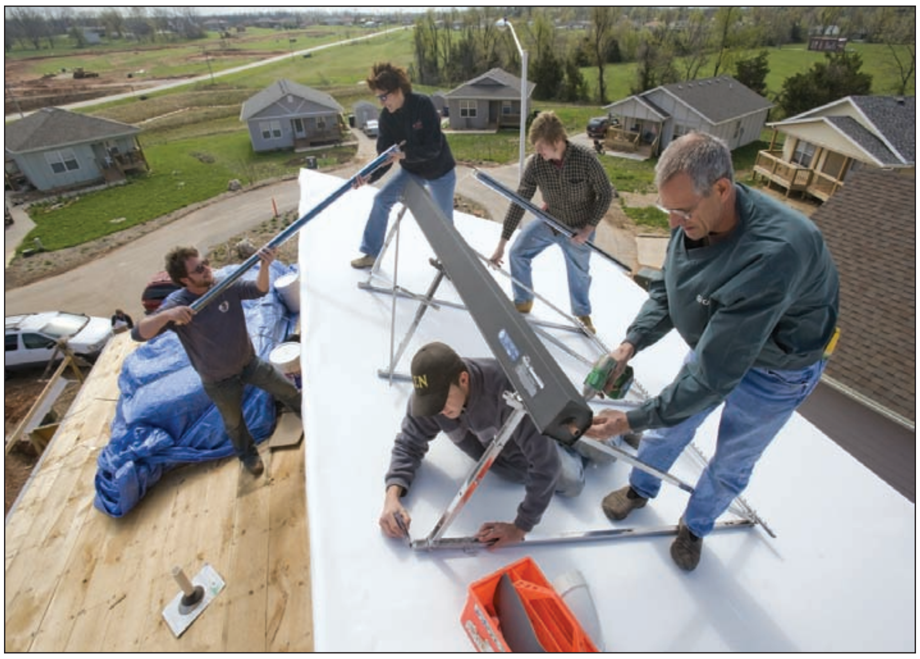
Architecture students designed the home as part of Sooter's design/build course. They worked on the construction and saw the positive impact the house had on a Habitat for Humanity family.

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. And they saw how a community can come together to achieve a common goal; they'll take that into their careers," said Sooter.



The Watts Radiant solar HydroControl panel incorporates a Caleffi Hydronic Controls solar pump station and stainless steel SolarFlex tubing to transport high-temp fluids from the panel to the indirect water heater.

"The residential sector contributes greatly to climate change and is responsible for 21% of U.S. carbon dioxide emissions," said 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 — one family at a time."



Bob "hot rod" Rohr and students install an Apricus 30-tube vacuum solar array on the roof of Drury University's Sustainable Habitat House project in Habitat for Humanity's Legacy Trails subdivision north of Springfield, Mo. During winter months, the solar array will heat a propylene glycol solution to about 110°F.

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.

Anna Codutti, director of development for Habitat for Humanity Springfield, said that they look forward to being 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 for our family partner Amy Pinegar," Codutti said. "We learned a lot through the process, and I know it meant a lot to Amy that the students were so eager to involve her during all stages of the project."

"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," added Codutti. "Legacy Trails is a low-impact development, designed chiefly to show developers the affordability and long-term benefits of environmentally friendly infrastructure."

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 which in turn shares its heat with the uppermost coil which 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% to 70% of the heating 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.

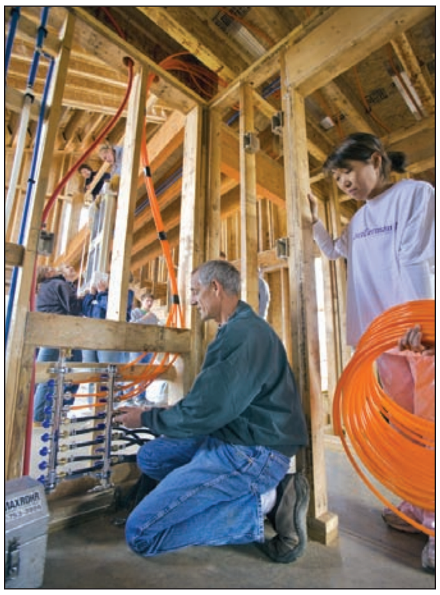
> **"This was an especially rewarding experience for Drury students and staff alike."**
> **– Traci Sooter**

"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," said Alex Green, director of research and development at Watts Radiant. So, according to Green, two radiant heat zones were installed in the house:

• The first zone is comprised of four 250-foot, 1/2" 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, 1/2" 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 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



Hot Rod instructs a student in the intricacies of installing radiant manifolds for the home's two zones.

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.

Key technology in the home's DHW and radiant heat systems include:

• Watts Radiant: solar HydroControl panel, radiant tubing, radiant heat manifolds, and aluminum heat dispersion plates;

• Caleffi Hydronic Controls: solar pump station which circulates glycol fluid to the solar tank's base coil, pre-insulated stainless steel SolarFlex tubing to transport high-temp fluids from the panel to the indirect water heater;

• Heat Transfer Products: 80-gallon solar tank;

• Crete-Heat underslab insulation system: 2" foam with formed tubing runs and vapor barrier;

• Electro Industries: 6KW electric radiant wall hung boiler; and

• Apricus: 30-tube solar thermal panel.

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. Rain water is managed through rain gardens. And all appliances and light fixtures are Energy Star compliant.

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