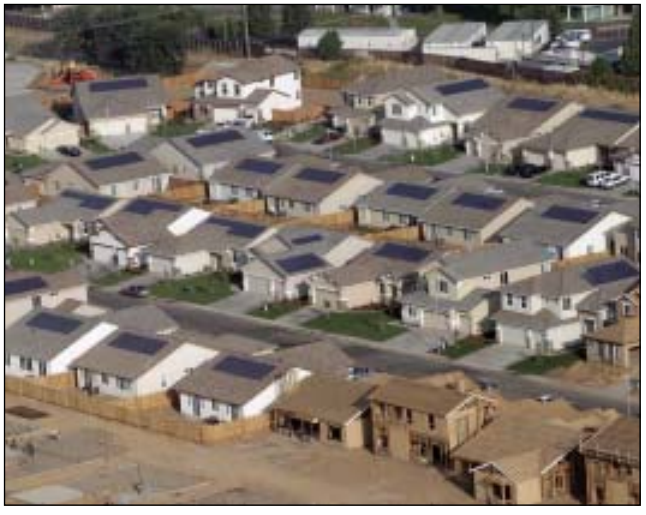
Extreme Green

Zero-energy homes aim at the smallest footprint possible

Even as the green building trend grows, Florida real estate developer Richard Schackow admits he's taking a risk.

Schackow appears to be the first in the state and among the first in the Southeast to launch a development of hyper-efficient solar-powered "zero-energy homes." Schackow, who was planning to break ground in May on the first two of 27 homes in centrally located Gainesville, says he would want to live in a zero-energy home — and he thinks like-minded buyers will give his homes an edge in a declining real estate market.

"I am trying to beat the marketplace on something that has not yet been successfully accomplished, which is a little bit scary," he says. "But it's very exciting."



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Paving the way. Zero-energy homes at Premiere Gardens — a "solar subdivision" in Rancho Cordova, Calif. — combine photovoltaic panels to generate electricity with an energy-efficient enclosure to conserve energy.

ZERO-ENERGY CONCEPT

Zero-energy homes both conserve and generate energy, with the goal of returning as much electricity to the grid as they use. Few actually achieve that goal, but there are about 2,000 "near zero-energy" homes nationally. Most are in California, where the concept got an early lift from the state's brownouts. Those events left many residents suspicious of the power grid and open to alternatives. Zero-energy homes also got a boost from California's post-brownout rebates and credits for solar cells and other energy-saving features — features whose high cost might otherwise prevent their adoption.

"It makes the economics a little bit more attractive, especially if you have the high utility rates they have in California," says Tim Merrigan, senior program manager for the National Renewable Energy Laboratory.

California may lead, but the zero-energy concept got perhaps its most important early boost in Florida. There, in 1998, the Florida Solar Energy Center pioneered a near zero-energy model home in Lakeland. Data from trials with that home have served as a marketing tool not only for the center but also for the U.S. Department of Energy's Building America program and the National Renewable Energy Laboratory.

As energy prices rise, there's no question that demand for green homes and buildings is increasing. But for southeastern builders, whether to try "extreme green" zero-energy homes comes down to practicality and finances.

PRACTICAL DIMENSIONS

On the practicality side, the region's hot, humid climate would seem inimical to the concept. But Danny Parker, principal research scientist for buildings at the Florida Solar Energy Center, argues the contrary. He says the institute's experience with the Lakeland home and a second-generation home in New Smyrna Beach have given scientists a blueprint for building.

In Lakeland, scientists built two 2,425-square-foot homes, one a standard "control" home and the other the zero-energy home. The scientists then spent the next four years comparing the homes' performances. The difference was impressive. Between July 2001 and June 2002, the zero-energy home consumed only 2,150 kilowatt-hours of utility grid power, a whopping 90% less than the 21,240 kilowatt-hours consumed by the control home.

That happened because of the zero-energy home's combination of energy efficiency (a huge factor) and energy production features.

Parker explains that the average home uses at least 50 kilowatt-hours daily, while a large and expensive photovoltaic system can generates perhaps 17 kilowatt-hours. As a result, zero-energy homes rely on "conservation squared, generating once," as he puts it.

Some of the Lakeland home's efficiency upgrades are mainstays in mainstream green homes, such as double-

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Utility interactive. The photovoltaic panels (right side of the roof) on a zero-energy home in Martin County, Fla., supply some power back to the utility company. Last year, Florida passed an expansive rebate program for photovoltaic cells, and other southeastern states are expected to follow suit — measures that will likely make the initial cost of providing energy production to homes a bit easier to swallow.

glazed windows and high SEER air conditioning units. But the zero-energy home also benefits from having all ducts built within the home's conditioned envelope, rather than in the attic where hot temperatures rob cooling power. The home has a highly reflective white tile roof that has proved adept at shunting sun away. And it has predominantly tile flooring — key in hot climates because of the ground temperature of 68° to 70°F, often 20° below ambient temperature.

"The average tile floor in a 2,000-square-foot house is providing half a ton of free cooling 24 hours per day," Parker notes.

High-efficiency appliances and lighting can further reduce electricity use. That said, there are some seemingly intractable energy sinks — clothes dryers, for example. And modern electronics don't help. For home entertainment, Parker says, "things are really going in the wrong direction for zero-energy." Computers, flat-screen televisions, and always-on technologies such as TIVOs together sap as much power as a refrigerator.

"To do this is hard, but it can be done," Parker says of near-zero-energy homes. "It requires a lot of attention to detail."

Cost is another big issue. The Florida Solar Energy Center spent about $23,000 on efficiency upgrades and $40,000 on solar cells for the Lakeland home, expenses that have dropped to about $15,000 and $30,000 today, Parker notes. Still, that's a lot to add to the home's purchase price, he admits. Last year, however, Florida passed an expansive rebate program for photovoltaic cells. Other southeastern states are passing similar measures.

Tim Merrigan says the hope is that the added cost will make sense over the long term.

"If you can make it so that your energy savings on a monthly basis on your utility bill are less than an increased mortgage payment, then you are cash-flow positive," he explains.

Whether zero-energy homes take off will likely depend on how much energy costs increase. If the trend grows, it could sharply reduce home electricity demand nationally. A 2006 report by the National Association of Home Builders Research Center estimated that, with continued research and development and tax credits for homeowners, proliferation of zero-energy homes could reduce energy consumption by single-family homes 17% by 2050. — *Aaron Hoover*