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SUSTAINABLE TECHNOLOGY

Eat-in kitchen featuring hood and dining stools handmade from scrap metal and iron by Jefferson Mack, and dining counter fashioned from a downed walnut tree, salvaged and re-purposed by Evan Shively of Arborica.

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TOUCHING EARTH SOFTLY

✎ MICHELE CHANDLER



A new construction
standard strives to create
buildings that enhance
the natural environment,
not just degrade it less

Tah.Mah.Lah's rear exterior looking west toward the Santa Cruz Mountains.

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Buildings should ‘operate like plants or flowers,’ self-sustaining entities that are able to thrive with only the resources that naturally come their way.

■ JASON MCLENNAN, CHIEF EXECUTIVE, INTERNATIONAL LIVING FUTURE INSTITUTE

THOUGH DEVELOPED LESS THAN 13 YEARS AGO, the popular Leadership in Energy and Environmental Design program is today’s green-building norm. LEED recognizes structures that use less energy and water than conventional buildings do.

But Jason McLennan, a Washington architect, is working to achieve more. McLennan is the brainchild behind a new, super-green certification program that aims to create an entirely new class of ultra-sustainable buildings.

Launched in 2006, McLennan’s Living Building Challenge construction standards go far beyond even LEED’s most rigorous requirements. “Living buildings” must generate all of their own power without using combustion of any kind. All wastewater must be treated and purified on site before it is reused or released into the environment. Buildings can continue to receive municipal water so long as they replenish that amount annually through recycling or rainwater harvesting.

Construction materials containing ingredients deemed harmful to human health are banned. The off-limits “Red List” includes electric cables coated with polyvinyl chloride, arsenic-treated wood, carpets that emit formaldehyde and petroleum-laced plastic nameplates typically found on office doors. Limited exceptions can be made if construction teams prove they can’t find products that are Red List ingredient-free.

Living Building Challenge projects in progress range from multi-million dollar custom homes to school libraries, churches and education centers.

High-efficiency dwellings should “operate like plants or flowers,” self-sustaining entities that are able to thrive with only the resources that naturally come their way, as McLennan explains it. His ultra-rigorous standards are intended to push the envelope, “to literally challenge the building industry to go much further than what people conventionally think is green building,” he said.

With four projects underway in the Bay Area and abroad, engineering design firm Integral Group is at the forefront of the Living Building movement. “LEED is about doing less bad, having less environmentally damaging materials and having less energy use,” said Peter Rumsey, Integral’s West Coast managing director and a green-building advocate. Integral has Oakland and San Jose offices.

“The whole idea with the Living Building Challenge is not just that you are using less energy, it’s that you are generating all your own energy, and maybe you even generate a little extra. It’s all about getting to a point of no impact and possibly regenerating or doing positive things to the environment,” he said.

A living building also must prove that it saves resources. LEED does not require proof of post-opening energy efficiency. Living Building certification is conferred only after net-zero energy and water use and zero wastewater emissions have been documented for an entire year.

Seven buildings worldwide—including one in the Bay Area—have obtained some degree of certification since the first Living

Building Challenge awards were announced in late 2010, according to the International Living Future Institute, a nonprofit headed by McLennan that administers the green-building program. Three structures have received full certification: a research-and-education center at Washington University in St. Louis; a combination yoga studio and education complex in New York; and an energy research laboratory in Hawaii.

The rest, including the San Jose headquarters of Integrated Design Associates, have received partial certification. The electrical engineering firm’s IDEAs Z2 Design Facility in San Jose has a rooftop photovoltaic system that supplies all the energy the 7,000-square-foot studio needs and led to its net-zero energy certification from the International Living Future Institute.

In all, backers of about 150 projects, including 18 in California, want to achieve living building status in the next few years, McLennan said.

While most projects striving to meet Living Building Challenge approval are in the commercial and institutional sectors, McLennan said interest also is coming from builders of single-family, multi-family and affordable-housing projects.

His crusade has gained influential backers from the corporate world. Last year, rapidly expanding tech giant Google Inc. pledged not to use components containing outlawed Red List substances in its new buildings. Some industry watchers predict that Google’s stance will prompt more manufacturers of building materials to drop ingredients on the Red List.

Interest in creating super-sustainable buildings is also gaining legislative steam, against a backdrop of rising energy prices and concern about how to slow the global use of dwindling natural resources. Starting in 2020, California law will require all new homes to generate as much power as they consume. In 2030, the same “net-zero-energy” rules will apply to every newly built office complex.

Commercial properties are given more time to transition because those structures are typically larger and have more complicated energy needs. The new rules stem from Assembly Bill 32, California’s Global Warming Solutions Act of 2006, which requires that greenhouse gas-emission levels in the state be cut to 1990 levels by 2020.

That potential has intrigued green-building gurus including Integral’s Rumsey. A decade ago, when the LEED system was newly released, “it was very hard to get certified,” Rumsey said. Cutting-edge products needed to reach higher efficiency standards weren’t widely available. “Doing something like the Living Building Challenge would have been impossible” back then, he said.

