

Western's bi-monthly energy efficiency and renewable energy newsletter dedicated to customer activities and sharing information on energy services.

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Rural Nebraska communities pull together to win renewable energy grants

A lot of people throughout the state of Nebraska had reason to be proud when the U.S.

Department of Agriculture's Rural Development Service awarded six farms and businesses grants for renewable energy system and energy efficiency improvement projects at the end of the summer.

The awards totaled \$177,654 to two farm projects and four small businesses:

- \$80,000 to construct a methane anaerobic digester on a hog farm, reducing the environmental impact of livestock manure while generating energy for the farm's needs. Excess energy will be sold to the local power supplier.
- \$10,000 to assist with the construction of a 10-kW wind turbine to supply a portion of a farm's energy needs.
- \$35,200 to the Gothenburg Feed Company to replace its natural gas alfalfa dryer with a new solid-fuel burner that uses 100-percent renewable waste wood, chips and sawdust that would previously be disposed of in a landfill.
- \$10,000 to the Northeast Nebraska News Company to replace the heating and cooling system in two locations with energy-efficient

heat pumps and replace a natural gas water heater with an electric unit.

- \$11,547 to the Tarnished Halo floral and gift shop to make energy-efficient improvements in the shop space.
- \$30,907 to Vantage Pointe Homes to assist with installing heat and insulation in its production plant. "Our dollar amounts were not huge, but we were very pleased with the number of grants," said Program Support Manager Cliff Kumm with the USDA's Nebraska office.

Nebraska received the most grants of any state completely in Western's service territory. Two states partially served by Western fared even better, with Minnesota receiving 22 grants—the most of any state—and Iowa earning nine. The USDA awarded 113 grants in 24 states, totaling \$21,207,233.

Publicity, networking

The Nebraska Rural Development office submitted nine applications for projects to develop renewable resources or improve the efficiency of existing systems. Kumm attributes the high selection rate to extensive promotion and strong support among the state's power providers

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Communities

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for conservation and alternative energy sources. "There's no doubt it was a combined effort," he acknowledged. "The state Department of Environmental Quality, Nebraska Municipal Power Pool, Nebraska Public Power District and the local utilities all got involved."

Getting the word out to eligible farmers, ranchers and small businesses in communities of 50,000 people or fewer was an important first step. Rural Development ran announcements in local newspapers and agriculture and electricity industry press. David Tobias, who is building the wind turbine, learned about the grant from an advertisement in the Norfolk newspaper and attended one of a series of USDA public information meetings. The Nebraska DEQ co-sponsored the meetings across the state.

Professional networks brought the funding opportunity to the attention of other applicants. Bridgeport City Administrator Finley deGraffenried, who helped the Tarnished Halo

owners apply, heard about the grants through economic development contacts, Sen. Charles Hagel's office and service providers.

An e-mail message from the USDA extending the application deadline caught the eye of Publisher Rob Dump of the Northeast Nebraska News Company. "I get hundreds of e-mails a day. It was dumb luck that I read that one," Dump admitted. "Once I did, I realized we had a shot at it."

Guidance helps applicants

Dump called his utility, Cedar Knox Public Power District, which contacted NPPD. Technical Solutions Team Leader Cory Fuehrer performed the energy audit on the newspaper publisher's two offices, put together a plan to update the heating and cooling systems and analyzed the potential savings. Dump credits Fuehrer with doing the hardest part of the job. "You have to be willing to jump through a lot of hoops and fill out a lot of forms," he said. "Cedar Knox and NPPD really stepped up to the plate for us."

Kumm agreed that the application process for Federal funding is complicated and labor intensive. "People need all the help they can get, and these grants never would have happened if the power providers and municipal officials hadn't been there for their customers," he said.

NPPD also performed the audit of Vantage Pointe's production plant. "We want folks to realize that we are here to help them make the most of their energy dollars, right down to the residential customers," said Fuehrer. "We do energy audits for

grant and loan applications. This particular grant keeps our focus on energy conservation."

NPPD and NMPP both publicized the Rural Development grants through employee newsletters and information briefs. Tarnished Halo co-owner Angie Lapaseotes worked with NMPP on her shop's audit. "We relied on the experts to make recommendations for improvements, and Finley did most of the paperwork," she recalled.

