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mindfully modern

A thoughtfully designed and recently updated older home delivers solar technology with an original sense of style.





From the greenhouse at the home's entry to the central light-filled atrium that serves as the dining room, this house was designed with the sun in mind.

By Laura Sanchez

Photography by Robert Reck

Architect: Bruce Warren Davis Architect

The phrase "a warm and inviting house" tends to conjure images of flowered wallpaper, chintz ruffles, and whatnots filled with Steiff bears.

What should we make of a wonderfully warm and inviting home where corrugated metal complements shelves holding anti-matter research devices? Industrial materials and clean-lined minimalism distinguish the interior of Michael and Karin Holzsheiters' home north of Santa Fe. Bruce Davis, the Albuquerque architect who designed the house, describes its aesthetic as "very mature, sort of classic, Zen."

So what creates the warmth and intimacy? Part of the answer is the color palette—warm sand and cream stuccoes, brick and blonde wood floors, accents of saffron and crimson paint. In the living room, two pots of tiny yellow orchids echo brilliant yellow upholstery.

A sense of humor lightens the eclectic mix of furnishings and art—pre-Columbian reproductions, simple chests in Colonial style, and cabinetry from Ikea and the Room & Board store in Denver. The scale of the house is comfortably human, with the living and dining rooms about 18 by 16 feet. Karin Holzsheiter says, "We use all the rooms. There's not one that stays empty. That's a good sign for houses."

Besides, any attempt at chilly, oversized splendor would clash with the magnificent surrounding landscape.

But all those factors take second place to the warmth the house draws, technically and emotionally, from the sun. Davis used a combination of windows, clerestories, skylights, and reflectivity to modulate natural light in a way that warms and illuminates without glare. Karin says that when she recently returned from Europe, being in her own light-filled house again was "like a vacation."

The warmth is not just subjective; it shows up on a thermometer. The Holzsheiter house used pioneering solar energy technology when Davis designed it in 1988 and 1989. Along with Davis, the Holzsheiters, and solar technology, a fourth major party influenced





Homeowners Michael and Karin Holzscheiter and architect Bryce Davis put function before convention, choosing adobe walls and metal for siding and a portion of the roof. The adobe stores the sun's heat, while the highly recyclable metal has a long life span.



the design—the site, a narrow finger of land jutting north from the foothills of the Sangre de Cristo Mountains. “Passive solar” calls to mind long south-facing walls of glass, but the narrow lot wouldn’t accommodate a long south-facing wall, and the most spectacular views are to the west, north, and east. The space was so constrained the site had to be graded down to create a pad big enough for the house. Karin says they tried to be very conscious of conservation and avoid destroying anything, even though Santa Fe County’s strict hillside ordinance had not been passed at the time.

The original house comprises four “pavilions” following the site’s north-south axis—two with adobe walls and flat roofs, two with pitched roofs and wall sheathing of standing-seam metal.

Starting at the south, a small greenhouse serves as a main entry and solar collector. Next, an adobe rectangle with a large clerestory encloses the living room and kitchen. The kitchen opens north into a high-ceilinged dining room with a pitched roof and exposed metal truss tie rods. A Skylid installation admits sunlight to heat the room. Continuing north, another adobe block with clerestories creates a private zone with two bedrooms and two baths. Large glass doors in each bedroom face south.

To gather enough sunlight, the clerestories had to be quite tall, risking the “down a well” effect that often plagues high-rising installations in relatively small rooms. But Davis neutralized the effect by using beams and other framing elements at ceiling height under the glazing. One hardly notices the Skylid’s height above the metal trusses and intricate web of small hanging lights.

The April 1991 issue of *Home Magazine* featured the house and its Skylids in the dining room roof. The Skylid tracking louvers, since discontinued, came from Steve Baer’s Zomeworks, an

Modern furnishings and select applications of bold color complement airy interior spaces. The pine flooring and other native, biodegradable building materials contribute to the home’s sustainability.

Albuquerque source of innovative solar technology since 1969. Davis says the louvers, something like large Venetian blinds, can "court the sun or evade the sun." The sun heats gas in two connected canisters that are attached to the louvers. The direction of the sun's rays changes during the day, changing the relative weight of the canisters as the expanding gas flows from one to the other. The changing weight adjusts the louvers' position and controls the amount of light admitted to the house.

