



# SERC

## ENERGY NEWS

**Spring 2006**  
Volume 1, Number 1

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**HUMBOLDT**  
STATE UNIVERSITY

## Teaming with Local Government for Sustainable Energy

Richard Engel

In a December 2002 planning retreat, SERC staff agreed we wanted to do more to contribute to the betterment of our local community. We have made good on that resolution through a number of initiatives. Many of these projects have been in support of Humboldt County's regional energy office, the Redwood Coast Energy Authority (RCEA). The RCEA is a joint powers association that was created "to develop and implement sustainable energy initiatives that reduce energy demand, increase energy efficiency, and advance the use of clean, efficient and renewable resources available in the region."

Apart from our work with the RCEA, SERC has also collaborated with Humboldt County's tribal governments. SERC provided and operated a fuel cell power system to provide back-up power for a Yurok Tribe telecommunications system and designed and built an off-grid residential solar electric system for a tribal elders' home on the Yurok Reservation. SERC is now working with the Yurok to develop a tribal energy program. We are also helping a local nonprofit, United Indian Health Services, to design solar energy systems to provide electricity and hot water for their facility.

In addition, some SERC employees lend their energy expertise to local government on their own time as volunteer members of the City of Arcata's Energy Advisory Committee and Arcata's Planning Commission.



SERC Staff and HSU Engineering students helped Redwood National Park install a solar electric system at Wolf Creek Outdoor School in Orick, CA.

### SERC has assisted the Redwood Coast Energy Authority by:

▷ preparing a series of reports and supporting materials to advise the RCEA on how it can increase energy efficiency and use of renewable energy in Humboldt County;

▷ developing outreach and education materials for RCEA to distribute to the public via printed fact sheets, a web page, and a telephone energy hotline;

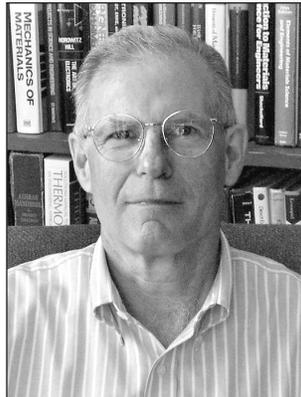
▷ collecting information on energy use in water and wastewater treatment facilities that is now being used to help local governments reduce their operating costs;

▷ organizing and presenting workshops on solar energy and energy management in water and wastewater facilities; and most recently

▷ contributing to the development of an energy element for Humboldt County's general plan update.

## A Message from the Director Peter Lehman

We at SERC have been working hard for over 15 years to advance our mission to “promote clean and renewable energy.” But, despite writing many research papers and technical reports, securing patents, and making conference presentations all over the world, we’ve never had a newsletter.



Now we do and you are holding our first issue in your hands. We will publish it quarterly and hope it will keep our friends and colleagues up to date on our activities and connected with us and SERC.

In this issue Richard Engel describes our work teaming with the Redwood Coast Energy Authority to develop the energy element of Humboldt County’s General Plan and our work with the Yurok Tribe to install clean power on their reservation. Richard also writes about installing a fuel cell test bench for Kettering University in Michigan. Our bench and the training we provided will jump-start Kettering into the fuel cell research and education world. Jim Zoellick covers our hydrogen safety training for first responders and Allison Oakland and Doug Saucedo describe our docent program in which HSU engineering students educate school children, university students, and the general public about energy issues. Finally, Juliette Bohn explains why she’s chosen to be a SERC docent.

I am writing this after Katrina and Rita struck the Gulf Coast. As gas shot up beyond \$3/gallon, we were all reminded of how vulnerable we are depending on a fossil fuel energy supply. The fact is, oil is becoming scarcer and oil shocks in the future will last longer and be triggered by smaller disturbances. We here at SERC will keep working to diversify our energy sources and lessen our vulnerability to dwindling fossil fuels. This newsletter will keep you informed about our efforts.

## SERC Builds a Custom Fuel Cell Test Stand for Kettering University Richard Engel

Since 1992 SERC has built and operated eight test stations for evaluating performance of its own proton exchange membrane (PEM) fuel cells. In 2002, the University of Michigan contracted with SERC to provide UM with a single-station fuel cell test stand. Following on the heels of this successful project, Kettering University approached SERC about building a multi-station test stand.

Dr. Etim Ubong and Dr. K. Joel Berry of Kettering’s mechanical engineering department made multiple visits to SERC to examine our test stations and to learn about our capabilities firsthand. The information exchanged during these visits helped Dr. Ubong and Dr. Berry identify exactly what features and specifications they required for their own test stand before placing their order with SERC. Kettering and SERC entered into a contract in August 2004. The test stand was designed, fabricated, and tested at SERC and then partially disassembled for shipment to Kettering University. SERC engineers traveled to Kettering to reassemble and activate the test stand and trained Kettering engineering faculty, technicians, and graduate students in operating and maintaining the system. SERC also provided Kettering with a comprehensive test stand operations and maintenance manual, as well as two built-to-order PEM fuel cell stacks for use with the test stand, one a 12-cell, 300 cm<sup>2</sup> unit and the other a 4-cell 140 cm<sup>2</sup> unit.