City manager deGraffenried wasn't the only local official to help out on a grant. When Hog Farmer Daniel Kluthe couldn't make it to the information meeting in his area, his county zoning administrator attended for him and later helped fill out the forms. "Chuck Meyers was a big supporter," said Kluthe, whose methane digester project may offer the county a means of reviving its declining hog industry. "People don't want hog farms in the area because of the smell. With the digester, you cut the odor way down and produce energy from a fuel that you never run out of."

Renewable development

Each of the projects was beneficial not just for the grant recipient, but also for its community and the state as a whole.

It seems in some small towns that everyone knows what everyone else is doing. But in Nebraska, you won't hear the Rural Development grant recipients complain about having friends who believe that saving energy and developing local renewable resources is everybody's business. ⚡

Energy Services Bulletin

The Energy Services Bulletin is published by Western Area Power Administration for its power customers. The mailing address is Western Area Power Administration, P.O.Box 281213, Lakewood, CO 80228-8213; telephone (720) 962-7451.

The mention of any service, product, or technology does not constitute an endorsement of same and Western, the Department of Energy, or the United States Government cannot be held responsible or liable for use thereof.

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C&I customers show growing interest in renewable energy

Kinko's does it, IBM does it, even Dow Chemical does it. Across the nation, companies large and small are electing to get some or all of their energy from renewable resources, creating more marketing opportunities for utilities that offer some sort of green power program.

The initiative usually comes from the company and is motivated by commitment to sustainable business practices. That doesn't mean that municipal utilities and electric cooperatives should wait for the phone to ring. Bulk green power purchases by large customers can help diversify a small utility's portfolio, develop new renewable resources and eventually make green power more affordable.

Active marketing

Roseville, Calif., Electric Utility Director Tom Habashi confirmed as much when he praised Kinko's Roseville location for joining the municipal utility's RE-Green 100 program. "Green energy customers drive the market in a positive direction," Habashi declared. "The more customers who sign up for our green energy programs, the more renewable power we can develop."

One of three options Roseville customers have for supporting renewable energy, RE-Green 100 guarantees that the Roseville Kinko's will receive all its power from renewable resources. For a penny more per kilowatt-hour, the store is purchasing enough green energy annually to meet the needs of more than 30 homes.



Kinko's largest Roseville location pays an extra penny per kilowatt-hour to receive all its power from certified green sources. (Photo courtesy of Kinko's)

The Roseville Kinko's is one of 71 locations fulfilling 100 percent of its energy demands with green power. More than 25 percent of the office supply store's U.S. branches now buy power from renewable sources, reflecting the corporation's long-standing dedication to protecting the environment.

Decision made locally

The decision to purchase green power was made at the local level, and stemmed from Kinko's corporate policy. However, Roseville aggressively markets RE-Green 100 and its other programs, RE-Green 50 and the RE-New Green Fund, to both commercial and residential customers. "Increasing the use of renewable energy and developing locally sited sources is one of Roseville's highest priorities," asserted Public Relations Manager Bernie Fargen.

Currently, 12 of the municipal utility's commercial accounts get some portion of their energy from green sources, each averaging more than 51,000 kWh annually. Customers

learn of the green programs through Roseville's quarterly newsletter to commercial and industrial consumers, through print ads in business publications and from committed account representatives. "The usual marketing tools," noted Fargen. "We also take advantage of the fact that we are a city department. We publicize our programs in the city newsletter, and the city council actively supports our goals."

The promotion has brought the green program subscription rate to nearly 2 percent of Roseville's customer base—double the state average for utilities' green power programs—and earned the utility the Solar Electric Power Association's 2003 Public Awareness and Industry Leadership award. So far, Roseville's energy mix includes enough solar, wind, geothermal and small hydro generation to meet large customers' demands. As the market grows, the utility hopes to fulfill requests with locally produced green power. The RE-New Green Fund raises money to develop new local green resources through customers' voluntary con-

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Renewable Energy

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tributions of an additional penny per kWh. Roseville matches those contributions and all green power purchases dollar for dollar.