Baer reviewed the Holzscheiter design but didn't bother to run calculations. "Perfect," he said. "It's gonna work." Although the house's desert promontory is very windy, the only other heat the Holzscheiters regularly use is the living room fireplace and a wood-burning stove in the dining room. Karin says they use the electric backup heat occasionally in winter in the bathrooms, but the radiant electric heat in the dining room ceiling has never been used.

Bruce Davis had the chance to remodel his own work when the Holzscheiters decided to expand the original 1,870-square-foot house. The first addition added a

WHAT MAKES IT GREEN?

Architecture and Passive Solar Features

The entire house was designed according to passive direct-gain solar principles.

Carefully sized and placed windows, clerestories, and skylights control sunlight. Clerestories let the sun in high, allowing the benefits of direct solar gain without blinding occupants with the sun or bleaching upholstery.

Massive adobe walls throughout the house absorb the sun's heat. The adobe rooms have wood floors, while frame-walled rooms have brick floors for mass.

Tracking louvers on the skylights in the dining room automatically follow the sun. The louvers open when the morning sun heats the sensors, and solar heat warms the room throughout the day. In the late afternoon, the aluminum louvers shut, insulating the skylights against cold nights. In the summer, the closed louvers prevent the room from overheating.

Set inside the dining room's south-facing windows, fiberglass reinforced plastic tubes filled with water collect the sun's heat.

Giant awnings called shade sails shade the side patio and keep the west side of the house cool.

A passive thermosiphon water heater heats domestic water without electricity or a pump. The sun heats water in a collector down the hillside. The heated water naturally rises as the cooler, denser water sinks. This creates a siphon, supplying hot water up to the house.

Materials and Construction

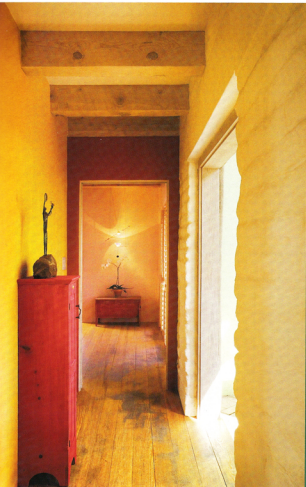
The home was built with native materials, including adobe, plaster, and pine flooring—products that do not involve a great deal of toxicity in their manufacturing and disposal.

The home has an efficient wood-burning fireplace and wood-burning stove to supplement the passive solar heating.

Windows are insulated with coverings of wood, cotton, bamboo, and paper—natural, recyclable materials with minimal outgassing.

Metal siding and metal roofing on a portion of the house is low-maintenance, highly recyclable, and has a long life span.

Native plants outside require little water, and where possible, roof water is directed to plantings.







Sunlight enters the home in specific, controlled ways through deliberately placed skylights, windows, and clerestories. Rooms that contain frame walls also have adobe walls to facilitate passive solar collection. The appropriately sized kitchen, minimalist and sleek, opens to the living area.

guest room and bath west of the bedroom block, along with a connecting deck to the living room. The second addition wrapped a sauna, larger closet, and spa around the main bedroom. By then, the law required strict protection of the terrain. The addition is set at an angle to fit on the narrow building site while still incorporating a heavily glazed wall on the south.

The Holzsheiters, both from Germany, were working as theoretical physicists at Los Alamos National Laboratory when the house project began. Davis centered the design on the dining room to accommodate their lifestyle, which includes having lots of friends over to eat. The couple constantly interacted with the design, Davis says. He considers them "very intelligent participants who understood the thinking behind features."

The Holzsheiters were committed to incorporating passive solar and were "willing to try things that don't look conventional, to let the house look unusual." They were also interested in industrial style and a Japanese aesthetic. In the late 1980s it was considered shocking to combine either look with adobe. Everyone expected Pueblo or Territorial Revival style, and prominent architects such as Antoine Predock and Frank Gehry hadn't started using metal to sheath walls. Davis says the Holzsheiter house was pivotal in his own career in moving him toward a more modern and innovative set of materials. Davis originally planned to use New Mexico travertine for a lavatory countertop, but the Holzsheiters wanted something different—a glass countertop. Davis says no one could cut a hole for the basin in glass until he found a place that used a water-jet gun to do just that, creating the



Unique lighting fixtures and eclectic furniture groupings distinguish each room in the house, including the bedroom. A variety of coverings insulate the home's windows and block the sun when it becomes overbearing—particularly important for south-facing glass.



first glass-topped lavatory in the area 10 years before the avant-garde picked up the idea.

