

華府太陽能建築設計大賽 比美觀、比創意

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環保意識抬頭，世界各國也都在積極推動太陽能的應用，美國華府上個周末就舉辦了國際太陽能建築設計大賽(Solar Decathlon)，有來自世界各地20多所大學的設計團隊參加，看誰可以蓋出又美觀又適合居住的太陽能環保屋。

美國華府國際廣場上，一棟棟的太陽能環保屋令人目不暇給，西班牙馬德里大學以太陽能板為屋頂，內裝全部都是廢棄的回收材料；德州農工大學將太陽能應用在庭院造景的設計上；柯羅拉多大學則是將整套太陽能基本設備設計成套裝組件，隨時可以移動。

柯羅拉多大學團隊指出，「我們可以運送這樣的設備，到任何地點，立即裝設成生活系統，這樣我們就可以為客戶量身訂作自己的建築，無論地點在哪。」

在美國華府舉行的太陽能建築設計競賽，吸引20多所世界著名大學的創意設計團隊參加，許多學生可以將課堂上所學，應用在實際的建築設計中。

達姆斯塔特大學團隊表示，「你不可能有這樣的機會，如

果只在大學教室上課的話，你只能有紙上作業，還有小小的模型，但這裡可都是1比1的實際模型。」

事實上，這項比賽比的不只是創意，還有居住的舒適度，目前這些太陽能環保屋造價還是略嫌昂貴，每棟大約要50到100萬美元，主辦單位希望未來能將成本降低，才能讓太陽能在生活中普遍使用，達到環保的目的。

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SOLAR DECATHLON: Solar house design competition

by Jorge



How difficult is it to design a house fully powered by the sun? That's what the U.S. Department of Energy is trying to find out. To do this, they have staged, once again, the Solar decathlon, a competition challenging 20 college teams from around the globe

to design, build, and operate an energy-efficient, fully solar-powered house that will be able to satisfy the needs of a typical family, and look good doing it.

The 20 college teams, ranging from the MIT to Germany's Technische Universität Darmstadt, will build their prototypes and transport them to the National Mall in Washington this October. Together, they will create a solar village, which will be open to the public for perusal. Using the newest products and technologies on the market, the students push the boundaries of residential solar viability, all in the context of a collaborative design process. We covered the Solar Decathlon back in 2005, and the results were very impressive. Check out 2005's winning designs from the University of Colorado and Cornell below.

solar decathlon, solar design competition, design competition, solar powered house, solar architecture

What are the demands of the contest? The houses must be able to provide enough energy to power proper lighting, run appliances and even to charge the Gemcar, an electric car made by Global Electric Motorcars. To generate the power, the teams are allowed to use photovoltaic systems, solar thermal systems, and solar hot water systems. The teams are allowed to use their own initiatives as long as the energy source comes from the sun. Because the energy available through the PVs is limited, teams will have to install energy efficient appliances and create an efficient lighting design. The houses will also need proper insulation in order to maintain a stable temperature and reduce the need for heating and cooling.

While technology is an important part of the competition, good solid design is what helps the most. In a house where every kilowatt counts, proper orientation and daylight access becomes invaluable. 「One of the guiding principles is that we would be using daylighting and natural ventilation as much as possible,」 said Corey Fucetola, MIT's team leader.

The event takes place on the National Mall in Washington, D.C., October 12 - 20. The team houses are open for touring everyday, except Wednesday, October 17, when they will close for competition purposes. An overall winner is announced on Friday, October 19 at 2 p.m. See the schedule for more information here.

Good luck to all involved from Inhabitat- we look forward to see if anyone will be able to take the crown from the University of Colorado team, who has managed to win the last two decathlons.

