

A House That Is as Green as It Gets

A down-to-earth couple in California asked for a structure that was guaranteed to be net-zero energy.

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May 4, 2023

This article is part of our Design special section about making the environment a creative partner in the design of beautiful homes.

Eleven years ago, Sally Liu, a water-resources engineer, and her husband Bay Chang, then a senior research scientist for Google, bought a 0.84-acre lot for \$2.675 million in suburban Hillsborough, Calif. Avid environmentalists in their mid-40s with two young sons, they set out to build something different from the neighborhood’s overblown mansions and closer to their hearts: a green energy home.

“I really did not want a large house next to a lawn,” said Ms. Liu, who is now 56 and advises for the Nature Conservancy.

The couple hired Aidlin Darling Design, a San Francisco firm, to build what the architects would come to call the “House of Earth and Sky.” Joshua Aidlin and Peter Larsen, the principals on the project, had ample experience with LEED, an evolving national standard for green buildings. And the couple wanted, and received, no less than the highest of the four LEED certifications: platinum.

“Sally and Bay had been to a friend’s rammed-earth home, and had fallen in love with the material,” Mr. Larsen recalled, referring to the compacted soil used in ancient constructions and many contemporary, sustainable ones. Ms. Liu’s desire for a drought-resistant garden was another prominent theme.

Within a week, the owners had a working model. Its ecological strategies for a durable, all-electric home were incorporated in a sculptural composition of rammed earth and glass walls, clerestory windows and blackened wood cladding, all customized for the partially sloped site.



The house has distinct public and private zones linked by insulated glass-walled walkways shaded by steel trellises or roof overhangs, Matthew Millman, via Aidlin Darling Design

“It was a diagram for sustainability,” Mr. Aidlin said. “The forms all had a function.” But before their clients settled on the version they built in 2015, the architects added Ron Lutsko, a landscape architect, and Gary Hutton, an interior designer, to the creative team.

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Intended for intergenerational living — in itself a green idea — the 7,477-square-foot enclave (including basement) is not monolithic. It has three public and private zones linked by insulated glass-walled walkways shaded by steel trellises or roof overhangs. The sections are laid out in a U shape around a central limestone courtyard dotted with garden beds and block-like stone benches where the family and friends can gather.

We wanted an abundant connection to the outdoors from every space,” Mr. Aidlin said. So the entire light-filled, indoor-outdoor composition sits at the center of a garden.

If you are a guest, you can climb from the car court at street level, through an entry garden of native grasses and up a flight of stairs to the formal front door. Turning right from the foyer takes you into Mr. Chang’s sanctum, where he keeps his prized board game collection. Turning left leads to a 65-foot long, open-plan sequence of living spaces on the north edge of the courtyard. This 1,000-square-foot area is lit with LED pendants and finished with nontoxic or low-VOC materials that have the downside, Ms. Liu noted, of degrading with powerful sunlight. (Though automated blinds have reduced the impact, the stained floors have faded to natural walnut.)



A private area of the house contains bedrooms and gardens for the couple and their sons, who are now adults. Matthew Millman, via Aidlin Darling Design

Beyond the public space is a private area containing bedrooms and gardens for the couple and their sons, who are now adults. A glass-walled bridge that borders a reflecting pond links the living/bedroom wing to a poolside pavilion on the south side of the central courtyard. The pavilion contains a family room and guest spaces for the couple’s parents.

The modern design inconspicuously incorporates water- and energy-conservation features. Retractable steel-and-glass doors open onto the courtyard from different sides of the house, offering a sleek visual contrast to the exterior walls and allowing for cross ventilation.

Those beautifully striated 18-inch-thick walls, made of compacted soil gathered from the site, were engineered by David Easton, an inventor in Napa, Calif., who concocted the blend of sand, earth and Portland cement. They are low-maintenance and rot-resistant, and their thermal mass shields the interiors from outdoor temperature fluctuations. This feature minimizes the use of hydronic heating and cooling systems embedded in the wood-covered concrete floors inside.

Asymmetrical “butterfly” roofs rest lightly above the living area and combined pool and guesthouse. Their wide wings angle upward so that out-of-sight arrays of photovoltaic solar panels absorb maximum sunlight that is converted to electricity and sent to the grid. The house produces and stores enough energy to power all needs, though a Tesla battery, to be used during storm-related blackouts, is still to come.

The V-shaped roofs double as rain collectors and drain into a 5,000-gallon underground cistern that preserves runoff for nonpotable purposes like irrigation. A 500-gallon cistern under the pool deck likewise collects used household water for the gardens, which Mr. Lutsko populated with native live oaks and with species he jokingly calls “honorary natives,” like Mediterranean Jerusalem sage and olive trees.

Because the site slopes up from the car court, the architects were able to excavate a subterranean floor for a garage, family entrance, wine cellar, utility rooms and the base of a rectangular concrete tower three stories tall.



A three-story tower contains a spiral staircase that rises past the living rooms on the main level, up to a crow's nest. Matthew Millman, via Aidlin Darling Design

The tower is just wide enough to contain a steel spiral staircase that rises past the living rooms on the main level, up to a third-story crow's nest. The slender tower is not an architectural conceit, but a passive stack effect cooling chimney with a motorized window at the top to ventilate the interiors when they get hot and simultaneously pull cooler air up from the basement.

"It could have been automated but Sally and Bay did not mind being active users," Mr. Larsen said.

Several years later, the combination of passive- and engineered-solar power seems to work as planned. At first, not fully trusting the energy systems they had invested in, Ms. Liu monitored everything closely. "I am an engineer who loves spreadsheets," she said. "The goal was to be net-zero energy, and I was relieved the solar numbers met the goal." That is partly because with many days in the 80s, the pool rarely requires heating.

Ms. Liu can now divert more of her attention to her other environmental causes, which she tends from a home office. The room's raised floor gives her views of the gardens even from her desk.

"It all looks natural. I can see a 'meadow' and the hills on one side. In the other direction, I look at a 'forest' of trees," she said. "And this wonderful house is simply a conservation cipher for others to decode."

A version of this article appears in print on , Section F, Page 4 of the New York edition with the headline: As Green as It Gets