



SERC ENERGY NEWS

Summer 2012
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The quarterly newsletter of the
Schatz Energy Research Center

HUMBOLDT
STATE UNIVERSITY

Summer Field Season in Kenya Peter Alstone and Meg Harper

As the spring semester drew to a close the signs of summer crept in: fewer cars parked on the streets of Arcata, foggy mornings, and SERC staff packing for field work on our international projects. In early June, we embarked on a trip to Kenya to support our ongoing work with the [World Bank / IFC Lighting Africa](#) program, which supports the growing market for clean, efficient, affordable solar lighting in the developing world.

Conducting Product Awards Focus Groups

2012 marks the second time that SERC is coordinating an Outstanding Product Awards Competition for Off-grid Lighting (the first was in 2010). The awards will be given in November in Dakar, Senegal. Eighteen groups of 10-12 people in India, Kenya, and Senegal have been selected as field judges and their feedback is a key part of the judging process. The field judges participate in an initial focus group, and then they try out a product in their home for about a week. Following the in-home trial, they report back at a final focus group. The judges in Kenya shared their enthusiasm for the project by welcoming us with songs (that we couldn't understand well) and dance (that was universally understood) to the initial focus groups. So far, the process has been a success. We are coordinating the judging in Kenya along with SERC alum Jennifer Tracy, who is leading the overall field judging process. SERC Engineer Brendon Mendonca is helping coordinate the judging in India, and Chris Carlsen (another SERC alum) is helping in Senegal.

Surveying the Market for Off-grid Lighting

In between focus groups, we led a survey of shops that sell off-grid lighting products in three Kenyan towns: Kericho, Brooke, and Talek. This study is an update to a survey that was completed in 2009. The new survey shows how the market has changed, and preliminary results suggest that many more good quality, affordable lighting products are available today than were three years ago.



Research assistant Daniel Koech surveys a shop in Kericho.

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A Message from the Director

Passing the Torch

This is my last director's column. After 7 years of newsletters and 23 years at the helm of the Schatz lab, I'll be entering the faculty early retirement program in mid-August and passing the torch on to Arne Jacobson who will become the lab's director.



We're fortunate to have Arne stepping in. He was one of the first grad students to work at the lab; his master's thesis concerned work with the electrolyzer at the Schatz Solar Hydrogen Project. He went on to earn his Ph.D. at the Energy and Resources Group at UC Berkeley and now is my colleague in the Environmental Resources Engineering department. Arne's long time connection with the lab, his service as co-director for five years, and his strong leadership skills will serve us well for many years to come. And starting next issue, you'll get to read his thoughts in this space.

Meanwhile, I'm not going away. Working here is way too interesting and fun to stop now. During the five years of my early retirement program, I'll be known as the Founding Director and share leadership duties with Arne. I look forward to being busy and involved; maybe I'll even have a chance to get back into the lab and turn a wrench or two.

In this issue of our newsletter, Peter Alstone and Meg Harper keep us up to date on summer activities in Kenya as part of the Lighting Africa project and Richard Engel writes a tribute to our benefactor Mr. Schatz on the 100th anniversary of his birth. Jim Zoellick describes a project with local partners to plan for an electric vehicle infrastructure in Humboldt County, Allison Oakland describes our continuing effort to bring fuel cell topics into science education with a teacher workshop, and Greg Chapman describes progress in upgrading our hydrogen fueling station to 700 bar operation.

I'm writing this on the summer solstice as the sun shines its warmth and light on our hemisphere. I want to thank all you faithful readers and send a fond farewell. It's been a joy and a privilege to communicate with you through this column; let's all keep working to improve the health of our beautiful planet. Goodbye, thank you, and best wishes.

---Peter---

Kenya Fieldwork (continued from page 1)

Training Off-grid Lighting Technicians

As the market for good quality off-grid lighting grows, it is inevitable that some will break, but hopefully not too many. To help ensure that people with broken lights do not slide back to dirty, expensive, unsafe kerosene lighting, it is critical that service and maintenance technicians are able to fix their lights. Lighting Africa has begun to train technicians to do just this, and plans to hold a number of trainings over the next year in Kenya. On June 13, we led a "train the trainer" session to build training capacity that Lighting Africa can deploy. We prepared for the session by developing a comprehensive training package based on the initial trainings held by Lighting Africa.