Renewable options

For utilities concerned that they do not have enough renewable sources to supply large customers, green tags can help make up the difference. Some wholesale power suppliers like Tri-State Generation and Transmission Association, Inc., can arrange green tag purchases for members, as it did for Mountain View Electric Association in southeastern Colorado when Schriever Air Force Base made a large wind purchase from the small co-op.

Western can help customers increase their green power sources through the Public Renewables Partnership, an initiative to enable public power providers to integrate renewable energy into their portfolios and business strategies. The PRP, in cooperation with Evolution Markets, has created an online bulletin board where publicly traded utilities

desiring to buy or sell green tags can make connections.

Some commercial customers may choose to generate their own green power with a wind turbine or solar array. Large food manufacturers, breweries, feedlots and wood product manufacturers have been known to produce enough biomass energy to sell back to power providers. In states with renewable portfolio standards, self-generation projects can help utilities meet their requirement, to say nothing of the benefits to the environment and local economy.

Good for business

Benefits, after all, are what business is all about. Everybody wants to be a good guy, but commercial and industrial customers have their bottom lines to think about. Utilities promoting green power to large accounts will sooner or later have to answer the question, "What's in it for my business, besides a white hat and higher electric bills?"

That white hat, it turns out, is worth quite a bit. Current national and global events have made renewable energy a hot topic. Green power is a good way for a company to gen-

erate favorable media coverage, set itself apart from its competitors and build customer loyalty. People who support green power like to support businesses that share their concern for the environment.

C&I customers don't have to take only their account representative's word for that, either. They can ask the Green Power Market Development Group, 12 major U.S. corporations that, with the World Resource Institute, are dedicated to building the corporate market for green energy. Members, including DuPont, Cargill, Staples, Johnson & Johnson and of course, Kinko's, have purchased a total of 97 megawatts of renewable energy as of September 2003.

That is quite a testament to the business sense of running a company on green power—and to the wisdom of offering green power to C&I accounts.

More than 300 utilities in 32 states do it, resulting in the installation and planning of more than 425 MW of renewable energy capacity. Commercial and industrial customers everywhere are finding that being green is getting easier—and more affordable—all the time. ⚡

California cities begin taking wind farm output

At the beginning of September, the California cities of Anaheim, Azusa, Colton, Glendale and Pasadena began taking output from what they said was the state's largest wind plant, the High Winds Energy Center in Solano County.

The five cities operate municipally owned electric utilities and are members of the Southern California

Public Power Authority. Through SCPPA, the cities jointly negotiated contracts with PPM Energy, Inc., totaling 30 MW, or 20 percent of the project's output. By working with their neighboring utilities, the cities enjoy wind energy at a price based on a larger quantity, which means savings to their customers.

Blackout a wake-up call to energy decision makers

Officials at the Rocky Mountain

Institute, a prominent energy think tank in Colorado, say the August 14 power outages show the need for distributed generation.

In a statement released the week after the blackout, RMI warned that U.S. energy policy makers should fundamentally change how the nation designs its electricity system to make it more reliable and more resilient.

Alameda P&T offers renewable energy education

If it is true that we conserve only what we love, we love only what we understand and we understand only what we are taught, Alameda Power and Telecom is out to turn its customers into conservationists.

The municipal utility serving an island community in the San Francisco Bay area launched a customer education program three years ago to teach people of all ages about energy efficiency and renewable energy. "We surveyed our customers to get their ideas on how their public benefits funds should be spent in each of the four approved categories: energy efficiency, low-income assistance, new investments in renewables and research and development," recalled Energy Management Supervisor Meredith Owens. "Their No. 1 interest was energy efficiency. We were surprised to learn that their No. 2 priority was education about renewable energy."

Maybe it isn't so surprising after all, since Alameda P&T receives 80 percent of its power from renewable resources. Hydroelectric power from Western and the Northern California Power Agency makes up 30 percent of the utility's portfolio. More than 50 percent is geothermal power from two plants in which the utility has partial ownership through NCPA.

School-based programs

Like all good habits, wise energy use is best started early, so educating future customers was a top priority. Working with the school district, other utilities and nonprofit educational organizations, Alameda P&T developed energy education programs to give students of all ages

the information to make good energy decisions down the road. "Our schools are facing big challenges," noted Owens. "Staffing is light, and they have standards to meet. It was important to offer them quality programs geared to what they needed to teach."

