Solar Decathlon Brings New Ideas for Home Innovations

Above and right: The Missouri University of Science and Technology team traveled to Denver in this van adorned with their mascot featuring a pickaxe and slide rule. Their SILO house (Smart Innovative Living Oasis) will return to campus joining six previous Decathlon entries in an eco-village. Designed for empty nesters, SILO features farmhouse architecture, grey-water systems, a water wall and clay plaster as a wall paint alternative. The team said the large windows were designed specifically for Colorado to "allow occupants to fully appreciate the state's natural beauty."

By John Fernandez

What is the best design for a livable home powered entirely by the sun that can be transported anywhere in the world and assembled in just a few days? This is the design challenge of the Solar Decathlon, the brainchild of the U.S. Department of Energy (DOE).

Nine collegiate teams from throughout the U.S. and two from Europe competed in the 11-day international event held this year in Northeast Denver in October. The teams designed, built and operated full-sized, solar-powered houses to demonstrate state of the art energy-saving technologies across 10 criteria including innovation, market potential, and energy and water efficiency. In the end, "winners" were selected, but in a broader sense, everyone is a winner. Since the first Solar Decathlon was held in 2002, ideas generated by the students have begun entering the marketplace and the students themselves have brought their energy and expertise to the home-building industry. This article concludes with examples of innovations from this year's Decathlon.

Global interest in the Decathlon has been so great that the next Solar Decathlon in the U.S. has been pushed back to 2020 to give space and time for Solar Decathlons to take place in Europe, China and Africa. A professor from Hungary went along with one of the jury teams to observe the Denver event in order to help organize Solar Decathlon Europe.

The Scope of the Solar Decathlon

The Solar Decathlon event is impressive along many dimensions, from the time invested by the student and other volunteers to the range of innovations in the homes.

Time: selected teams spend nearly two years from inception to demonstration of their concepts at the actual competition.

Commitment: Often these undergraduate and graduate students take reduced academic loads to bring their ideas to life. Teams ranged in size from 20 to 100. Each team brought a core group to Denver and stayed with their house throughout the competition.

Finances: fundraising for the house projects ranged up to $4 million and was undertaken by the students themselves.

Scope: the structures were first built and tested at the home institutions, then broken down, packed and transported to Denver where they were then re-assembled in less than a week.

Ideas: this was the real magic of the event, with each house in the temporary "solar village" demonstrating a cornucopia of innovations, some ready for the marketplace, others still in development or just so far out there that the rest of us will just have to mull it over before deciding whether to become an early adopter.

Above and above right: Northwestern's Enable house is likely headed back to Evanston to become a private residence, with a sale pending to a couple representative of the target market: baby boomers wanting to age in place. Team leaders were proud to say that fund-raising was easy: "It sold itself". The house was transported to Denver on eight trucks, a cost absorbed by FedEx, a team sponsor. Its interior walls can be easily reconfigured. Sliding sun room panels allow three-season living. Roof-integrated solar panels help avoid the choice between beauty and sustainability.

Adapting to Mother Nature

Weather was a theme in this year's competition, both in the planning of the houses and in transporting them. Homes were designed to address specific needs based on climate in different regions of the country. Students on the Alabama team remembered the April 2011 "Super Outbreak" of tornadoes and incorporated a safe room able to withstand winds of 250 miles per hour in their southern vernacular house. The University of California Davis team designed their house to maximize water conservation in a state suffering through drought and used "drought wood" (from trees that died due to the drought) for the furniture and wood finishes. The University of Las Vegas team, coming from a desert region, likewise focused on water efficiency with their system for greywater reuse and collection of rainwater and condensation. The St. Louis team, with adequate rainfall in their *(continued on page 20)*

Above and right: The University of Maryland ReACT house made use of solar heat for in-attic dryers to slow cook or de-hydrate food or dry clothing. The Resilient Adaptive Climate Technology structure incorporates a composting system, hydroponic garden, moveable living walls covered in plants and a central courtyard that pre-heats air as part of an energy recovery ventilator system that exchanges heat and moisture between fresh, outdoor air and conditioned air in the house to minimize energy loss. The prototype "house kit of parts" cost $470,000. The team believes future versions could cost as little as $270,000.