

Solar Decathlon 2017 - Bringing Concrete to the Game

The Solar Decathlon, first held in 2002, is a competition that is made of up a number of contests that challenge architectural and engineering students to design full-sized smart-energy houses by combining new innovations, market potential and energy and water efficiency. The winners have the chance to win a whopping \$2 million prize!



Image Source: <http://www.solardecathlon2014.fr/>

This year's Solar Decathlon 2017 is scheduled to be held in Denver Colorado and though most design entries rely on light-frame wood or steel construction, an entry by Team WashU will rely heavily on precast concrete panels.

Hongxi Yin, associate professor at Washington University in St. Louis argues that though the manufacturing process of concrete emits carbon dioxide, its inherent longevity and thermal properties can successfully offset those emissions. Yin further goes on to explain that the goal is not to successfully design and build one smart-energy house but rather to create an overarching framework that will be used for its efficiency across the industry. "To conquer global warming we have to find ways of dealing with buildings in the most natural and affordable way possible" Yin states.

Concrete has a high heat capacity, or thermal mass than that of other construction materials such as wood and steal. Note that thermal mass refers to the ability of a material to absorb and store heat energy. That is, a lot of heat energy is required to change the temperature of

high density material such as concrete, in comparison to other, light-weight materials as that of wood.

What is being dubbed the CRETE House, which will eventually be used as a long-term residence for scientists at Tyson Research Center, will use these thermal qualities as a means to self-heat and cool. That is, rather than using a traditional HVAC system, the house will be primarily heated and cooled by water coils that are embedded into the precast concrete panels. “It’s a hydraulic system”, Yin states. “The thermal mass radiates a uniform, comfortable temperature”.

On a warm summer afternoon, the concrete walls will absorb the heat from the sun which in turn slows the rise of temperature within the building. Then on cooler summer evenings, the heat will be released back outside.

The idea of using concrete for its thermal mass properties is nothing new, dating back into the Ancient times. The issue is that until now, we have largely ignored its potential!

For more information about Solar Decathlon, visit solardecathlon.wustl.edu

Source: <https://source.wustl.edu/2017/04/concrete-house/>