SWISS TEAM'S HOUSE

The Swiss Living Challenge house, the combined work of four Swiss schools, is built with a "productive envelope surface," including walls and a green roof that can collect heat from the sun for water and space heating, collect water and grow food. The team used a laminated veneer lumber for both the house and furniture within. The house also has a zero-water toilet that uses worms to treat and recycle waste.

IN A COUP FOR DENVER, THE CITY IS HOSTING THIS YEAR'S INTERNATIONAL SOLAR DECATHLON COMPETITION, WHERE YOU CAN VIEW THE LATEST EYE-POPPING IDEAS IN SUSTAINABLE, ENERGY-EFFICIENT DESIGN

GAME OF HOMES

WORDS: *Jane Craig*

A "ZERO-WATER TOILET" THAT USES WORMS, NOT H2O, TO TREAT AND RECYCLE WASTE.

ADJUSTABLE KITCHEN COUNTERTOPS THAT HELP THE ELDERLY "AGE IN PLACE."

A ONE-FLOOR HOME THAT IS "STACKABLE" UP TO THREE STORIES.

IKEA-STYLE FLAT-PACK BUILDINGS THAT ARE EASY AND CHEAP TO SHIP AND ASSEMBLE.

FITBIT-LIKE IN-HOME METERS THAT LET A CONSUMER KNOW HOW MANY GALLONS OF WATER IS USED DURING A SHOWER.

THOSE are the kinds of 21st-century innovations you'll see in the 10 houses competing in this year's Solar Decathlon, a biannual event sponsored by the U.S. Department of Energy and taking place in October next to the 61st and Peña commuter rail stop on the RTD A-line between Union Station and DIA.

"Denver is a great place for the decathlon because Peña Station Next is a smart development that really aligns with our goals," says Linda Silverman, Solar Decathlon director. "It's all about energy efficiency, renewable energy and sustainable design, and all of those really fit with the Colorado ethos." (Denver's fabled "300 days of sun a year" makes the city even more suitable for a solar event.)

Each of the 12 teams represents a different college (or colleges), including the University of Nevada at Las Vegas, Northwestern, Washington University, Washington State and a tag-team effort between Denver University and UC-Berkeley. Each team has two years to design and build a residential home, which must be assembled on campus, transported to Denver and reassembled in about 10 days for the competition. After the winners are announced, the homes are disassembled and taken back home, to be used for everything from student housing to a community center.

The Solar Decathlon launched in 2002 and has been held biennially since 2005. It draws crowds who not only want to tour the cutting-edge houses the university teams have constructed on site, but also attend workshops for homeowners and a sustainability expo; they even get the chance to drive an electric car.

Like any decathletes, the entrants must show proficiency in 10 contests, each one worth 100 points: — architecture, market potential, engineering, communications, innovation, water, health and comfort, appliances, home life, and energy. "This is the eighth U.S. event, and we review those categories after each competition and modify them based on team feedback and market changes," Silverman says. "The teams really build their houses to fit the contest rules, so they can maximize their scores." Two requirements: The homes must be under 1,000 square feet, and they must use solar-based renewable energy sources (as opposed to wind-, hydro- or geothermal-based sources).

This year, for the first time, teams are eligible for cash prizes: $300,000 for the first-place team; $225,000 for second; $150,000 for third; $125,000 for fourth; and $100,000 each for the eight other teams. A running scoreboard on site lets contestants and visitors see how each team is doing (some categories are juried; other scores are based on actual energy usage); the winner is announced on Oct. 14.

"There's an energy level at the decathlons that is just unbelievable—people get really excited," says Silverman. "We want visitors to imagine themselves living in houses like this. They're very attractive, so people look at them and go, 'Oh my god, could I have that in my house?' But each team has its own, very specific goal. That's what makes this event so cool."

For example, the Washington State team set its target market as Seattle, where the urban infill lots are all different shapes and sizes and often face stiff construction restrictions.

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- Linda Silverman

WASHINGTON STATE'S HOUSE

This house is designed to be part of a smart community of tiny homes that share amenities, including an electric car. It is built of prefabricated components that are made for flat-pack (IKEA-like) transportation and that allow for quick on-site assembly without the need for cranes and other heavy equipment. The decks are made of recycled wind turbine blades that would otherwise go into landfills.

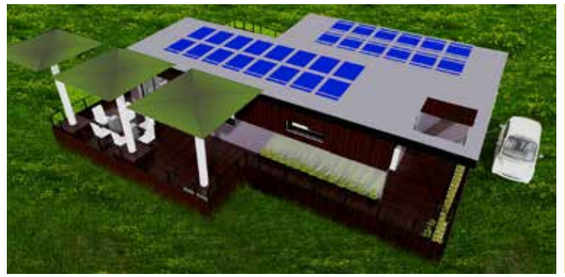
"Our home is designed to fit like a puzzle piece into these lots," says team member Camren Richards. "We use a flat-pack system so all of our walls are prefabricated and everything can fit in a flat space and be reassembled easily. Our Trex-like decking is actually made out of recycled wind turbine blades, which otherwise would go into landfills. We've also partnered up with a startup in Seattle that has designed a four-step water filtration system that can take rainwater and filter it for re-use in toilets and irrigation."

