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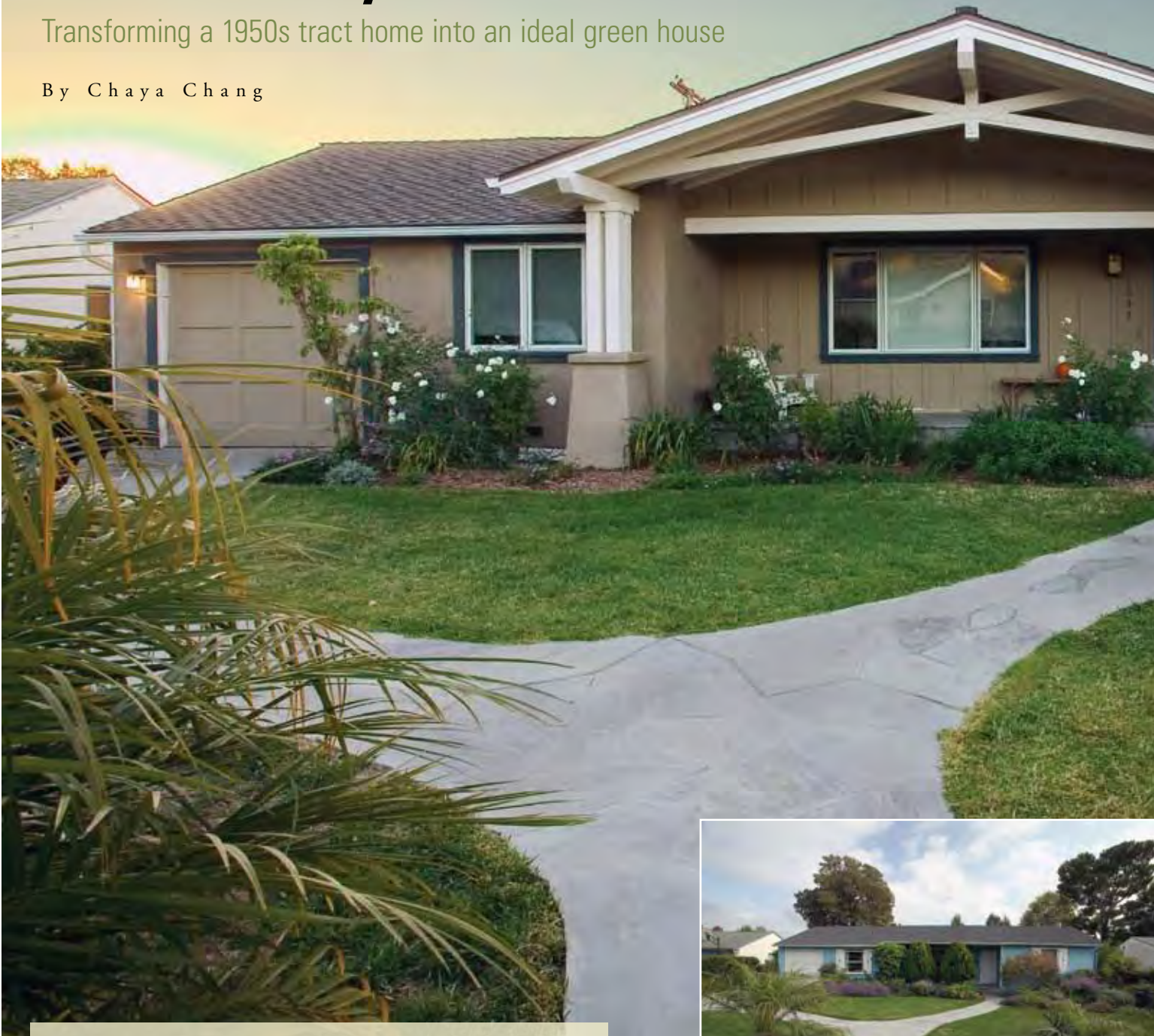
Allen Associates, along with Thompson-Naylor Architects, creates an energy-efficient and healthy home for the Doering family, Santa Barbara, Calif.

Green Home,
Healthy Home

Green Home, Healthy Home

Transforming a 1950s tract home into an ideal green house

By Chaya Chang



The exterior of the house was finished with color integrated stucco and fiber cement board, reducing long-term maintenance.



