



SERC ENERGY NEWS

Spring 2012
Volume 7, Number 1

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The quarterly newsletter of the
Schatz Energy Research Center

HUMBOLDT
STATE UNIVERSITY

Wind Energy in Humboldt County

Colin Sheppard

For the past two years, SERC has conducted a renewable energy planning study through the California Energy Commission's Renewable Energy Secure Communities (RESCO) program (see Project Updates for current RESCO news). Together with our project partners the Redwood Coast Energy Authority and the Pacific Gas & Electric Company, we've taken a comprehensive look at the potential for local renewable energy in Humboldt County.

Here is what we learned.

- We have the resources to supply most, if not all, of our energy needs with renewable sources.
- No single resource is sufficient on its own; we must simultaneously develop multiple resources.
- The most practical resources in order of increasing cost are energy efficiency, wind, small hydro, biomass, wave, and solar.

One thing that stands out in these conclusions is that wind power is the most cost effective of the renewable energy generation technologies. That's of particular interest because, right now, people in Humboldt County are engaged in a debate over a proposed wind power development project on Bear River Ridge, about 5 miles south of Ferndale (see map on next page). ShellWind has proposed building a 50 MW wind farm on the ridge by installing 25 turbines and an associated substation.

ShellWind has been working on this project for several years and is nearing the end of the feasibility phase of the project. They have collected wind data, conducted environmental studies, including bird and bat surveys, and held public meetings. Details can be found on Humboldt County's web site, <http://co.humboldt.ca.us/planning/bear-river/default.asp>.



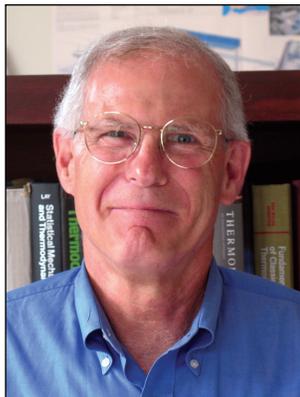
The wind farm on Bear River Ridge would look similar to this wind farm in the United Kingdom. *Photo credit Andrew Smith.*

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A Message from the Director

Peter Lehman

The past couple of months have been an exciting time at the lab. As Colin Sheppard reports in his article about wind energy in Humboldt County, SERC—and I personally—have been caught up in an intense and politically charged debate about ShellWind’s proposed 50 MW wind farm on Bear River Ridge. Though our work in renewable energy has always had political overtones, never before have we been thrust into the political limelight. It’s been an eye-opener for me.



In many ways, ShellWind’s proposal to build the wind farm seems like a no-brainer. When complete, it will mean a substantial increase in renewable energy generation in Humboldt County and it will make us more energy secure. It will mean local economic development and jobs. It will reduce greenhouse gases. Who could be against that?

It turns out many people can. The citizens of Ferndale and Petrolia have come out in force to oppose the project. As Colin notes, they have objected to the road building, the environmental impacts, the disruptive nature of big turbines in their pastoral country, and doing business with a large, multi-national corporation that they don’t trust. Editorials have appeared in our local paper entitled, “I don’t want ShellWind in my backyard,” and “NIMBY and proud of it.” Because we’ve written and spoken in favor of the project, some have called us out for “attacking” local citizens and their interests. It’s an unfamiliar situation for me personally and for the lab.

The good news is that we’ve been able to start a civil dialogue with some of the project’s opponents that I hope will allow cooler heads to prevail. But how this will play out is anyone’s guess. We’ll keep you informed in subsequent newsletters.

In other, calmer news, Andrea Alstone reports on progress in upgrading our hydrogen station so that we can achieve 700 bar refueling. That will mean we can drive our Toyota fuel cell car to the Bay Area, refuel at the AC Transit or Berkeley station, and drive home. Since we travel to the Bay Area frequently, this will be the first long distance fuel cell commute in the world. Richard Engel reports on our efforts to take our hydrogen/fuel cell curriculum to a national audience through an NSF grant. Finally, Jim Zoellick reports on our RESCO project that is coming to fruition with the publication of our strategic renewable energy plan for Humboldt County.