Alameda P&T commissioned Make*A*Circus, a San Francisco community theater group, to create a performance for 3rd-, 4th- and 5th- graders. In "Sky Juice," three clowns use acrobatics, dancing and juggling to introduce students to the basics of electricity and the value of renewable energy. A videotape of the circus performance made the message available to students throughout the Alameda Unified School District.

Through a contact at Palo Alto Utilities, Owens learned of The Rahun Institute, a research and educational organization focused on solar energy education in California. Alameda P&T hired the institute to contact high schools, determine interest in a program on energy efficiency and solar energy and help teachers develop hands-on classroom lessons.

After the successful collaboration, science teacher Bill Dodge of Lincoln Middle School expressed interest in a similar program. Students' and teachers' response to science lesson



Geothermal Facilities Manager Murray Grande (center in hard hat) of Northern California Power Agency leads Alameda P&T customers on tour of NCPA's geothermal plant No. 1 located in Middletown, Calif. (Photo courtesy of Alameda Power and Telecom)

plans based on The Rahun Institute's Solar Schoolhouse Program were so positive that the program expanded. Using public benefits funding and money from its Clean Future Fund, Alameda P&T installed a one-kW photovoltaic system at the school. When the PV system went live in April 2002, Lincoln Middle School sponsored a month of solar activities integrated into all aspects of the curricula.

Getting teachers involved was the hardest part of the program, Owens recalled. "We had to go from teacher to teacher. If a utility is going to do this kind of program, it really helps to have a teacher advocate, like Bill Dodge."

The focus of the program is now moving from solar energy to geothermal, the source that supplies Alameda residents with more than half their power. The Geothermal Education Office is providing teacher education, classroom presentations and field trips.

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Small gasifier promises clean energy from wood waste

Man kind's oldest fuel source, wood, may become the latest trend in small renewable energy generators if Community Power Corp. succeeds in commercializing its line of biomass-fed gasifiers designed for homes, schools and small businesses, especially those in off-grid locations.

Not that biomass is an under-used renewable resource, according to the National Renewable Energy Laboratory. Biomass generation accounts for 75 percent of all non-hydro renewable energy generation in the nation. Most of that, however, comes from utility-scale operations that sell electricity to the grid. NREL, the U.S. Forest Service and the Littleton, Colo.-based company hope to change that in the near future, or as CPC cofounder and Chief Executive Robb Walt put it, "We're writing a new chapter with small modular biopower."

Biomass generator

The collaboration is part of NREL's Small Modular Biopower Initiative to develop clean, efficient biomass generators of less than 5 megawatts for rural electrification and thermal applications. A 1997 grant from NREL enabled CPC to design and field test the prototype for the BioMax gasifier that converts woody residues into environmentally friendly energy.

Models range in size from 5-kW units for home use to 15-kW machines, enough to power a small business. The company is currently demonstrating six gasifiers in off-grid field applications. Those include one 15-kW unit using forest residue to power a greenhouse

at North Park High School in Walden, Colo., and a 15-kW gasifier converting a Ruidoso, N.M., wood shaving factory's waste to energy. "The system is perfect for entrepreneurs whose businesses produce biomass residues," said NREL Senior Engineer John Scahill. "They can make the waste pile disappear while offsetting power and heating costs."

Originally, the initiative identified developing countries as the target market for small gasifier technology, "especially countries near the Equator," explained Scahill. "Those regions have a lot of biomass residues but no power. Once they get power, economic development opportunities open up."

CPC's exclusive focus on developing renewable energy-based products for unelectrified areas won the company funding to build a biomass gasifier for a rural village in the Philippines. The 15-kW unit gasifies coconut shells to make a gas for combustion in a spark-ignited engine. The engine drives a generator that powers a coconut-based enterprise. "They make biodegradable erosion control mats from the coconut fiber and sell the dust to process into a planting medium for orchids," said Walt. "It's a 100-percent sustainable and environmentally friendly business."