While the concept of environmentalism is very popular, Davis says most people don't want to go further than using earth tones and rounded corners. Davis considers most current architecture to be "incredibly oblivious" to environmental factors. "Enormous amounts of glass are not a very ecological thing," he says of a recently built, heavily glazed Albuquerque building. "It's the placement of the glass that's important."

Another environmental mistake is ripping out grass to put down plastic covered with gravel. The gravel creates a "heat island" and prevents native xeric plants from taking hold. The plastic keeps water from soaking into the ground. Davis prefers reestablishing native vegetation and other low-water-use plants. His goal is to enhance land by healing the damage that has already been done. He turned his own place, "a ruined corner store surrounded by asphalt," into a "small urban wilderness."

Davis says water harvesting and conservation are as critical as energy conservation. Asked New Mexico's second most popular question, "Evap cooler or refrigerated air?" Davis says, "Neither." He prefers night sky cooling, specifically a system called Double Play, also designed by Steve Baer. When the temperature reached 105 degrees in the summer of 2005, Davis' Double Play system kept his studio at a comfortable 75 degrees. The system circulates water through panels on the roof and plastic pipes inside the house. The night sky is very cold, Davis says, colder than the temperature of the air. Heat radiates into the sky from the water circulating through the roof panels. The cooler water grows heavier, and gravity pulls it back into the pipes in the house to pick up more heat, after which it rises again and discharges more heat to the sky.

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not sacrifice comfort or beauty in its quest for green. It's not a place that will be singled out for ridicule or criticism by neighbors. Frankly, the neighbors will notice little out of the ordinary with the possible exception of the solar collectors.

"We're not taking the VISION House more seriously than we should," says Jones. "It's not the perfect answer to sustainability, but allows you to look at the buffer of items you might choose from. It's something to promote thought and cause people to think about the built environment and their relationship to it."

The home's green features, which meet the tougher-than-national Gold standard set by Build Green NM guidelines, took root long before groundbreaking began on the one-acre lot with sweeping views of the Rio Grande and the Sandia Mountains. Despite the PV system, the insulated concrete form construction, the sprayed-in airtight foam insulation, the demonstration home's origins begin with a passive solar design of south-facing windows and generous overhangs to block the brutal desert sun.

Now, enter technology.

The home's exterior construction is of Amvic, an insulated concrete form system offering superior mass and insulation values when compared to traditional timber-framed homes. It's a Lego-like building system in which 11-inch-thick walls are formed of foam blocks, then later crisscrossed with rebar and filled with concrete. Insulation values perform at R-40 to R-45.

Inside, Icynene foam insulation fills the attic with an airtight mass that reaches the roof decking. The HVAC duct work is installed in conditioned space under the insulation, where it is not impacted by the outdoor temperature extremes that can easily swing 50 degrees or more in a 24-hour period.

Powering this home is a rooftop-mounted 2 kilowatt PV system, which is connected to the electric company PNM's utility grid in an electricity buyback program known as net metering. A standard

PNM meter runs backward when the panels produce more power than the house uses, a happy occurrence that happened consistently throughout the first summer and fall months of occupancy, even as the home's doors were flung wide open and all lights turned on to accommodate the various tour-goers.

"We didn't use the air conditioner all summer," says Schreifels. "We finally turned the heating on in November."

Heating is provided through an in-floor radiant system powered by a highly efficient, variable BTU boiler made by Buderus. Sensors and monitors have been installed throughout the home—even within and under the slab—to provide energy data during the home's first year of operation. The Schreifels family is now midway through this live-in experience and experiment, an event they would not have missed even if they eventually decide to sell the home. Schreifels is one builder who fervently believes that architects and contractors who don't make the switch to sustainable residential design in the next few years will be out of a job.