Looking Forward

These three activities highlight SERC's diverse engagement in clean off-grid lighting in the developing world. Our team's reach goes from the test lab downstairs at SERC in Arcata all the way to the sitting rooms of off-grid homes in Kenya. Looking forward we will continue to expand our activities with Lighting Africa, and we are in the early process of similar engagement in India. We'll keep you apprised of our continued off-grid lighting work in future newsletters.



Top to bottom: Participants in the "train the trainer" session held at the University of Nairobi. A shopkeeper in Talek (100 km off the grid) displays two off-grid lighting products he offers for sale. The one on the right (Sun King™) has been tested and met Lighting Africa's Quality Standards.



SERC Begins Electric Vehicle Planning Study for the North Coast

Jim Zoellick

SERC has teamed up with the Redwood Coast Energy Authority and GHD (formerly Winzler and Kelly) to conduct a plug-in electric vehicle planning study for our North Coast community. The California Energy Commission has provided \$200,000 in funding for the study as part of the Alternative and Renewable Fuel and Vehicle Technology Program (also known as AB 118). The goals of this program are to reduce dependency on petroleum and greenhouse gas emissions while improving energy security. The North Coast was one of nine regions funded throughout the state.

The aim of the North Coast Plug-in Electric Vehicle Readiness Project is to prepare Humboldt County for the successful adoption of electric vehicles. Project activities will include the development of a plan to install electric vehicle charging infrastructure throughout the region, preparation of a permitting and installation guide, efforts to assist fleet vehicle operators in adopting plug-in electric vehicles, and education and outreach to the general public. We expect to complete the project by the first quarter of 2014.

Celebrating a Milestone

Richard Engel

This year the Schatz Energy Research Center is observing the 100th anniversary of the birth of Louis W. Schatz, our original benefactor and the lab's namesake. Mr. Schatz was born January 20, 1912 in Pittsburgh, PA. He graduated from Pennsylvania State University with a degree in forestry in 1934, going on to earn a master's degree at UC Berkeley in 1939. He established General Plastics Manufacturing Company in Tacoma, WA in 1941, where he served as president and owner for many years. General Plastics technology has been used in the NASA space shuttle, in Navy submarines, and in most Boeing passenger jets.

Mr. Schatz was an early and enthusiastic advocate for hydrogen energy. A series of phone calls with SERC director Peter Lehman at HSU in the spring of 1989 led to their discovery of this shared interest and to Mr. Schatz's initial financial contribution to fund the Schatz Solar Hydrogen Project in Trinidad, CA. The success of this project led to the establishment of a permanent Schatz Energy Research Center with additional support from Mr. Schatz.

Mr. Schatz was awarded an honorary doctorate degree by HSU in May 1994 in recognition of his support of SERC and other HSU programs, including the L.W. Schatz Demonstration Tree Farm. Penn State, where he sponsored fellowships and endowed the creation of a center dedicated to tree genetics research, also honored him with an achievement award and named him an alumni fellow.

Peter summed up the feelings of all of us. "We're extremely fortunate to have a benefactor like Mr. Schatz," he said. "His unwavering support, his trust in our work, and his enthusiastic cheerleading made the good work of SERC possible."

Mr. Schatz passed away September 22, 2001 in Pauma Valley, CA at the age of 89. He left additional funds in his estate that continue to support SERC's work to this day, including the construction of our new facility completed last year. In total, Mr. Schatz contributed some \$12 million to support SERC and other programs at HSU. Please join us in remembering this important champion of clean energy technology.

Project Updates

Hydrogen Fueling Station Upgrade Greg Chapman

SERC is nearing the completion of the installation phase of our hydrogen station upgrade project. As a reminder, when it's complete, the upgrade will allow us to completely fill our Toyota fuel cell car with 6 kg of hydrogen. That will give us a 400-mile range, enough to travel to the Bay Area or Sacramento and back.



The 700 bar compressor and partially-assembled high pressure dispensing system mounted on the block wall.

