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All energy angles covered

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BY RICHARD AMRHINE

Gary Pretty has found a way to apply his technological know-how to something more concrete than the wireless networks he's accustomed to installing as a systems integrator.

Actually, it really is concrete--as in the insulated-concrete-form structure he's building in southern Orange County on the 185-acre homestead that's been in his family for generations.

But this isn't the customary ICF construction people around here have been doing for years, nor does this project stop there. ICF is only the beginning.

The building will incorporate a geothermal/radiant heating and cooling system in conjunction with photovoltaic solar panels that he expects will have utilities paying him for surplus power. He's constructing an overall thermal envelope that will make it easy to maintain indoor comfort levels.

"We want to create an environment that is sustainable, livable and at very low cost," Pretty said. Once he has completed what he intends to be a "showcase" project, he'll be looking to share his knowledge with anyone who wishes to partake.

"It's the cost-versus-saving thing. Once we have the proof of concept, we want to go out there and share it."

This might sound like a pie-in-the-sky outlook--until you see what he has already done. Given that, what he says he wants to do seems well within the realm of probability. He's advancing this technology amid crowing roosters penned nearby.

LEARNING FROM PIONEERS

This sort of project is not created in a vacuum. Pretty has sought out a



An array of solar panels is under construction as part of Gary Pretty's project to add an extremely energy-efficient structure to his property.



Gary Pretty stands on the second floor of his building. Above him, the ceiling has been sprayed with layers of closed-cell polyurethane foam.



variety of people who have pioneered this sort of working philosophy: construction that results in extreme disaster protection and highly economical operation while leaving virtually no environmental footprint.

One such person is Mark Baker of Florida's central east coast, south of Cape Canaveral. His home destroyed and family displaced by a hurricane, Baker built a replacement home that turned out to be "Florida's Showcase Green Envirohome." The whole story can be found at fsge.net.

Gary Pretty's energy-efficient two-story building, rising next to the family's conventional ranch home, is also designed to be stormproof thanks to its insulated-concrete-form construction.

Pretty said he has gained immense knowledge from Baker, and will in turn share with Baker the knowledge he gains about the heating side of the technology, since Baker has needed only to pursue the cooling side.

Pretty also turned to James Estes of ThermoBlock, which is a newer variety of ICF that had never before been used in this region of the country.

ThermoBlock sections have four cylindrical holes and are stacked like conventional ICF blocks. But they are made of closed-cell polyurethane rather than polystyrene. There is virtually no off-gassing, and the polyurethane is an extremely efficient insulating material. The foam is by nature moisture-resistant and impervious to insects and mold.

Rebar and steel framing are inserted in alternate holes, and the holes are then filled with concrete. Pretty said the ThermoBlock design ends up using 2.5 times less concrete than conventional ICF blocks, and thus uses more of the insulating foam. The walls end up with a value of R-38 (code is R-15).

The attic is insulated with closed-cell polyurethane sprayed in layers to a thickness of 4 to 5 inches, providing a value of R-50 (code is R-38). Crevices are filled with a product called Great Stuff, which also uses polyurethane.

The envelope starts with a concrete footer, which in this case is stepped to meet the hillside on which the house is built. As with the rest of the structure, everything is planned in advance, such as the tubing for the radiant heating and cooling liquid, which is embedded in the concrete, and every sort of wiring.

For the geothermal system, Pretty is using WaterFurnace equipment. The tubing loop used for it is buried 6 to 7 feet deep to assure a uniform 50- to 55-degree temperature for the circulating liquid. Pretty figures geothermal has proved itself so well that it ought to be the standard by now for replacement systems and new residential construction.

LOW-HANGING FRUIT

Pretty loves the term "low-hanging fruit." He uses it to refer to the steps he or anyone else can take to reduce their energy consumption. The fruit to be picked depends on whether one is addressing an existing structure or building new.

Adding insulation, installing geothermal, sealing cracks, replacing windows and creating a crawl-space vapor barrier are all things any homeowner can do.

With new construction, low-hanging fruit not only includes doing those things and using the latest materials and features, it starts with the orientation of the home, and using passive solar power to best advantage.

Although Pretty has placed his solar panels in a sunny area away from the structure rather than on its often-shaded roof, the position of the house itself is still important. It determines where large windows will do the most good--where they will be shaded by trees in the summer, while drinking in sunlight in the winter when the leaves are off the trees. Though he's using some windows marketed on their ability to reject solar heat, the glass on the back side is designed to welcome it.

The partially painted steel roof also has a role in accepting or deflecting solar heat.

A couple of other items Pretty is incorporating: a 1,500-gallon warm-water storage tank, or "hot-water battery," as he calls it, that is buried and insulated with the same spray foam, and a buried 2,250-gallon water collection tank to capture stormwater runoff for irrigation or other use.

He's also planning an interior "living wall" with plants that will help improve indoor air quality.

KEEPING COSTS DOWN

Pretty has taken full advantage of the federal tax credits allowed for qualified energy-saving equipment and materials. Though the 30 percent credit went away after Dec. 31, a smaller program is still available. He was also able to take advantage of ThermoBlock's efforts to expand along the East Coast, obtaining the blocks nearly at cost, given that he plans to showcase his project to the public.

Pretty aims to have the structure completed by the end of the summer, and looks forward to "watching the [electric] meter go in the other direction."

Then he plans to turn his new space into a small brewery, where he'll produce beer using the same heat-exchange technology that he has learned during construction.

Pretty praised Orange County officials for their attitude toward his venture.

"They have been super helpful and supportive, and learning as they go," he said. "They monitor, watch and learn. It has been a very pleasant surprise."

Richard Amrhine: 540/374-5406

Email: ramrhine@freelancestar.com

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