Department of Energy

# Q&A With Byron Washom of the University of California at San Diego

JULY 22, 2010


Byron Washom, Director of Strategic Energy Initiatives at the University of California at San Diego, poses with an electric vehicle and some of the solar panels that cover UCSD's campus.| Photo courtesy of UCSD

*Byron Washom is helping to define and create solar energy's future. In 1984, Washom's company built a concentrated solar energy generator using a parabolic dish to concentrate solar power onto a Stirling engine. That project set a world record for efficiency in solar power, which stood until 2008. It also helped Washom, a MBA without formal engineering training, launch a career in renewable energy. Currently, Washom is Director of Strategic Energy Initiatives at the University of California at San Diego, a job that involves collaborating on energy research and securing funding, including a recent $1.75 million grant from the Department of Energy (DOE).*

*We recently spoke to Washom about quantum innovation, solar forecasting and a project with Sanyo.*

**Q: What does the Director of Strategic Energy Initiatives do?**

**A:** My job is to bring quantum innovations to the campus as a living laboratory, and then to incubate that technology into the marketplace. I work across the board, [including with] the operators of the 1.2 MW [of photovoltaic solar energy system] on campus. I closely collaborate with them, and I'm a principal investigator here or a co-PI with a variety of different faculty members.

*Editor's note: Through co-generation, UCSD produces 85 percent of the energy needed for the campus. The university then studies its energy production and sustainability data to support academic research and efforts to be a zero-waste, climate-neutral campus. These efforts give rise to the "living laboratory" label. Washom does his own research and works with other academics and industry partners to get new technologies in the sustainable energy field to the market.*

**Q: Tell us about your energy storage work that's funded by the DOE grant.**

**A:** Within our modeling for mitigating the impacts of high penetration of PV on distribution circuits, we will be developing [computer programs] that will create [schedules for] charge/discharge [of energy] based upon hour-ahead solar forecasts. We also just signed a three-year, $3 million research agreement with Sanyo. They want to collaborate with us to create a fully integrated photovoltaic storage system.

*Editor's note: The agreement includes multiple projects designed to improve the stability and reliability of renewable energy, including solar forecasting, energy storage and general energy management. Fully integrated PV storage allows excess energy generated through a PV system to be stored and used when the system is not generating electricity at peak.*

**Q: That's a hard problem to solve.**

**A:** That's what makes it so attractive. The challenges are extensive, but it's a game-changer. This is one of those areas where, if you have a significant success, you've substantially altered the dynamics of renewable energy, not only as a distributed energy resource, but also as a resource with a fully integrated grid.

**Q: Can you explain that?**

**A:** There is a shared benefit between the PV owner and the utility grid, if you can orchestrate the charging and discharging schedules to meet both of their needs and thereby reducing expensive spinning reserves. Storage gives solar energy a new capability, of optimally timing its use from instantaneous to more strategic. Storage also aids the grid by buffering extreme ramping of power flows from cloud transients.

**Q: What else are you working on with the DOE grant?**

**A:** The other part is probably some of the most exciting work I've been involved with in the past 20 years, and that's solar forecasting.

One device is used to put a fisheye on the sky. It recognizes clouds as they appear on the horizon. We do a 3-D characterization of those clouds, and we track the height, speed, direction and nature of the clouds as they move towards shading each individual solar panel within a five- mile radius. The objective is to have an accuracy of 90 percent to predict shading on photovoltaic systems an hour in advance.

If you know an hour in advance what your photovoltaic systems are going to produce, they've gone from being a non-firm source of power to a firm source of power on an hourly basis.

**Q: What's the potential market impact of this work?**

**A:** What it's doing is increasing the value of our renewable distributed energy resources by increasing the shared benefits to the owner and the host utility from the power they produce. The utilities and grid system operators are really into market value and price intermittent and firm electricity in a wholly different fashion. If you have non-firm power, that's not of much value to the local utility. However, if you can bring it to the point where you can make it firm power because of the hour-ahead forecasting or energy storage , then the local utility and grid operators could come to depend upon it and price it competitively with conventional generation and spinning reserves.

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