The new 700 bar compressor is mounted and electrical power and the nitrogen and hydrogen gas supply lines have been connected. We are now in the process of installing the last few components of the high-pressure hydrogen dispensing system (the compressor discharge side). Once assembly is complete, SERC engineers will begin the testing phase of the commissioning plan. Tests will include field inspections, instrumentation verification tests, gas analysis, and pressure testing of the hydrogen plumbing. The initial start-up and operational testing of the new system will follow sometime in late July. This is an exciting period in the project; we'll keep you posted on our progress.

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HyTEC Teacher Training Allison Oakland

SERC is gearing up for our final Hydrogen Technology and Energy Curriculum (HyTEC) teacher training August 6-7 at Humboldt State University. This professional development opportunity is aimed at high school teachers interested in bringing HyTEC-funded hydrogen and fuel cell technology into the classroom.

SERC collaborated with the Lawrence Hall of Science at UC Berkeley on development of the [curriculum and experiment kits](#) for teaching high school students in chemistry, environmental science, and physical science courses about hydrogen energy and fuel cells. Curriculum topics are correlated with National Science Teachers Association standards. The project has support from the U.S. Department of Energy and the Alameda-Contra Costa Transit Agency.

The curriculum has gone through extensive testing and is now being disseminated nationwide. The hydrogen experiment kits that were developed as part of the curriculum have recently gone into production by LabAids, a longtime partner of Lawrence Hall of Science. The kits are designed to be low-cost, but given very limited budgets at high schools these days, SERC and the Humboldt County Office of Education will act as regional hosts, providing a physical location where high school teachers can check out the kits.

Teachers who participate in the training will also have access to additional resources at SERC, including staff and docent support during the lab portions of the curriculum. To bring the topic of hydrogen for transportation out of the classroom and into the real-world, SERC staff and docents can also provide tours of the Humboldt State University [Hydrogen Fueling Station](#) and demonstrate our Toyota Highlander fuel cell car.

The workshop will be led by scientists, engineers, and curriculum developers working on hydrogen and fuel cells. Workshop participants who reside in Humboldt County will receive a \$200 stipend. Out-of-county participants will receive a \$250 stipend. High school teachers of Environmental Science, Chemistry, or Physical Science are encouraged to register.

The one- to two-week flexible curriculum module includes an introduction to alternative energy for transportation, electrolysis of water to produce hydrogen fuel, use of the hydrogen produced to run hydrogen fuel cells and measure efficiency, and the chemistry of the fuel cell reaction. Practical applications and challenges of this technology and environmental issues related to energy use are also covered.

The kits available on loan to each participant include one complete set of teacher materials and eight complete sets of classroom materials, including 8 experiment kits, appropriate for a classroom of 32 students working in groups of four.

Visit SERC's [project website](#) for additional information.



Top to bottom: Past teacher training participants test for hydrogen (*photo credit Design Your Future*), and take data during the fuel cell lab experiment.



[SERC Energy News](#) is published quarterly by the Schatz Energy Research Center at Humboldt State University.

The mission of SERC is to promote the use of clean and renewable energy in our society. SERC meets its mission by performing research and developing new technology; designing, building, operating, and demonstrating clean and renewable energy systems; providing training for professionals; and educating the public about a sustainable energy future. SERC's affiliation with the Environmental Resources Engineering program at HSU provides a rare opportunity for undergraduate and graduate engineering students to acquire hands-on experience with cutting-edge energy technologies.

SERC is a member of the California Hydrogen Business Council, the International Association for Hydrogen Energy, the International Solar Energy Society, and the American Solar Energy Society.

SERC co-directors are Peter Lehman, Charles Chamberlin, and Arne Jacobson. Faculty Research Associates are Eileen Cashman, Elizabeth Eschenbach, Steven Hackett, and David Vernon. Research and administrative staff include Andrea Alstone, Peter Alstone, Greg Chapman, Richard Engel, Meg Harper, Robert Hosbach, Patricia Lai, Marc Marshall, Brendon Mendonca, Allison Oakland, Carolyn Ortenburger, Tom Quetchenbach, Kristen Radecsky, Mark Rocheleau, Colin Sheppard and Jim Zoellick. SERC Docents are Joel Bautista, Shelly Dean, Dustin Fredricey, Chet Jamgochian, Greg Pfothenauer, Alisha Sughrone, and Max Tanti.

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