



The Future's Bright

For "green" buildings, award-winning architect Alicia Ravetto's outlook is sunny.

BY BOB GEARY

Architect Alicia Ravetto is an optimist when it comes to energy-efficient building designs and the use of solar heating and daylighting in our homes and offices. She points to North Carolina's generous tax credits for solar systems, considered the best in the country by the experts. State law requires that public buildings be designed with energy conservation in mind, and the Triangle J Council of Governments has new guidelines out on how to make that happen. Nationally, Ravetto went to a conference in Austin, Texas, two months ago, where she was given a "Best Practice" award for one of her buildings. Conference organizers expected 1,500 to attend; they got 4,000. "They were blown away," she says.

January 29, 2003

COVER FEATURE Then came news that the White House, which had taken the Jimmy Carter-era solar panels off its roof in Reaganite days, had begun--quietly, without fanfare (don't tell Dick Cheney)--to install a new line of photovoltaic cells, units that can capture and store the sun's energy output. "It's happening," Ravetto says brightly. "It's not in the mainstream of architecture yet, but we're in the midst of a transformation, and it is happening."

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Courtesy Of Alicia Ravetto

**Alicia Ravetto says solar's time has come:
"It's not in the mainstream of architecture yet,
but we're in the midst of a transformation, and
it's happening."**

Well, she's the expert--about solar design (or as its proponents have started to term it, sustainable or "green" design) and also about transformations. Solar's been the one constant in her professional life. But it's led her through a series of changes. A native Argentinian, she got interested in the emerging field of solar design as an architectural student there, and her first job in 1980 was with Argentina's National Council of Scientific Research. But all the best research was being done in the United States, she says, and she was drawn, first, to UCLA (on a Fulbright Scholarship) and thereafter to Innovative Design, the Raleigh firm that's been a longtime leader in solar applications for schools and other institutional buildings.

Along the way, she's gone from researcher to practitioner, from an early emphasis on studying energy-efficient designs for schools to designing commercial buildings, and lately from commercial to residential designing as well. She worked with Carrboro architect Charles Blunden on the Acadia co-housing community in Orange County, a pathfinding village of solar panels, small building lots and shared common space. Now she has her own practice in an office building that used to be a house on West Weaver Street in Carrboro.

Ravetto's award came from the Sustainable Building Industry Council, and it recognized her work on the new headquarters building in Pittsboro of RAFI-USA, the Rural Advancement Foundation International-USA, that is.

The RAFI headquarters is state-of-the-art solar and daylighting. What's that mean? In simple terms:

1. The sun pours through windows on the south side of two attached buildings.
2. The lower windows light and heat offices on the south side; the upper windows send light through to the north side. (See diagram.)
3. The sun's energy is captured and retained in the natural flooring and brick walls and fireplaces.



Courtesy Of Alicia Ravetto

The sun's energy is captured and retained in the natural flooring and brick walls and fireplaces across from and beneath the windows.

4. Energy costs are low, and the working environment is bright and and uplifting.

That's just the once-over, of course, for a project that was front-and-center in Ravetto's life for four years, starting with a daylong design charrette that brought together RAFI's staff, community leaders and building experts. RAFI-USA promotes sustainability and equity in agriculture, and its folks wanted to walk the talk in their own building. Ravetto's design helped them realize their goal.

Step one was orienting an elongated building--actually two attached buildings--on an east-to-west axis, maximizing the southern exposure and, thus, the opportunities for south-facing windows. An 1830 building on the site was carefully deconstructed and the materials recycled, allowing RAFI to have a gorgeous white pine floor at a fraction of what such a thing would cost new. Driveways and parking areas were carefully positioned to protect hardwood trees (and their shade--a must in the summer for a solar-heated place), and they were graveled to minimize water runoff.

It's not a fancy place at all. Rather, it's beautifully simple.

Bottom line, in dollars and cents: When Ravetto benchmarked RAFI's actual energy performance using the Environmental Protection Agency's online rating system, it scored 90 out of 100, making it the first building in North Carolina ever to receive the EPA's "Energy Star." (For you building owners, it uses 25.1 kBtu/sq. ft, which translates to a cost of 60 cents a year per square foot to operate. For the rest of us, Ravetto says that compared to the average building of its size, RAFI's headquarters emits 300,000 pounds less carbon dioxide every year.)