Before



FAST FACTS:

- **Contractor:** Allen Associates, Santa Barbara, Calif.
- **Architect/Designer:** Thompson Naylor Architects Inc., Santa Barbara, Calif.
- **Sq. ft. before:** 1,200
- **Sq. ft. after:** 1,800

The word “home” is synonymous with many things, both physical and emotional. Home is shelter. Home is family. When Allen Associates came across the Doering family, they knew how important it was for the two to come together, a beautiful, healthy place to house their entire family — and they did this with being very environmentally aware.

Transforming the Doering’s typical, older Santa Barbara tract home into an exemplary “green” remodel was the major challenge of this project. Built in the 1950s when neither energy efficiency nor indoor air quality was even considered, this house, like many others similar to it, had opportunities to be transformed into a comfortable and healthy home with a low operating budget. The construction budget was limited so cost-benefit issues drove the planning and decision making.



Photo credit: Emily Hagopian, Essential Images

The solutions that the “green team” — client, architect Thompson Naylor Architects, and contractor Allen Associates — came up with to improve energy efficiency and create a healthy environment had to stay within the allotted budget.

One of the goals of the project was to improve the energy efficiency and overall comfort of the entire house. In keeping with this strategy, the team decided on filling all walls with polycyrene insulation. It is a nonozone depleting, spray-in foam that fills every little void in a wall, resulting in an airtight building envelope. “Icynene is not used much in California because it costs a little more, but it is ideal for a retrofit project where the original 2X4



The new cathedral ceiling adds a feeling of spaciousness while a new French door adds warm sunlight to the remodeled living room.

wall framing is being preserved,” explains Karen Feeney, Green Resource manager for Allen Associates. Surprisingly, an existing fireplace — an item that typically serves as a focal point with considerable aesthetic value — was removed from the center of the south living room wall. It was replaced by a wall of French Doors. This glazing transforms the living room into a passive solar collector in wintertime. Double layers of 5/8” drywall were installed in the core of the house to increase thermal mass and dampen temperature swings from the free solar heat.

The attic was insulated to R-30 with cellulose insulation — a recycled product that creates an excellent barrier to sound and temperature penetration. In an effort to further reduce heat gain in the building, a radiant barrier paint was sprayed on the underside of the roof sheathing. This paint contained two additives — aluminum pigment with a reflectance value of 0.8 and ceramic microspheres that reduce thermal conductivity — that create an effective, insulative, radiant barrier. Radiant barriers deflect up to 25 percent of summer heat gain — an excellent

investment that will add only a small increase in cost. A new whole-house attic fan removes most of the remaining heat and keeps summer indoor air temperatures at a comfortable level. All of the bedrooms have ceiling fans as another element on the menu of cooling strategies.

The final element in the conservation package is the glazing. New French doors and operable windows add natural light and promote circulation of fresh air. The windows are energy efficient, Low E2 with an Argon gas fill and a fiberglass exterior. This fiberglass exterior — which expands and contracts with the glazing itself — makes the product very durable and needing minimal maintenance.

The above steps create a thermos like shell for the house — minimizing the need for space heating and completely eliminating the need for air conditioning. The minimal space heating that will be required is supplied by an Energy Star Bryant two-stage forced air furnace that is

93% efficient. For domestic hot water a passive solar water heater on the roof serves as a preheater to an on-demand unit — sometimes referred to as the backup heater.

Another measure for improving the energy efficiency of this home was the use of high-efficiency residential LED lights in the kitchen, hallway, closets and front patio. LED lights are three to four times more efficient than halogen and incandescent lights and last for 15 to 20 years.

Since the family has two small children, creating a healthy indoor environment was another top goal. A conscientious decision was made to avoid all carpeting to greatly improve the indoor air quality and create a healthier home. The existing oak floors were sold on Craig’s List and were replaced with bamboo flooring, selected for its low VOC glues and finishes. Natural linoleum was used in the utility room and bathrooms. All of the interior walls were finished with zero VOC paint.

Painted wheatboard cabinets have been selected for the kitchen, bathrooms, utility room and living room along with wheatboard trim to be used around the doors and windows. An old and unsafe acacia tree on the property was removed and its wood used for cabinet trim, shelves, a window bench, and the kitchen bar counter.

Other green features include concrete containing 50 percent fly ash, a waste product from coal fired power plants. Every ton of

cement that is manufactured produces a ton of carbon dioxide, making the production and use of concrete one of the largest contributors to global warming, accounting for about 8 percent of global CO₂. Fly ash is a direct substitute for cement in concrete mixes, greatly reducing carbon dioxide emissions.

