[Schneider Electric Case Study]

Department of Energy (DOE)

Washington DC

The Solar Decathlon: Preparing the Next Generation of Solar and Microgrid Innovators

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In Brief

Goal

As most homes are part of the grid. Solar Decathalon wanted to provide power to show how solar can drive a meter backwords and storing and sending back to the grid the energy created.

Solution

Microgrid

Results

- Provided an example of a working residential micorgrid
- Brought Power to the National Mall
- Ability to Show Homes In A More Realistic Context

The Background

Every 3.2 minutes – that's how often a new solar project was installed in the United States during the first half of 2014. Today, the use of solar energy is extremely popular, yet the outlook for photovoltaic technology hasn't always been so positive.

When solar power was first a commercial offering in the energy market, the fledgling industry suffered due to a dubious consumer public. Not all installers possessed the same sense of professionalism seen today among solar specialists. Quality and workmanship issues made customers hesitant to put solar panels on their roofs.

The Department of Energy acknowledged the promise of solar technology and energy efficiency and sought to legitimize its use among homeowners. As a result in 2002, the Energy Department created the U.S. Department of Energy Solar Decathlon, an award-winning program that has challenged teams of college students to design and build solar-powered houses that are energy efficient and budget-conscious. Entries are judged based on their affordability, consumer appeal, and design. The projects also exhibit optimal energy production and maximum efficiency.

The houses are displayed at a public location – such as the Orange County Great Park in Irvine, CA, for the 2013 and 2015 events – in order that visitors may tangibly experience the look and feel of a solar home.

The Solar Decathlon serves other goals as well. The event encourages college students to problem-solve around architectural and electrical issues, and trains and inspires them toward careers in energy. This latter detail is especially pertinent given that 60 percent of utility workers are expected to retire in the next decade. Teams of students spend almost two years designing and building the houses that use solar for electricity, heating, and cooling.

But the Solar Decathlon demonstrates more than just the effectiveness of solar; it also provides an example of a working residential microgrid.

Why a Solar Microgrid

With the help of Schneider Electric, the Solar Decathlon featured its first microgrid in 2009. The microgrid project was born out of concern that the competition did not truly reflect how solar typically operates in the U.S.

Most solar homes are tied to the larger central grid. Yet, prior to 2009, Solar Decathlon houses operated “off grid.” As a result, the projects were unable to show the relationship of the home to the larger electric grid, particularly the bidirectional flow of electricity.

The microgrid allows for this two-way power flow. Eachhouse can receive electricity from the grid when its solar panels are not producing power, at night for instance. And during the day, the house can send any excess electricity it creates back to the utility. In a real-world setting, the utility then can credit the consumer for the energy, which reduces the homeowner’s utility bill.

A microgrid helps to show homes in more of their true context. Making it more relevant and realistic to home owners.

The consumer benefits, but so does the utility. The solar panels provide the utility with an additional power generation, and this can be especially valuable on hot summer days when demand for electricity is high and central power plants are working at full capacity.

Before Schneider Electric added the Solar Decathlon microgrid, students measured only the flow of energy in and out of batteries during the competition. Now, they are able to track what the house produces and consumes with a bidirectional utility meter.

> Blue skies are a welcome sight during the U.S. Department of Energy Solar Decathlon 2011 in Washington, D.C., Monday, Sept. 26, 2011. (Credit: Stefano Paltera/U.S. Department of Energy Solar Decathlon)

In addition, the presence of the microgrid creates an opportunity for the students to learn about a technology that is expected to become increasingly common. The number of microgrid installations is expected to grow dramatically in coming years. Navigant Research forecasts that the microgrid market will reach $40 billion by 2020, a quadrupling since 2010, with much of the activity in North America.

A collegiate team member surveys microgrid equipment that will be used to power their Solar Decathlon house. Once teams have passed the necessary inspections, their houses will be connected to the village grid for the remaining part of the assembly period and the competition. (Credit: Amy Vaughn/U.S. Department of Energy)

Why Schneider Electric's Microgrid

Needless to say, the competition itself is stressful. The solar village goes up quickly and everything must work properly from the get-go. During crunch time, the event organizers need dependable partners.

When the Solar Decathlon seeks partners, it looks for those with similar goals and philosophies about energy – and a commitment to improving quality of life. A selected partner must be committed, professional, and stable.

Schneider Electric has been a valuable partner of the Solar Decathlon for four events now," said Chuck Kurnik, Solar Decathlon Site Operations Manager. "We could not have a grid-connected event without their assistance."

Each year that Schneider Electric has participated in the Solar Decathlon, they have brought a wealth of experience working with microgrids and related equipment. The company has worked with the technology for two decades, completing more than 700 control and microgrid projects.

For the Solar Decathlon, Schneider Electric provided microgrid design and engineering services as well as electrical distribution equipment in 2009, 2011, and 2013. The company also provided a proprietary metering and data system for display of real-time electricity production and consumption in 2011 and 2013.

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Solar Decathlon Director Richard King spoke about the benefits of the Solar Decathlon and the power of individuals in reducing world energy use at the TEDxOrangeCoast Annual Conference in September. (Credit: Stefano Paltera/U.S. Department of Energy Solar Decathlon)

Ready For The Future

The Solar Decathlon offers value well beyond the event. Some of the houses are sold, but most continue to be used for research and public education. (Their locations are listed on the Solar Decathlon website)

Students involved in the competition get a jumpstart on careers in building, architecture, engineering, and other professions that can help the world transition to a clean energy economy. The event's message resonates. A recent study showed the students continue promoting cleaner technology beyond the event, and attendees are likely to purchase some kind of solar or energy efficiency product.

Since the first Solar Decathlon in 2002, the event has grown and extended its reach. Now Europe, China, and Latin America are all hosting Solar Decathlons.

King sees this kind of international expansion as vital. "By expanding to Europe, China, and Latin America and the Caribbean, the Solar Decathlon has involved an additional 94 teams and nearly 12,500 participants. It's now having an impact on worldwide audiences." he said.

The Solar Decathlon's mission continues with an international reach. Schneider Electric is proud to continue to be a part of this worthy educational endeavor, one that is heightening student and consumer understanding – and enthusiasm – about solar and microgrid technology.

For further reference on the Solar Decathlon visit:
www.nrel.gov
Research: Solar Decathlon 2011 High-Penetration Microgrid presented at the 2012 World Renewable Energy Forum

For further information on the Schneider Electric visit:
www.schneider-electric.com

Cover Photo: Visitors tour the U.S. Department of Energy Solar Decathlon 2011 in Washington, D.C., Friday, Sept. 30, 2011, with Arlington, VA, left, and the Lincoln Memorial, right, in the background. (Credit: Stefano Paltera/U.S. Department of Energy Solar Decathlon)

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