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WRITTEN BY
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ABOVE Developer Steve Glenn stands on a balcony of the first green modular house his company, LivingHomes, produced. **TOP** A rooftop garden and solar panels above it contribute to the structure's zero-energy design. Western red cedar siding visually warms the steel-frame residence.

thoroughly modern

a promising model of eco-prefab rises in california

AS A BOY, STEVE GLENN BUILT pint-size dream houses out of wooden blocks and Lego bricks. As a young man, he became enamored of the work of California modernist architects like Ray Kappe and David Hertz. As an adult, he developed an interest in the environment. Then, after working several years as a technology-company entrepreneur, he decided to fuse his three passions with his business experience and start LivingHomes, a pioneering Los Angeles-based real estate development endeavor. His goal: Blend efficient

prefabricated construction, designs by his architectural heroes, and sustainable building techniques and materials—and then market the resulting dwellings to style- and eco-conscious consumers.

With the completion this past July of a 2,500-square-foot Kappe-designed model house, Glenn is off to a commendable, if somewhat local, start. The two-story structure, which doubles as his living quarters and LivingHomes' by-appointment-only showroom, is the first residence to receive a platinum Leadership in Energy and Environmental Design

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GOOD & GREEN

(LEED) rating—the highest of four possible designations—from the U.S. Green Building Council (USGBC).

The Council's voluntary program for homes awards points for sustainable building practices, for example, site placement and development and materials selection, as well as for performance in areas like resource savings (energy, water, land) and indoor air quality. It also considers the house's proximity to public transportation.

The Los Angeles prototype accrued 91 of 108 possible points, including a perfect score for water efficiency—thanks, in part, to a subsurface, reclaimed-water irrigation system (fed by storm-water runoff that's stored in a 3,500-gallon cistern under the house), a recycled-household-gray water system, and low-flow faucets, showerheads, and toilets.

Bonus points were awarded for energy and atmosphere (that is, how efficient the house is at cooling and heating), and materials and resources. Solar-powered photovoltaics produce most of the home's electricity. If the energy these cells generate is not needed, it can be stored in batteries or, in some locales (though not this one), sold back to a utility company.

For solar gain in cool weather and interior lighting, Kappe placed large panels of low-e glass and thermal polycarbonate along exterior walls. Roof and deck overhangs and motorized interior shades also help control light and temperature. A solar water-heating system, LED lights, and EnergyStar-rated appliances contribute further to the home's anticipated zero-energy status: It's designed to generate at least as much energy as it consumes. (A full-year evaluation period is needed to confirm that this is the case.)

The 864-square-foot roof is more than half covered in Forest Stewardship



Modular millwork and movable interior walls maximize flexibility within the open plan. Denatured alcohol, a clean-burning, renewable fuel, powers the fireplace.

Council (FSC)-certified Tigerwood decking, a dark orange Brazilian species that resembles Brazilian cherry. The rest of the roof is taken up by a garden, which helps insulate the house and reduce runoff, a contributor to water pollution, flooding, and municipal costs for storm-water management. The green space also alleviates the climatic phenomenon known as heat island effect, in which urban and suburban settings register warmer temperatures (up to 10 degrees Fahrenheit in some spots) than surrounding rural areas.

To enhance indoor air quality, the home has a steel frame, which will not rot or mildew; formaldehyde- and urea-free millwork and substratum; VOC-free paints and stains; moisture-reducing bathroom vents; and a whole-house cooling/ventilation fan.

A radiant-floor heating system contributes to both improved indoor air quality and energy efficiency. It emits warmth by circulating solar-heated water through underfloor tubes and avoids the air-blown allergens of forced-air systems.

Sustainable materials were used throughout the house. All of the home's

homes. Even so, the contemporary facade draws stares, as it did during construction. Stick-built homes take about 12 to 18 months to complete. Prefab houses take less time, according to Glenn, because the modular units—frame, roof, walls, floors, ceilings, decks, and cabinetry—are constructed off-site (in this case, in one southern California factory) while the lot and foundation are being prepared.

Glenn notes that completion times for the prefab's foundation are site-specific, though six to seven months would be typical for a flat lot. Here, it took seven months to resolve drainage issues and build a foundation on the sloped parcel.

Erecting the flatbed truck-delivered building components took all of eight hours—and attracted a small crowd of onlookers. The steel frame was welded to the concrete-slab foundation. Frame members were bolted together. Steel wall studs filled in the two interior walls that bear drywall. The finish work, such as

built-in storage units, took three months.

In addition to reduced construction times, as compared with standard building practices, prefab methods generate far less landfill-bound waste—2 percent versus 30 to 40 percent, Glenn estimates.

No doubt this house saves energy and other resources, but how does it stack up in dollars? In the future, LivingHomes units will be built to only silver-level USGBC standards (50 to 69 points). Construction budgets are estimated at \$250 per square foot, which, says the company's literature, is 20 to 40 percent less expensive than a comparable site-built home (steel frame, Kappe-level design, expanses of glass, eco-friendly elements). This doesn't include the cost of land or design fees, nor other expenses, such as foundation construction, which will add up to \$90 per square foot to the prefabs.

As of press time, architect Kappe had completed designs for one line of homes for the company that's still under wraps;

Hertz is drafting another. LivingHomes' houses will range in size from 650 to about 6,000 square feet. And the start-up is accepting standard and semicustom commissions, but only from owners of nearby land. The company's expansion and the affordability of its product depend somewhat on economies of scale: reducing costs by building multiple housing units within its own development, a 20-acre southern California site near Joshua Tree National Park. The expense and logistics of transporting modular house parts from factory to assembly site are other factors. To date, Glenn has worked with several plants in southern California, though he will work with others elsewhere in the United States.

Time will tell if such a pioneering product can be delivered at a price that will popularize Glenn's "compassionate consumerism." ■

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lumber is reclaimed or FSC-certified, including the 12-foot-wide bands of western red cedar siding. Recycled glass tiles and countertops and recycled porcelain tiles appear in the bathrooms. Kitchen counters are made of a recycled-paper-and-water-based-resin material comparable in its durability with granite.

The location of the house—within walking distance of the ocean, shopping, and public transportation—holds out hope for a reduced reliance on automobiles. But this being southern California, there's a two-car garage (tricked out with a vent fan that automatically exhausts carbon monoxide). By tucking the garage under the front deck and media room, Kappe saved space on the slim 50-by-52-foot site and adhered to the company's ethos of minimal impact on the land.

"A structure of this size is not out of line with the neighborhood," maintains Glenn, referring to the surrounding small modern and Craftsman bungalow-style



1. Building the LivingHomes model house required seven months of site prep and foundation work followed by an eight-hour assembly day, during which a 175-ton crane, shown as it's being counterbalanced for stability, hoisted all the modular components. **2.** Flatbed trucks, including this one loaded with part of the steel frame, brought prefabricated elements from a southern California factory to the site. **3.** A second-floor deck panel is lowered onto a section of the frame at the front of the house. **4.** By 5 P.M. on the assembly day, all the modules were placed, and the crew, including LivingHomes CEO-founder Steve Glenn and architect Ray Kappe (second and third from right), posed for a celebratory photo.



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