"When people ask how this is working, I want to be able to produce the data and bills," he says.

Energy efficiency is but one aspect of this home, however. Water conservation and the quality of the indoor environment are equally important, says the builder. A mechanical ventilation system in this exceptionally tight VISION House brings in fresh outdoor air to mix with recirculating air already in the home. Return ducts and transfer grills in most every room with a door keep temperatures consistent within. The plaster is a natural product, and exposed beams and other woodwork are treated with low-VOC sealers to reduce outgassing. The floors are Italian tile rather than dust-gathering carpet.

Waterwise, there is a control-activated recirculation system for domestic hot water. The home is plumbed so gray water eventually can be reused. A low-volume drip irrigation system serves the minimal desert landscaping outdoors.

Add up the green features and the

upscale detailing, along with a one-acre building lot valued at more than \$230,000, and the VISION House is listed for sale at \$1.2 million. But so, too, are other far less sustainable homes in Corrales. The gourmet kitchen, the stone and tile detail work, fireplaces, custom cabinetry, and spacious size are givens in this upper price range. Schreifels thinks that many of the green features ought to be givens, as well. Every home, after all, can benefit from careful placement on the building lot; every house can be more livable with high-quality windows and carpets that don't give the residents a chemically induced headache. Of all the green features in the VISION House, the photovoltaic system and the concrete used in the ICF exterior walls indisputably are the big-ticket items, says Schreifels.

As a demonstration house for a variety of manufacturers, the Corrales home succeeds in melding luxury and sustainability. The builder makes no apologies for the home's size and stylish features. Custom builders, after all, design and build for clients who demand those very amenities. While this particular demonstration home illustrates the green possibilities for high-end custom residences, Green Builder's next VISION House 2007 infill project in St. Louis will be geared for move-up buyers looking for homes starting in the \$390,000 price range. The new homes will incorporate green products and systems available in an ever-evolving market.

"Green building in its purest form—an efficient, durable home with a healthy indoor environment—is critical and achievable at an affordable level," says Jones. "If it was not, it would be a disservice to the housing industry."

Finally, a full year after the first wave of visitors examined every insulated nook and cranny, the number of tours at the Schreifels' home has slowed to a trickle. Life in a fishbowl is proceeding swimmingly. ■

Freelance writer Jane Mahoney resides in a fixer-upper in Albuquerque's South Valley and frequently writes about home builders and real estate issues for the Albuquerque Journal.

As for the future of sustainable architecture, Davis says he knew one thing and hoped another. He knows that returning to a mixed-use urban environment, where one can walk to work, school, or entertainment, contributes enormously to sustainability as well as to cultural diversity. He considers these features more important than whether you build a "solar" house. He hopes the younger generation, the twentysomethings who read *Dwell* or *ReadyMade*, will more easily accept a radical idea of sustainable technologies. He says they are "not a bit afraid of aluminum louvers on the ceiling or plastic pipes on the walls."

Davis says the first step in effective environmental design is "subtle, intelligent orientation" that pays attention to sun, shade, wind, rain, and water harvesting. The next priority should be "quick payback" features that might slightly increase a mortgage payment but immediately lower utility bills. An example of such technology is the Sunbender, an adjustable, curved aluminum reflector made by Zomeworks that mounts over a skylight. Otherwise, Davis says, "Everything's wrong with skylights. They let in heat very efficiently in summer, but the angle is wrong in winter."

Davis still works with contractors Christian Cooke and Joel Muller, who built the original Holzschneider house. In the intervening years, each has started his own business. Cooke heads Harmony Design & Construction Inc., and Muller heads Tent Rock Inc.

Perhaps one more thing that contributes to the warm and intimate atmosphere of the Holzschneider house is the fun they've had over the past 20 years working with Davis during design, construction, and remodeling. Karin characterized the interaction as lots of "pasta and wine and design." In fact, they so enjoyed the process, they are selling the house so they can start all over again, with Davis designing a house that is smaller but moves even further toward passive solar and green building. ■

Laura Sanchez is a frequent contributor to Su Casa and with her husband, Alex, is author of Adobe Houses for Today, published by Sunstone Press.

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