The UNLV team, in contrast, has designed a home that pays homage to the look of classic mid-century Las Vegas houses but is aimed at people 55 and older (a demo that has surged in Vegas over the last decade). "We've created a one-story house that is fully wheelchair accessible throughout," says the team's Nasko Balaktchiev. "The shower is a roll-in shower, there are grab bars next to the toilet, and the kitchen has a movable countertop so you can roll your chair underneath it and adjust it the way you like. And we're working with Tesla to get one of their 2.0 batteries, which would be used in case of a grid failure. In Vegas, if your AC unit goes out, you basically have to go to a hotel until it gets fixed, because it's unlivable in the summer. This past month, it hit 117 degrees."

The UC-Davis team has dubbed its project "Our H2Ouse," which can be translated as either "Our House" or "Our Water Use," says student Geoffrey Mangalam. The impetus is obvious: the potential of continuing California droughts. Beyond making a home that operates efficiently, the UC-Davis team has built-in features that encourage the homeowner to be proactive about energy and water use. "Normally," says Mangalam, "when people try to quantify a shower, they'll talk about how long it took. Virtually no one can say, 'I used this many gallons of water.' We want to help occupants better understand the amounts of water and energy they're using through a series →87

UNLV TEAM'S HOUSE
The goal for the UNLV team was to blend nostalgia for the mid-century architecture of Vegas with modern materials to create a house where active older residents could "age in place." The result is an energy-efficient, healthy home with handicapped-accessible features like adjustable kitchen countertops, easy circulation, large overhangs to provide shade during Vegas's scorching summers, and remote-control security, heating-and-cooling and lighting monitors.

UC-BERKELEY/DU TEAM'S HOUSE
These two universities teamed up to create a "stackable" house meant to work in the kind of urban infill space found in high-density environments looking for sustainable, affordable solutions. The one-story house is built to support up to two stories above, with a flexible floor plan that includes movable interior walls, foldable beds and east- and west-facing "party walls."



UC-DAVIS TEAM'S HOUSE
Dubbed "Our H2Ouse," the UC-Davis team's structure is aimed at Californians faced with severe drought conditions and has the potential to cut a home's water use in half while still maintaining comfort. One important way the house does that is by including monitoring and feedback systems that tell residents exactly how much water they are using while, say, washing dishes or taking a shower.

HU UNIVERSITY OF APPLIED SCIENCE UTRECHT TEAM'S HOUSE

The Dutch team is introducing the "Selficient" concept with its home, which uses a modular frame that can be taken apart and rebuilt in a different shape or even in a different location without wasting materials. The standardized walls, floors and roofs can be manufactured affordably but also are easily customizable. The house also includes a greenhouse that regulates interior temperatures.

TEAM ALABAMA'S HOUSE

A joint project between the University of Alabama at Birmingham and Calhoun Community College, this "surviv(AL)" house was inspired by the 2011 tornadoes that hit the state. It includes a composite and steel "strong room" that extends below the house's subfloor and is built to withstand twisters. The house also features a heat-resistant high-albedo roof, a wet wall shared by two showers, and a large northern porch with a canopy that allows light to enter the house in the early morning or late evening.

WASHINGTON UNIVERSITY TEAM'S HOUSE

This house, designed as a longterm residence for two research scientists in Eureka, Mo., is a single precast-concrete structure meant as an alternative to traditional wood, light-frame construction. The material is resistant to fire, moisture, mold and insects, and the house is abutted by a series of modular planter beds that support a hydroponic garden.

of light meters that light up in relation to how fast water is being consumed."

The DU-Berkeley effort is also aimed at the efficient use of "long, skinny" infill lots in cities where space is at a premium, says team member Samuel Durkin. "We call our project RISE, which stands for Residential, Inviting, Stackable and Efficient. The single-family house is a simple post-and-beam structure that is over-engineered so it can be stacked up to three stories high and still be structurally sound." Besides using low-energy appliances and recycling gray water, the home has a super-flexible floor plan including Murphy furniture and sliding interior walls.

There's a lot more to see—including the University of Alabama at Birmingham and Calhoun Community College's "surviv(AL)" house, which includes a tornado-proof "strong room"; Washington University's hydroponic garden, which aims to provide nearly year-round vegetables; Northwestern's photocatalytic exterior windows, which break down airborne pollutants and improve air quality; and of course the Swiss team's "worm toilet." Visitors can tour the houses for free from Oct. 5 to 9 and Oct. 12 to 15. Also on the lineup: a sustainability expo, consumer workshops, and four dedicated education days, in which middle school students go on field trips to the houses and take tours led by the college students. "It's the full gamut and an amazing event unlike anything you've ever been to before," says Silverman.

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