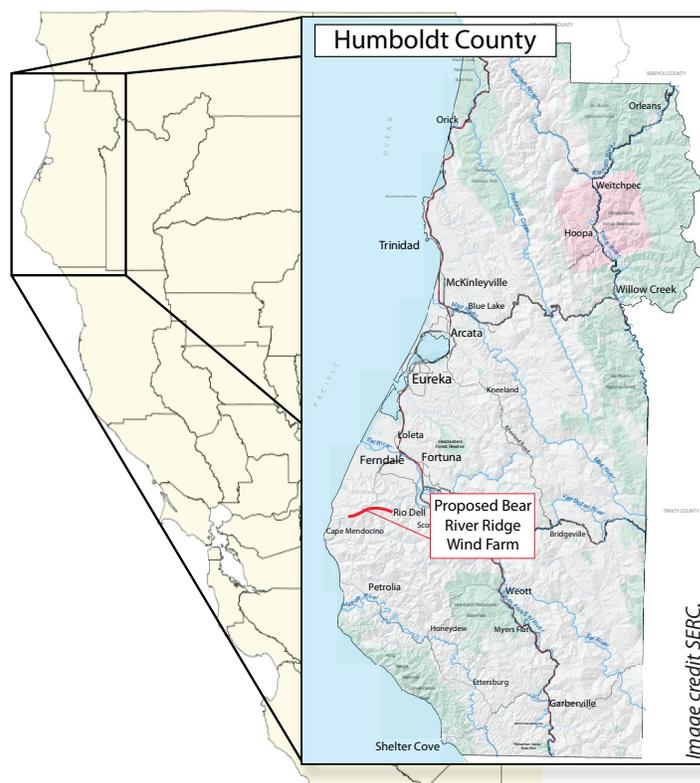
Last newsletter, written in December, I wrote about the sunniest fall and early winter ever. Now our more usual winter weather

Wind Energy (continued from page 1)

On the plus side, the wind farm would produce enough renewable electricity to power 22,000 Humboldt County homes, and generate 10% of our countywide electricity. It would create local jobs and generate local revenues. It would directly displace the burning of natural gas at PG&E’s Humboldt Bay Power Plant. The project would increase our local energy security, reduce greenhouse gas emissions, and increase our local air quality.

But a wind farm is a substantial civil project, requiring a large capital investment and involving industrial-scale construction activities. Naturally, people are concerned about the potential negative impacts of the project. The debate has become heated, with pro and con editorials and letters in local papers and discussions on local radio. At a recent Ferndale City Council meeting, ShellWind made a presentation and attracted an overflow crowd, with strong opinions being expressed. SERC also attended and director Peter Lehman made a presentation, “Facts About Wind Power,” at the meeting. You can find Peter’s presentation at: http://www.schatzlab.org/wind/Lehman-Facts_About_Wind_Power_2012-01-05.pdf.

The range of concern reflects the diverse composition of our community. Some are worried about the impacts of construction on local tourism and quality of life; some are concerned over



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has returned with a vengeance. It’s pouring as I write this and flood warnings are posted. As everything here in Humboldt turns electric green, I wish you some refreshing spring rain and flowers to come.

Hydrogen Education Pursues National Audience

Richard Engel

In January, SERC submitted a proposal to the National Science Foundation to expand our work in hydrogen education with the goal of reaching a national audience. Working with proposal partners at Drexel University in Philadelphia, Michigan Technological University in Houghton, MI, and San Francisco State University, we proposed to create a new “Teaching Energy Concepts with Hydrogen” (TECH₂) project. This project would build on our recently completed (see [SERC Energy News Winter 2011](#)) three year Hydrogen Energy in Engineering Education (H₂E³) curriculum in which we worked with California universities in both the CSU and UC systems. The proposed TECH₂ project would reach nearly 5,000 freshman engineering students across the country.

[Wind Energy](#) (continued from page 2)

the impacts to the local environment; some are bothered by the aesthetic impact of tall turbines on the scenic, coastal landscape; and some are simply opposed to a multi-national oil company doing business in Humboldt County. Adding to the general tumult, there has been some misinformation circulating about this project and wind in general. In addition to appearing on radio programs, writing editorials, and our Ferndale presentation, we’ve published a web page to address some of these topics and present relevant facts: <http://www.schatzlab.org/wind>.

We’ve considered these facts and debated the pros and cons here at SERC. We believe the benefits outweigh the consequences so we’ve gone on record in favor of the project. Of all the renewable resources we might develop locally, wind is the easiest to accomplish at scale, as well as the most cost effective. ShellWind expects to make a profit from the sale of wind electricity—without government subsidies—and is prepared to invest \$125 million to complete this project. It is hard to imagine how Humboldt County would raise funds of that magnitude otherwise.

We feel that saying no to this wind project would be missing a rare opportunity to implement the RESCO vision and put Humboldt County on a path toward a sustainable and secure energy supply. At the same time, we recognize that the concerns being raised by the local community are real and need to be addressed. We’re working with both sides—ShellWind and local citizens—to try and see this project through.

Being on the front lines of renewable energy development and being in the middle of a sometimes intense, politically charged debate has been a new and challenging experience for SERC. Our mission has always been to promote clean and renewable energy. We’re finding out what that really means.

Project Updates

HSU Hydrogen Fueling Station Upgrade

Andrea Alstone

SERC is now beginning the construction phase of our hydrogen station upgrade project. 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 new 700 bar compressor has arrived and the on-site work for the fueling station upgrade is in progress. The extension to the east block wall is complete and our design has been reviewed and approved by an independent engineer with experience in hydrogen systems. In the coming weeks the compressor will be moved to its final location (no small task) and plumbing and electrical work can begin. We’re excited to see the upgrade taking shape; stay tuned for more updates.



