

Students Build the Solar Homes of the Future

For the Solar Decathlon, 20 teams of college students strive to build the most technologically savvy sun-powered house. For two weeks in October their homes go head to head in a contest to consume the least energy.

By Harry Sawyers

Team California's heating and cooling system may help the house hover near that perfect zero. "Doing all the heating and cooling with electricity would take a lot of power from our solar panels," 23-year-old thermal design leader Tim Sennott says. So the students drew up an elaborate system in which solar thermal collectors heat and cool the house through radiant tubing in the floor and ceiling. An energy-recovery ventilator maintains a constant indoor temperature and humidity, further reducing HVAC demands. "What we designed is a whole ton more complicated than something we would ever put in a residential home," Sennott says. "We're trying to do stuff with technology that's not mainstream yet." The tactic can be risky. In July, the supplier of the cooling system's solar-powered absorption chiller pulled out, leaving students scrambling for an alternative.

The Solar Decathlon has a precedent of such edgy approaches, according to its director, Richard King. Students in years past have adopted solar technologies that were "hardly even heard of at the time," King says. The competition gives the public a chance to see these new technologies work together as a system—some, like California's radiant cooling, for the first time.

Santa Clara's 2007 Solar Decathlon house, its boxy frame crowned with solar panels, stands a short walk from the current job site. In its sunny living room, sitting in a chair made from reclaimed wine-barrel staves, Anand pulls a tape measure from his back pocket and points to handsome bamboo joists along the ceiling. The 2007 team wanted to develop bamboo-based structural materials, he says. That idea caught the eye of the company Teragren, which sent unfinished bamboo for the students to test in a Tinius Olsen machine—a massive contraption that stresses I-beams to evaluate tensile strength and shear-load capacities. That year, underdog Santa Clara took third place. The students' joists, now certified under multiple international building codes, will soon be on the market.

"It's one thing to manufacture a product, but it's another to have it installed in a building that meets code," says Tom Goodham, Teragren's vice president of operations. "The beauty of putting products into an actual building is that it helps people understand it's not just conceptual. This is a material that's ready to be used, that can be integrated into design today." Working with Santa Clara on this year's house, Teragren revised the joist to create open-web floor

trusses. The elegant, trestle-shaped bamboo beams have openings to run conduit, simplifying installation.

But really, all the cutting-edge technology eclipses the core challenge—building a house isn't easy. Try doing it on top of a full college course load. Despite the occasional decision Ruffoni describes as "so embarrassingly wrong that only students would do it," his teammate Anand credits their team's inexperience as a major asset. Unfamiliar with the sobering constraints of actual construction, he says, "The only thing we had to apply was creativity."