Solar Decathlon 2015: Building a Sustainable Future as a Team

A presentation by
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What is the Solar Decathlon?

2015 Solar Decathlon teams pictured at the entrance of the competition
10 Contests

Comfort
Affordability
Engineering
Architecture
Home Life
Appliances
Commuting
Energy Balance
Market Appeal
Communications

Casa del Sol’s outdoor patio
Decathlon History

  • National Mall, Washington D.C.
• 2013 and 2015
  • Orange County Great Park, Irvine

Solar Decathlon in Washington D.C.
Team Orange County

UCI
Engineering & Project Management

IVC
Construction Technology

CHAPMAN
Communications, Marketing, Documentary, & Graphic Design

SADDLEBACK
Architecture & Interior Design

Team OC poses for a photo for our website
Central Role of Students

- Student-Led Team
  - Leadership Skills
- Interdisciplinary
  - Group Project
  - Communication
  - Time Management

Casa del Sol at night at the Solar Decathlon
Central Role of Students

- Learning Curve
  - Learning-on-the-Go
- Research & Hands-On Experience
  - Outside of the Traditional Classroom

Construction process of Casa del Sol
ENV 229: Solar Decathlon 2015

Research-based, creative activity seminar course

- Facilitating the student-led administration, conception, development, and execution of the Solar Decathlon 2015 competition entry

Team OC finishing construction at the Great Park
Course Structure

• Built around SD competition areas
• Communications
  • Electronic & face-to-face communications
  • Presentations
  • Public education
• Finance & Marketing
• Home Life
Experiential Service Learning

- Outreach to public
- Schools’ involvement
- Public tours
- Countless hours!

Casa del Sol’s custom 3D print room
Final Project: Home Life

- Sustainable plant-based diet
- Energy efficient food preparation
- Sustainable home entertainment

A Sustainability Analysis of Team Orange County’s Home Life Events During the U.S. Department of Energy: 2015 Solar Decathlon

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Introduction
This project will look at the U.S. Department of Energy’s 2015 Solar Decathlon and examine Chapman University’s development in Team Orange County. This project will further examine the Home Life sub-competition by studying the sustainability of the different components of the two HomeLife dinner events, the Nexus 8th party, and the energy budget associated with each of the three events. Reviewing team documents and collecting data from affiliated team members will give us an overview of the efforts taken to achieve sustainability for the dinner and move-out. We found various strategies were incorporated in the HomeLife concept for the three rights, during which these events were hosted, which integrated sustainability practices to embody the goal of the U.S. DOE’s Solar Decathlon. Finally, the overall sustainability of the Nexus hosted events will be combined to the net-zero nature of the home, Casa del Sol, and the impact of these dinner events in terms to the average and move-out to understand the sustainability of this sub-competition.

Methods
In order to fully understand the sustainability of these three hosted events, a water footprint analysis was done for the ingredients of the meals and the energy demand of the food production (based on trophic level analysis) to be taken into account. Information on the menu was sourced from Team Orange County’s Home Life sub-group, which were submitted in the August 2015 deadline for the U.S. DOE’s Solar Decathlon requirements. In addition, the specific calculations for each individual ingredient, in terms of associated water footprint, are presented. The NexoLife impact score menu would have a California’s extreme score of drought. Furthermore, an overall examination of local foods hosted diets was completed for a better understanding of the various factors in food sustainability and the urban hidden environmental impact of uninvolved food source.

Theoretical Framework
Principles of Sustainability:
- Primary plant- and seafood-based diets (responsibly grown and harvested)
- Energy efficient food preparation (in relation to appliance efficiency and sources of energy)

Research Questions
In order to analyze the sustainability and impact of Team Orange County’s efforts, we asked:
- How does a plant-based diet compare to a standard omnivorous diet, in regards to environmental impact?
- How are food, entertainment, and home life concomitantly an unsustainable activity? Just how sustainable are these actions?
- How are the choices made in the menu selected and served reflective of sustainable living? What does the research tell us about this?
- What was the water footprint of food served during the competition, compared to a typical American meal of equal caloric intake?

Conclusions
Unfortunately, our plant-based, seafood-based meal had a much smaller water footprint associated with it than the apple plate setting meant to represent a typical dinner in the United States of equal caloric (specifically in relation to socio-economic status). The meals chosen for the lunch were also much healthier, less processed, and more abundant than the options chosen to represent the “cheater” or standard, meals made by an equally efficient water budget. It is also noted that the foods used in the mostly plant-based menu for the Solar Decathlon made life’s production was more inherently efficient due to trophic level dynamics and the efficient rate of transfer from one trophic level to the next. This analysis can contribute the sustainability of the meal prepared for the 2015 Solar Decathlon (as well as the menu studies) may additionally be high due to the high efficiency of agricultural, water-nourished crop production, and the low-powered impact of our kitchen versus the typical American home.
Final Project: Affordability

- Cradle-to-cradle design made affordable
- Sustainable architectural design principles
  - Passive solar
  - Efficient insulation
  - Drought tolerance
  - Use of local building materials

Casa del Sol ready for competition
Final Project: Communications & Fundraising

- Community education via presentations on net-zero energy solar homes
  - Home tours
  - Seed packets
  - Documentary films

Communications contest included public tours, custom poppy seed packets, website, and banners
The Winners: Students

- Enduring learning
- Theory into practice
- Experience as gateway to careers

Team OC winning 2nd place in engineering
Thank You!
Questions?`