

# Solar NEST Project, Department of Energy Solar Decathlon 2015

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Solar NEST was created when our university was admitted into the U.S. Department of Energy (DOE) Solar Decathlon 2015 at the Orange County Great Park in Irvine, California against 17 competing universities. We entered this competition to educate and improve the local area by demonstrating the benefits of net-zero living with homes that are sustainable, aesthetically pleasing and affordable. The DOE website ([www.solardecathlon.org](http://www.solardecathlon.org)) states: *The Solar Decathlon challenges collegiate teams to design, build, and operate solar-powered houses that are cost-effective, energy-efficient, and attractive. The winner of the competition is the team that best blends affordability, consumer appeal, and design excellence with optimal energy production and maximum efficiency.* Solar NEST strives to discover the future of sustainable, energy-efficient housing and deliver these innovations to home buyers at an affordable price. We aim to rethink the design and construction of homes while maintaining traditional aesthetics and ease-of-use for the end user. Through our efforts, we aspire to bridge the gap between ‘what is’ and ‘what is possible’ by providing unique, elegant, simple design. The project is being conducted as an exercise in Integrated Project Delivery (IPD), where the architecture students worked closely with the construction management and engineering students through design of our 1,000 square foot home. The engineering design takes into account passive energy, south facing roof for solar photovoltaic panel utilization, and modular layout for transporting the finished structure to the competition site approximately 450 miles from campus. From a constructability perspective, the design uses traditional and readily available building materials along with conventional framing methods to develop highly energy efficient wall and roof assemblies for a cost effective production home. We have developed a complete digital energy model for this home design, with optional wall and roof assembly construction. We will be constructing and performing scaled energy testing of the various wall and roof assembly types to determine insulating R-values, material costs, and labor productivity rates in making our final selection. The students will be constructing the full-scale home in the spring 2015 semester, followed by testing systems in the summer 2015, and finally disassembly, transporting, and re-assembly at the competition site September 2015 through October 2015. One of the DOE’s main objectives for this solar decathlon competition is to educate students and the public to the environmental benefits, affordability, comfort, and aesthetics available in our energy efficient home design. Throughout the design and construction of this project, the faculty continue to integrate this project into some of the curriculum in construction management, engineering and architectural design courses. Following the competition, the home will be returned to our university at its permanent location to be used as a learning laboratory for middle school, high school, and college students, and the public. In September 2014, we hosted a delegation of energy professionals representing 20 countries around the world as we showcased our project and exchanged ideas.

**Key Words:** Solar Decathlon, Energy, Solar Power, Design