The test stand consists of four test stations, which can all be operated simultaneously under the control of a single computer and data acquisition system. The test stand integrates air, hydrogen, and water delivery subsystems; an electrical power system including a programmable electronic load and uninterruptible power supply; monitoring and control hardware and software; and a safety control system to automatically shut the system down in the event of a malfunction or power outage.

SERC’s test stand makes up part of Kettering University’s new Center for Fuel Cell Systems and Powertrain Integration. The Center debuted with an open house in June 2005. The SERC test stand was one of the Center’s major attractions as they showcased their fuel cell capabilities to the media, the public, dignitaries from Congress, the Governor of the State of Michigan, and the new facility’s numerous corporate sponsors.



SERC engineers Greg Chapman, Antonio Reis, and Marc Marshall (*left to right*), show off the newly installed Kettering University multistation fuel cell test stand.

# SERC Delivers Hydrogen Safety Trainings

Jim Zoellick

In order to promote the safe use of hydrogen as a transportation fuel and energy commodity, we need to educate and train industry professionals, emergency responders, government officials, permitting officials, and the general public about the promise of hydrogen and its safety characteristics. SERC is doing its part to spread the word. In recent years, we have developed and delivered hydrogen safety presentations to numerous groups.

In November of 2005 we trained over one hundred Oakland, CA firefighters about the safety aspects of gaseous hydrogen fuel and the specific safety features associated with AC Transit's hydrogen energy facilities. The trainings included a 45-minute classroom presentation and a facility walk-through.

In February of 2005 Chevron Corporation hired SERC to provide safety training to more than fifty firefighters in the Chino Valley Fire District at Chevron Hydrogen's newly completed energy station at the Hyundai-Kia America Technical Center in Chino, CA.

Prior to taking on these projects, SERC built a solar powered hydrogen generation and fueling station and a stationary hydrogen fuel cell power system at SunLine Transit Agency in Thousand Palms, CA. As part of these projects, we conducted hydrogen safety and awareness trainings with SunLine staff. SERC also delivered a hydrogen safety training to the Riverside County First Responders in May of 2003 at SunLine headquarters.

Our expertise in working safely with hydrogen energy systems comes from more than 15 years of designing, installing, and operating systems, including fuel cell powered electric vehicles, stationary and portable fuel cell power systems, solar hydrogen energy systems, and hydrogen generation and vehicle fueling facilities. By offering our services in hydrogen safety consulting and training to others, we have found a valuable way to share our expertise. To learn more about how SERC can provide hydrogen awareness and safety training for your project or company, contact us at [serc@humboldt.edu](mailto:serc@humboldt.edu) or 707-826-4345.



Dr. Peter Lehman delivers a hydrogen safety training to Chino Valley firefighters.

## Docent Corner

Allison Oakland and Douglas Saucedo

### SERC Docents Bring Energy to the Community

At SERC we aim to increase energy and environmental awareness by offering first-hand experience with clean energy technologies to students and the public. Our two-year-old docent program helps us accomplish this goal. SERC docents are motivated Humboldt State University (HSU) students interested in hydrogen and renewable energy. They share a common interest in the proliferation of renewable energy power systems in today's society and voluntarily bring their knowledge out into the community.



SERC recognized the need to institute a docent program because of the increasing number of requests we get to bring our knowledge, expertise, and excitement about energy to the community at large. Docents attend career fairs and community festivals, speak as guest lecturers in classrooms, and guide tours of SERC's fuel cell laboratory and solar hydrogen system in Trinidad, CA. Teaching techniques include interactive lectures, hands-on activities, games, and physical demonstrations tailored to fit the age and focus of the audience. Our docents often incorporate SERC technology such as the Stack-in-a-Box® portable fuel cell system in their classroom and public demonstrations.

### A Word From... Juliette Bohn

“ Through the SERC education and outreach program, students who are passionate about clean energy are able to participate in shaping the future. The more our community understands the costs and benefits of our current energy economy, as well as the alternatives available today, the more informed and empowered they will become. Working as a docent has been an enjoyable way to grow my own understanding of the present issues and reach out to other curious minds with tenable solutions. Talking to people one by one may seem small-scale, but in reality it is also one of the most effective ways to bring about lasting change. ”

*Docent Juliette Bohn is a graduate student at HSU interested in the transition to a clean energy economy.*



## Looking Back

**15 years ago** SERC broke ground on the Schatz Solar Hydrogen Project. Located at HSU's Telonicher Marine Laboratory in Trinidad, CA, this project became the first stand-alone energy system in the U.S. to demonstrate how hydrogen can be used to store solar energy.

For information about this system visit:  
[www.humboldt.edu/~serc/tdad.html](http://www.humboldt.edu/~serc/tdad.html)



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**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 National Hydrogen Association, the International Association for Hydrogen Energy, the International Solar Energy Society, and the American Solar Energy Society.

SERC co-directors are Peter Lehman and Charles Chamberlin. Research and administrative staff include Greg Chapman, Richard Engel, Anand Gopal, Ray Glover, Arne Jacobson, Peter Johnstone, Marc Marshall, Allison Oakland, Hannah Ragland, Antonio Reis, Mark Rocheleau, Scott Rommel, Douglas Saucedo, Michael Winkler, and Jim Zoellick.

For more information about SERC's research and educational programs, please visit our web site at:  
[www.humboldt.edu/~serc](http://www.humboldt.edu/~serc)



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