As nice as that all is, the most important thing for RAFI is that it's a great working environment that requires literally no artificial lighting when the sun shines. Ravetto's an optimist, but she will admit to a combination of puzzlement and irritation when she thinks about how little of sustainable design has penetrated the North Carolina building industry to date. Public buildings are the exception (and a lot of her work's been done on new public schools), but for all the hoopla over the RAFI building, she's still waiting for her next private-sector commercial client to call.

And even in the housing market, North Carolina lags badly behind California, for example, where solar panels on the roof are becoming commonplace and, in new houses, solar hot water systems are gaining, uh, steam. One reason for solar's surge in California is the state's shortage of energy from traditional power plants--shortages both real and Enron-induced. In contrast to California's deregulated utilities, however, North Carolina retains both tight regulation of energy supplies and, so far, enough Duke Power and Progress Energy capacity to keep utility rates relatively low.



Photo By Alicia Ravetto

RAFI's building, seen from the southwest.

Still, most new houses could be made "green" very easily and at relatively little additional cost on the front end, but big down-the-line savings on the monthly electric and heating bills. The same is true of many house renovations, Ravetto says.

New Houses

If possible, she says, let someone familiar with the basics of solar design help you with site selection. A site that allows lots of south-facing windows is best. If the land has a slope, best if it's south-facing too. Then, of course, the building design can be customized to the site for maximum "green" impact.

For what's called "direct gain" solar heating and daylighting, you need the sun coming through from the south and the "thermal mass" inside to grab and hold its energy. That usually means a floor area, or a part-floor, part-wall combination, made of concrete, tile or brick--in other words, something porous. Wood works too, though the area needs to be a bit bigger. What doesn't work: Carpeting.

You also need a heat source under the floor for when the sun don't shine.

The ratio of window openings to thermal mass is critical, Ravetto says. One reason solar heating failed to catch on in Jimmy Carter's day is that the equation wasn't well understood, with the result that in many homes too much heat was captured and held, especially in the summer. A must-have in summer: awnings, trees or some other way to dim the incoming sunlight.

In new houses, installing solar water heating is also "a no-brainer," Ravetto says. One or two 4-by-8-foot solar panels on the roof (or a slope) and connection to a heating element--a pipe--will usually do it. Again, a backup heating source is needed, but a solar system will slash your heating bills and--with the state tax credit--pay for itself in seven years or less.



Photo By Seth Tice-Lewis

RAFI's actual energy performance scored 90 out of 100 using the EPA's online rating system – the first building in North Carolina ever to receive the EPA's "Energy Star."

Renovations

Here, Ravetto says, your options are limited if your house lacks southern exposure. But assuming you can put more windows in on the south, doing so--and putting down a floor, wall or fireplace that acts as a collection system--will pay big energy-saving

dividends. Ditto a solar hot water system.

If you do nothing else "green" in your renovation work, she says, you should make sure your insulation is adequate and seal up the leaks around your windows and doors. "First things first," she says, laughing. "Get a caulking gun and use it."

Ravetto says the up-front costs and utility savings vary from project to project. They can be accurately estimated, however, using a software package called Energy-10, the same one she used to model the RAFI project. More and more architects are learning to use it, she says. One way they do is to take a workshop she teaches in concert with the N.C. Solar Center at North Carolina State University.

A typical, high-quality solar home, according to Ravetto's husband, Paul Konove, a Chatham County building contractor, might cost 5-15 percent more to build than a conventional house. It depends on the site and whether the project includes solar water heating and the kind of framing, casement and cross-ventilation materials that have cut the air-conditioning bills in their own, 1,650-square foot house to a high of \$40 per summer over the last six years.

That's right. No more than \$40 all summer for air conditioning. And their other utilities run about \$600 a year, versus typical costs for a new house that size of \$1,200 or more.

And remember, the state offers a 35 percent tax credit for qualified renewable energy projects, up to a limit of \$3,500 in credit for solar space-heating and an additional \$1,400 for solar water-heating systems.

Photovoltaics like the ones used on the White House have a longer payback period due to their relatively high cost (\$15,000-\$25,000 is typical) and still-low efficiency. But they're getting better and cheaper every year, Ravetto says. "And you can always add on in the future," she says. ■

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