All new framing wood came from sustainably harvested forests or is reclaimed timber. The home was electrically plumbed for a future solar



photovoltaic installation. A final green element is the installation of dual-flush toilets, which reduce total water usage by about 30 percent.

This project is a great example of how to meet the goals, strategies and budget of the entire “green team.” It also showcased what is needed to transform any small, leaky old house into a tight state-of-the-art energy conserving, resource frugal, and nontoxic house that promotes the health and well being of the environment and most importantly, the family. | QR



Before

Painted wheatboard cabinets were used in the kitchen, bathrooms, utility room, living room along with wheatboard trim around the windows and doors.



PROJECT DETAILS

Project Site Sustainability

- All mature plants were saved
- Drought tolerant landscaping
- Owner to remove the existing front lawn — the goal is no turf grass
- Original concrete block patio, brick from fireplace and outdoor tiles saved and made into an outdoor bench along new back patio
- Old, unsafe acacia tree on neighbor's property removed and used as mulch to amend soil and moderate moisture evaporation

Water Efficiency

- Water efficient whole house filtration and water softening system does not require electricity or use of salts – by Aquasana
- Roof runoff collected in drywell allows water to slowly percolate back into ground-water
- Two dual flush toilets — by Toto
- Water efficient bathroom and kitchen fixtures
- Tankless (on-demand) water heater — by Takagi

Energy & Atmosphere

- New passive solar features include increased amount of south window area to allow natural sunlight; new overhangs and trellis reduce heat gain on south side of home
- Owner found “radiant barrier” paint that helps reduce heat gain when applied to underside of roof
- Owner found paint product with ceramic particles that increases the insulation and thermal mass capabilities of walls
- Gas fired “on-demand” water heater — EF of 82

- Solar hot water heater – by Copperheart
- Energy efficient, Low-E2 windows with fiberglass clad exterior — by Integrity
- Icynene insulation in all exterior walls to limit infiltration losses
- Cellulose insulation in ceiling
- Whole house fan helps cooling interior
- New walls constructed with 2 by 6 framing to increase insulation capacity
- Skylight provides natural lighting
- All new exterior doors are being installed to reduce air infiltration
- Compact fluorescent lights and new LED technology installed throughout house
- Standard outdoor lighting will be replaced with fluorescent and LED super low wattage lights
- Infrastructure for photovoltaic panels provided for future installation.

Materials & Resources

- Comprehensive construction demolition plan implemented with goal of diverting 95 percent of project's waste; actual diversion 85 percent (equal to 93.6 tons of waste diverted)
- Product reuse: five windows given to neighbors; doors, furnace, and appliances donated to Salvation Army; eight doors, toilet, pedestal sink and wall heater donated to Habitat for Humanity; four windows, shutters, and fireplace mantle bought by antique dealer
- Existing oak flooring sold for reuse on local Craig's list
- Owner reused old kitchen cabinets, bookshelves, and closet shelving
- Reusable materials used for construction fences; will be used for drywell fencing
- Locally harvested acacia tree milled in San Luis Obispo used for cabinet trim, shelves

- and a window bench
- Owner used unused bathroom sinks, faucet hardware and vanity light fixtures from Orange County construction project
- Sustainable building materials including bamboo flooring and wheatboard cabinets, and cellulose insulation (recycled newspaper with a class-1 fire rating)
- Natural linoleum in bathroom and utility room
- 20 percent of framing lumber FSC certified
- 50 percent fly-ash used in cement mixture
- Exterior of house finished with color integrated stucco and fiber cement board reducing long-term maintenance
- Roof has an expected life of 50 years

Indoor Environmental Quality

- Wheatboard and formaldehyde-free melamine shelving and cabinet materials
- American Pride zero-VOC paints and coatings from Livingreen were used on the interior of the home. Dunn Edwards Eco-Shield paint was used for some interior finishes.
- Nontoxic sealants, adhesives and oils used
- Operable window promote circulation of fresh air.
- No carpet used in the home
- Water filtration system provides clean fresh water for the residents

Innovations & Special Features

- Owner conducted preremodel analysis of home's energy usage and monitored energy demand after remodel complete to determine effectiveness of energy efficiency improvements
- High efficiency residential LED lights installed in kitchen, front patio, hallway and closets meet Title 24 standards. LED lights are 3 to 4 times more efficient than halogen and incandescent lights and last for 15-20 years.



Allen Associates
835 North Milpas Street, Suite D
Santa Barbara, CA 93103

Phone: (805) 884-8777
Fax: (805) 884-0029
www.dennisallenassociates.com