SERC Engineers Greg Chapman (left) and Mark Rocheleau with the new 700 bar compressor. *Photo credit Andrea Alstone.*

New RESCO Products: Strategic Plan, Guide for Local Leaders

Jim Zoellick

The Humboldt Renewable Energy Secure Communities (RESCO) project is nearing completion, and we’re close to publishing two new products, a RESCO strategic plan and a guide for local government on energy policy and regulations.

Humboldt County has the opportunity to lead the way toward a renewable energy future by using local renewable energy resources to meet the majority of its electricity needs and a large portion of its heating and transportation needs. To accomplish this in an efficient, cost-effective manner will

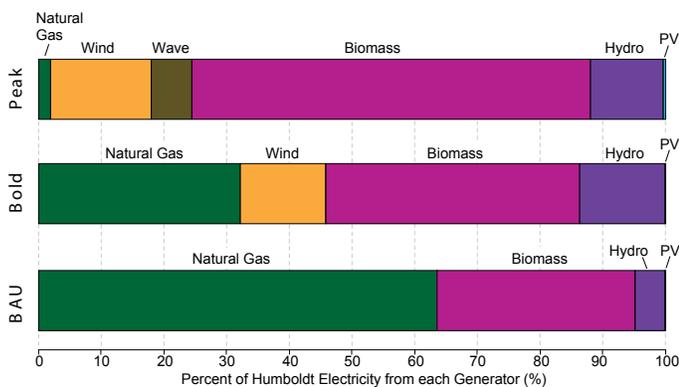
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require a well thought-out plan. The RESCO strategic plan lays out such a road map.

The plan discusses three potential future energy scenarios for the year 2030 (see figure 1, below): **business-as-usual**, **bold**, and **peak**. **Business-as-usual** assumes we maintain our current sources of energy, **bold** assumes we develop an optimal mix of new efficiency and renewable energy resources while capping overall cost increases at 5% above business-as-usual, and **peak** assumes we develop all that is practically achievable. Technologies considered include: energy efficiency, small hydro, wind, plug-in electric vehicles, heat pumps, biomass, wave, and solar power. The costs and benefits of these scenarios and technologies are considered. Finally, a set of long-term strategies and near-term next steps are presented.

The other important deliverable nearing completion is a handbook for local policymakers to help them take leadership roles on bringing more renewable energy and energy efficiency to Humboldt County. The guide posits a number of questions (How can local governments capture the financial benefits of generating their own renewable energy? How can local governments encourage and support the private development of local renewable energy and energy efficiency?) and lays out action-oriented responses tailored to conditions in Humboldt County. The guide presents examples of many ways in which Humboldt County has already acted as a leader on energy policy and identifies examples from elsewhere that may work well with a local twist.

Figure 1. Comparison of energy production by generation source as a fraction of total county demand for electricity in 2030.



Looking Back

7 years ago...SERC collaborated with Redwood Coast Energy Authority (RCEA) and other local partners on the [Humboldt County Energy Element report](#). The report is part of the County's current General Plan update process.

The development of an Energy Element for Humboldt County's General Plan update will help ensure that policy decisions made now, which will guide the County for the next twenty years, take into account the region's need for long-term energy sustainability. SERC's main contribution was preparation of the [Background Technical Report](#). This report found there are adequate renewable energy resources in Humboldt County to meet most of our energy needs, and provided the foundation for our current RESCO work.

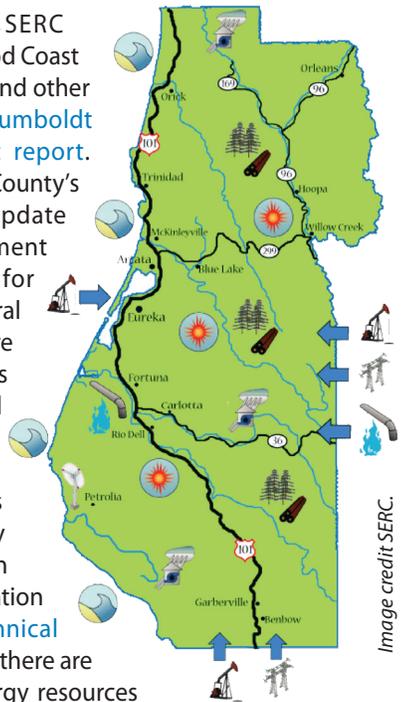


Image credit SERC.

[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, Alejandro del Valle Reynoso, Richard Engel, Meg Harper, Robert Hosbach, Patricia Lai, Marc Marshall, Brendon Mendonca, Allison Oakland, Carolyn Ortenburger, Tom Quetchenbach, Kristen Radecky, Mark Rocheleau, Colin Sheppard, Zak Stanko, and Jim Zoellick. SERC Docents are Joel Bautista, Shelly Dean, Alisha Sughrone, and Peter Seidel.