

# University of Colorado at Boulder

As the two-time champion of the Solar Decathlon, the team from Colorado is striking out in a new direction this year, with an emphasis on creating a marketable house. The house you'll see on the National Mall fits within the 800 square-foot guideline, but this is only part of a planned full-size house of 2,100 square feet, which the students feel makes the project more relevant to homeowners and the building industry. After the competition, they will build the "rest of the house" for its purchaser, Xcel Energy, which will use it as a permanent facility for research, education, and outreach to both the industry and the public.

## What's Different?

- The Colorado team went beyond the 800-square-foot building limit required for the Decathlon to design a 2,100-square-foot home with three bedrooms, three bathrooms, and the ability to accommodate an average-sized family. They will bring the core of the home, which fits within the competition guidelines, to the competition.
- The house features a mechanical spine in which the plumbing and HVAC system are centralized in a completely modular, prefabricated, structural core.

## Architecture, Interior Comfort

- The core or "spines" of the house—including the heating and cooling systems, electrical service, laundry, and kitchen—are all enclosed within two modified shipping containers.
- If the concept were commercialized, the core of home could be assembled in a day by delivering the two containers to the job site, with all the plumbing and electrical lines and major mechanical components pre-installed.

## Heating and Cooling Systems

- A ductless heating, ventilating, and air-conditioning system is used with architecturally integrated heat exchangers.
- The beating heart of the mechanical system is a heat pump with two storage tanks—one hot and one cold—to capture energy from the environment when it's available, store it in tanks, and use it when needed.

## Lighting (including Daylighting)

- The lighting system employs a combination of efficient electric lighting and photosensor-driven daylighting control system. The electric lighting includes a mix of fluorescent, LED, and halogen lamps configured to provide both direct and indirect illumination.

## PV and Solar Thermal

- Building-integrated photovoltaic panels that generate 8.8kW provide a waterproof roofing shell while collecting all of the energy needed to power the home.
- Integrated solar thermal collectors cool the PV and help make it more efficient while producing hot water. The PV/thermal system can also be used to cool the thermal storage tanks at night.

## Communications

- The team's marketing efforts have included development of the branding, graphics, and messaging for the project, something the Colorado team did quite successfully in the 2005 Decathlon.

## Budget

- If mass-produced, the team estimates the house would cost about \$200,000 to build. Because economies of scale don't factor in when producing a concept house, the team estimates that the entry cost is about \$300,000.

## Future Plans

- After the competition, the team will enlarge the house for its purchaser, Xcel Energy, which will use it as a permanent facility for research, education, and outreach to both the industry and the public.

**Team Information**

Web site: <http://solar.colorado.edu>

Contact: Michael Brandemuehl, [michael.brandemuehl@colorado.edu](mailto:michael.brandemuehl@colorado.edu)