

Affordability

Solar power has traditionally been dismissed as a luxury for the rich. The Solar Decathlon competition is working to change that image through the addition of an Affordability contest. In order to achieve full points in this contest, the estimated cost of constructing the home must be less than \$250,000. Elements such as efficiency, design, and sustainability are not rewarded in this category, although those factors are important to other areas of the competition. The Department of Energy implemented this contest to encourage low-cost innovation and show that energy-efficient choices can save money for consumers.

The Santa Clara team has publicly voiced its support of the Affordability mission. Using the tagline, “Solar for All,” the team means to show that solar power is a feasible option at any income level. The Three E’s, chosen by the team to convey its mission, are Economy, Efficiency, and Elegance. Affordability, it seems, is foremost.

In practicality, the affordable ideal has proven difficult to uphold. Teams have struggled to meet the Affordability guidelines since it became a contest in 2011. In 2009, Team Germany’s winning home was estimated to cost between \$650,000 and \$850,000. The home was highly innovative, with copper indium gallium diselenide photovoltaic panels covering the entire surface, but it led disgruntled teams to wonder if Team Germany was merely buying their way to victory. In 2011, Team Maryland’s winning home cost \$336,186.35. Of all the categories, that was their worst score. Only two teams managed to earn full Affordability points. The contest was effective in driving down costs, though, with the most expensive home still being over \$200,000 cheaper than Germany’s 2009 house.

One of the biggest challenges for Santa Clara has been balancing affordability with efficiency and sustainability. For example, the cost of using a steel frame in the house, as

opposed to a wooden frame, is sending the team over budget. However, steel makes sense because of its structural strength and stability, and having a steel frame makes it much easier and safer to transport to Irvine. The team might have saved costs by choosing another supplier, but SOS Steel was a good sustainable choice. Their close location reduced carbon emissions from transportation, and the company is committed to using recycled steel and meeting LEED standards whenever possible.

One area where affordability did dominate was in the interior of the house. The kitchen will feature low-cost tile. Most of the appliances are reasonably priced. The windows are standard glass, not the impressive but expensive three-pane films the team originally considered. Since the interior design is graded purely on aesthetics, the team did not have to meet rigorous performance standards, leaving room to look for bargains. The compromises in appliances and windows were made after considering the long-term energy savings of more expensive technologies. Once the team decided a triple-pane window would not significantly affect the temperature of the home, they decided conventional glass would work instead.

One fundamental problem with the Affordability scoring is that it is solely based on up-front construction costs. The vast majority of efficient appliances and renewable technologies save money over time, but require an initial investment. For example, the refrigerator exceeded the team's appliances budget, but it only requires the energy of a light bulb to operate. The difference in energy savings is enormous, and this eventually converts to a noticeable reduction in one's energy bill. The current Affordability judging looks at the homes with an eye towards instant cost savings, but the value of today's energy-saving technologies lies in long-term investment.

The Affordability contest is a well-intentioned effort to make solar technologies more accessible; however, a \$250,000 home is still expensive once the cost of land and furniture is added in. One of the reasons the SCU team chose to target the home to a retired couple is because they realized the cost would be prohibitive for a young family without accumulated savings. Despite their mission of “Solar for All,” the team has recognized that efficiency and elegance often come at the cost of economy.

Bamboo, for example, is not currently an economical technology because it is not widely grown in the US. However, the team hopes their use of bamboo will inspire other builders to invest in long-term sustainability. The team knows they are sacrificing affordability points, but they have decided it is more important to leave behind a legacy rather than a mere point total.

The Affordability contest is an important example of the struggle to maintain SCU’s values in the pursuit of victory. At this point, it appears that rather than solely seeking the least expensive option, the team has chosen to pursue high-performing technologies that minimize environmental harm. Although that might cost the team, in both points and cash, it reflects an admirable dedication to designing the home with a well-rounded balance of economy, efficiency, and elegance.