Now, a wide variety of eco-friendly products, more experienced design and construction teams and rising customer demand have helped fuel a surge of sustainable construction industry-wide. Green homes comprised about 17 percent of the overall residential construction market last year, more than double the 8 percent in 2008, according to a recent report by McGraw-Hill Construction.



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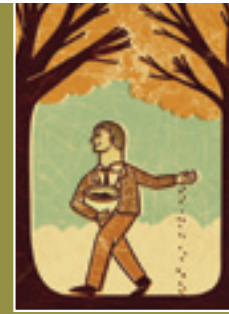
In the Bay Area, Rumsey's company has helped design mechanical, electrical and plumbing systems for a 5,600-square-foot Portola Valley home that isn't Living Building certified yet but was built to achieve those standards. Linda Yates, a management consultant, and her husband, Silicon Valley venture capitalist Paul Holland, built Tah.Mah.Lah—an Ohlone word meaning "mountain lion"—and live there with their three school-aged daughters. They recently passed the one-year occupancy mark with all the new systems in place and plan to start the Living Building Challenge certification process.

The sprawling residence purifies wastewater onsite using a network of septic and subsurface-irrigation systems. A 50,000-gallon underground rain catchment system collects water that is then used to nourish the low-water native-plant landscaping. Mounted with 118 solar panels, the home generates enough energy to supply its needs and power as many as five electric cars.

In an email, Yates said she and her husband want their residence to meet the Living Building Challenge "out of our commitment to advancing the broad sustainability and green-building agenda, which means supporting the most progressive and innovative relevant programs out there that are directed at our common goals."

Adding the solar power, wastewater processing capacity and other features needed to meet Living Building standards typically boosts a project's overall cost from 7 percent to 11 percent compared to a conventional structure, said Peter Busby, managing director of the San Francisco office of architects Perkins & Will. In comparison, bringing a project to LEED Platinum, that system's highest rating, would add 4 percent to 5 percent to a regular building's cost, he said.

Those financial realities mean the Living Building Challenge "is not for everybody," Busby said. Right now, he said, the pursuit



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“They’ve certainly demonstrated there are many things that can be done without inordinate heartburn. They have made it easier for whomever wants to come next.”

■ ANN EDMINSTER, PRINCIPAL, DESIGNAVENUES LLC



ABOVE:

*Natural ponds and bogs surround the bio-filtered, chemical-free swimming pool.
Background: a living willow reed play structure/sculpture by artist Patrick Dougherty.*

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is best for individuals or groups who “really want to demonstrate leadership and are prepared to invest the additional capital necessary to do that.” While declining to give details, Busby said his own company intends to open an office in 2014 that meets Living Building standards.

In Tah.Mah.Lah’s case, designing and implementing sustainability upgrades took several years and added a 3 percent to 5 percent premium to the home’s cost, said Ann Edminster, the project architect and owner and principal of Pacifica-based DesignAvenues LLC green-building consulting firm. But, “They’ve certainly demonstrated there are many things that can be done without inordinate heartburn,” she said. “They have made it easier for whomever wants to come next.”

However, she predicts it will take years for this new way of building to catch on: “The transformation of the industry to the point where a large fraction of the structures that are built will meet Living Building requirements is a pretty long-term process. I’m not seeing that in my crystal ball in less than a decade and that might even be absurdly optimistic.”

For instance, the super-high standards of full Living Building certification remain well beyond reach for the IDeAs Z2 Design Facility. While receiving partial certification for its extensive net-zero-energy-generation system, other Living Building mandates are too far-reaching—and expensive—to add to the structure, which was renovated into a net-zero-energy office building in 2007. “It’s not something we can do after the fact,” said David Kaneda, an engineer who is principal and founder of Integrated Design.

Adding onsite wastewater processing capacity would be the most costly hurdle. “The sewer goes out to the street now, so we’d have to dig it all up and put in systems and rebuild parts of the building,” Kaneda said. “We meet the Living Building Challenge’s energy piece, but we don’t necessarily meet many of the other pieces. For this building, it’s too late, unless I’m willing to do a major remodel, and of course I’m not because we just did a major remodel.”

Still, backers of other projects are considering whether to take the Living Building plunge. The EcoCenter at Heron’s Head Park in San Francisco is a \$1.2 million, 1,500-square-foot environmental education facility opened in 2009 to showcase alternative energy and onsite wastewater treatment technologies. While the complex already plans to aim for LEED certification later this year, its many sustainable features could also be tailor-made for Living Building recognition.

The structure is powered by a phalanx of rooftop solar panels, while a 15,000-gallon tank captures rainwater now used to irrigate plants. The group has applied for a county permit to use rainwater to flush toilets, which would further reduce reliance on water from the San Francisco Public Utilities Commission.

All toilet waste is processed through an elaborate treatment system that relies on underground tanks that use bacterial microbes to digest impurities before sending the water through a blast of ultraviolet light that kills any remaining pathogens. That water then goes through a small wetland and into a holding tank before being pumped to irrigate park landscaping.

“We really wanted to demonstrate that we weren’t just reducing energy and water usage,” said Patrick Marley Rump, acting executive director of nonprofit Literacy for Environmental Justice, the EcoCenter’s operator. “We really wanted to show that we’re also having very little to no impact on the city’s infrastructure.” ○



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