- + [Solar Decathlon](#)
- + [Energy geeks compete for coolest solar home](#)
- + [MIT's solar house under construction @ Cnet](#)
- + [Santa Clara University team to compete in Solar Decathlon @ SFGate.com](#)

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SOLAR DECATHLON 2007: University of Colorado Solar House

by Ali



One of the biggest highlights from the 2007 Solar Decathlon comes from reigning victor University of Colorado- and the design is proving once again that the team has what it takes to be solar design champions. Committed to defending their 2002 and 2005 titles, the 2007 CU Solar Decathlon team has brought a versatile, modular design that integrates 「shining」 examples of solar technology, recycled shipping containers, and a super cool aesthetic.



Putting a twist on the competition criteria, CU has designed a 2,100-ft² house with a central 700-ft² core. The smaller version meets the Solar Decathlon guidelines and functions as a complete house on its own. However, the team decided to design 「a full-size house to make our story more relevant to homeowners as well as the building industry」, said Michael Brandemuehl, an associate professor in CU's Department of Civil, Environmental, and Architectural Engineering.

At the National Mall solar village, the team has built the smaller version of it's CORE concept and delineated the full house outline with decking. The larger version uses two conventional shipping containers to take advantage of modular, prefabricated materials. The competition module houses the kitchen, bathroom and a centralized area for mechanicals. The additional module will be constructed after the Solar Decathlon adding space for laundry, a master bathroom and a guest bathroom. The complete concept will become a research, education and outreach facility for Xcel Energy, the team's primary sponsor.



Solar Photovoltaic

CU's design uses a building integrated photovoltaic thermal (BIPV/T) collection system, a building integrated photovoltaic (BIPV) system and a battery bank. The thermal system collects heat from the backside of the PV array and transfers the thermal energy to storage tanks for a water-to-water heat pump. The PV system was sized to meet electricity needs in Washington, D.C., and Colorado with a battery bank that allows for four days backup during zero PV power.

High Efficiency Water to Water Heat Pump

The EnergyPlus building energy simulation program was used to size an efficient water-to-water heat pump with two thermal storage tanks. More energy-efficient than air-to-air or air-to-water systems, the chosen system also allows use of refrigerant R410A which has zero ozone depleting potential.

Solar Decathlon 2007: Colorado Colors, Solar Decathlon 2007: Colorado House, solar decathlon, University of Colorado, Colorado zero energy house, CU, National Mall, Washington D.C., solar house, photovoltaic house, energy efficiency, sustainable design, green building, EERE

Materials

Inside, the CU team's CORE solar house uses environmentally friendly Marmoleum® flooring, formaldehyde-free Plyboo Strand® 100% bamboo cabinetry, Richlite recycled paper countertops and Ecogress mosaics made from eco-friendly porcelain. Several

walls and doors are eco-resins from 3Form Material Solutions with 40% post-industrial reclaimed material. The decking is made from reclaimed redwood planks sourced from Boulder-based building material recycler ReSource2000.

Net-zero Energy

Designed to reduce energy loads, the entry from CU minimizes system needs with a well-insulated building envelope, high performance windows, natural daylighting, natural ventilation, energy-efficient appliances and an efficient HVAC system. Even without the BIPV systems or the specified HVAC, the team estimates that the design would use 40% less energy than a conventionally built home of the same size.



Insulation, passive solar design and windows create a 73% savings in heating and a house that requires 60% less electricity throughout the year. As a grid-connected home in sunny Boulder, Colorado, the design would produce 38% more energy than it needs to operate. Even under cloudier skies in Washington, D.C., the home is still a net-zero structure that would produce an energy surplus.

WILL COLORADO WIN THIS YEARS SOLAR DECATHLON AGAIN - FOR THE THIRD TIME?
Inhabitat is on hand at the Solar Decathlon 2007, so stay tuned to find out.

+ [University of Colorado Solar Decathlon 2007](#)

+ [Inhabitat photo coverage of the 2007 Solar Decathlon](#)







① NORTH SITE ELEVATION

1/8" = 1'-0"



② EAST SITE ELEVATION

1/8" = 1'-0"



① SOUTH SITE ELEVATION

1/8" = 1'-0"



② WEST SITE ELEVATION

1/8" = 1'-0"