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Alumni Profile

Solar engineer and home designer Susan Guernsey Nichols (Barstow '59).

Susan Nichols Finds Her Place in the Sun

Susan Guernsey Nichols (Barstow '59) and her husband Wayne (Pem-Day '59) are president and vice-president of Communico Inc., a passive solar construction company in Santa Fe, New Mexico. Their present project, La Vereda, is a 19 unit passive solar, single-family residential development built in three clusters on ten acres within the Santa Fe city limits.

When asked how they got their start in the solar home building business, Susan explains, "We got the message in 1972, when our heating bill in January was $500 more than our mortgage payment and we were only heating half the house. It was an old adobe built by Earnast Thomas Seton and the Indians in the 1930's. It leaked and had a sand roof and no insulation, not unlike a lot of the American housing stock. Conservation and solar seemed the obvious antidote to high fuel bills, particularly in northern New Mexico, which is blessed with clear days 75% of the year."

"A big part of our energy problem," according to Wayne, "is energy waste which can be quickly solved through a comprehensive conservation program. Once we are saving energy through conservation, we can start generating our own energy through solar. The real issue is whether to go with active or passive systems."

"We made the decision," says Susan, "to go with passive systems as the result of a market experiment at First Village, our first solar subdivision. Wayne was part of a research group called Sun Mountain Designs. The group really did more talking than building, and most of the experiments were with active air systems; the brainstorming that went on in Sun Mountain Designs was really the spark behind the design of our present home and behind our experiment at First Village, an 8 home development on 40 acres, 4 miles south of Santa Fe. First Village was the laboratory in which Wayne and I experimented with active and passive designs to explore the relationship between construction costs, system efficiencies, and buyer acceptance. Our goal was to begin with two homes (one active and one passive), in order to compare costs, performance, and buyer preference in the market."

The experiments at First Village were a valuable learning experience. Unit 2, the active air collector/rock storage system, was more complicated and costly to build, requiring more operational and maintenance expenses than the passive system in Unit 1, the Balcomb House, which combined a greenhouse, rock storage, and interior mass walls. It was simpler, cheaper, and more efficient than Unit 2. The Balcomb House was also the first solar house built on spec in the state of New Mexico. It has been featured in national building magazines and was recently pictured in *Life*. It could be called "the Passive Solar National Monument."

Susan's role as an innovative engineer developed at the time Communico decided to apply for a HUD demonstration grant for passive design for the Balcomb House. Until that time, the engineer format for solar

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performance existed in a rigorous format for active, not passive solar systems.

Susan's role was to qualify the engineering for passive systems. Her resulting thermal analysis defined the efficiency of a collector mounted on the roof. Susan received the first HUD demonstration grant for passive design for the Balcomb House in 1975. Doug Balcomb, the Los Alamos engineer who bought the home from the original purchaser, monitored its thermal performance and the data came back in line with Susan's predicted performance efficiencies. The Balcomb House has a solar heating fraction of 90%.

Beyond the cost and performance data, the most important result of the work at First Village was Wayne's discovery and intuitive understanding of passive solar as a real estate product. With passive solar, the building structure itself is the collector, storage, and distribution system combined in a cost effective package. This is a fundamentally different concept from a piece of manufactured hardware mounted on the roof. The passive system is integrated into the construction of the dwelling through careful siting, orientation, design, and engineering.

"In our passive solar homes," says Wayne, "we are selling more than collector efficiency. We are selling thermal comfort in your home and in a neighborhood of solar homes. In many cases, prearranged long-term financing is the key to a sale. That means, selling the lender, which means selling the appraiser, in order to sell the home."

The systems which are fine-tuned at First Village (greenhouses, clerestories, and Trombe walls), became foundations for the Nichols' second generation solar village, La Vereda, which is enjoying great market success and national publicity. Volume of sales has jumped from 2 to 10 homes a year.

"The market was there waiting for us with few other options to choose from," says Wayne. "Our careful analysis and 3 years of experimenting in a live market have paid off."

In tandem with their present project, Wayne and Susan are developing the "Heat Wall" in a joint venture with Crimsco Inc., a Kansas City Firm. The "Heat Wall" is a double glazed 4' x 8' water loaded Trombe wall which can be readily installed on the south side of an existing structure or integrated into new home designs. It can be installed on frame, stemwall, or slab construction, requiring only standard construction skills. When sheet rocked, the "Heat Wall" gives the appearance of any interior wall surface.

What's ahead for the Nichols? The obvious direction is to move toward higher densities and multi-family dwellings in order to lower costs through common wall construction and production building techniques. They expect their next project to incorporate the most cost effective, efficient designs and systems designed and tested at La Vereda.

Beyond the next project? "Planned passive solar communities," says Wayne without blinking, "and an electric car in every garage."

Model One solar home at La Vereda. One of Susan's two-bedroom passive solar designs.