As a demonstration, SBS Wood Shavings of Ruidoso, N.M., installed the first BioMax 15/35 gasifier. (Photo courtesy of Community Power Corp.)

Fire prevention help

Having successfully demonstrated the small-scale gasifier's commercial performance, CPC was ready to build and test more BioMax units. Unfortunately, that phase of development required more funding than was available through the SMB Initiative.

Another Federal initiative came to the rescue. 2002 Healthy Forest Initiative called for thinning the underbrush from thousands of acres of forest and rangeland to reduce fire danger. The biomass gasifier offered a means of using some of the tons residue resulting from the clearing. "The volume of material on the forest floor is enormous," said Scahill. "Turning it into an energy product might help to offset the \$1,000-per-acre cost of the project."

The Forest Service contributed \$1 million over two years to speed development of the gasifier project, which DOE matched. Shell Renewables and the California Energy

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Commission also funded a total of \$5 million to build and deploy BioMax validation systems.

CPC placed gasifiers at four sites, selected from a nationwide Forest Service survey. The test sites record the machines' performance, helping the company refine the design. "Basically, we are asking them to run the machines into the ground," said Walt. "That information will help us to find and correct any flaws before BioMax goes into large-scale commercial production."

Commercial production is the key to making the technology affordable. Making the system modular and standardized so that it can be easily installed in the field will drive the cost per unit down. Walt

aims to start making the machines for commercial use in the United States by mid-2005, at an estimated cost of \$50,000 for a 20kW unit. If CPC recruits corporate investors and manufacturing partners, the price of each unit is likely to drop more.

Small modular biopower systems are most economical on a straight cost-per-kilowatt basis where there's on-site wood waste and a need for the available thermal energy, Walt acknowledged. If there are enough of those kind of sites in the United States and worldwide—and Walt believes there is—small biomass gasifiers could turn wood waste into the "hot" new alternative fuel source. ⚡

New housing community to run on solar power

Residents of Greenwood Ranch Estates in northern Arizona won't have to worry about power outages because their community is not connected to the electrical power grid.

Genesis Homes, a member of the Building Systems Council is using modular technology to produce 487 homes isolated from electrical sources.

Designed to take advantage of the area's annual average of 320 sunny days, each 1,165-sq. ft. home is equipped with a 1.65 kW PV system capable of producing enough electricity to power the average vacation home. The community's full-time residents can get optional larger solar packages. ⚡

Alameda P&T ——— from page 5

Powerplant tours, lectures

Geothermal power is at the center of the utility's education program outside the classroom. For the last three years, Alameda P&T has offered adult customers field trips to NCPA's geothermal powerplants and steam fields just north of Calistoga. Twice yearly, two busloads of customers spend the day learning how geothermal power is generated. The field trip includes a visit to the Calpine Geothermal Energy Visitors Center, a presentation by a geologist, lunch and a tour of the NCPA geothermal powerplants.

Owens, who developed the tour program, publicizes the trips in newspaper ads and billing statements. "More than 700 customers have been up to the powerplants," she said proudly.

Customers who attended the tours and Clean Future Fund contributors were on the mailing list for invitations to a free lecture series in Spring 2003. The Clean Future Fund Speakers Series launched with Dr. Severin Borenstein, professor in public policy and business administration at the UC Berkeley Haas Economic School of Business and director of the University of California Energy Institute. About 90 people attended the talk on California's energy crisis, how future crises can be prevented and steps Alameda P&T has taken to protect its customers.

The most recent event took the form of a panel discussion about renewable energy options. Following a presentation by Alameda P&T General Manager Junona Jonas, industry experts discussed the potential of geothermal, wind and municipal solid waste resources.

"We need to add new generation by 2005," said Owens. "The lecture series gave us a forum to start acquainting customers with the different options."

The speakers' series will reach more customers as part of Alameda P&T's public access cable program, "Energy Views." Besides the taped Clean Future Fund lectures, the new weekly program will feature videos on energy efficiency and renewable energy.

Spreading the message of energy efficiency and renewable energy has strengthened Alameda Power and Telecom's ties to the community. Residents who wanted to learn about renewable energy are now more familiar with their utility's staff and facilities as well. Giving customers what they asked for has never been better for business—or the environment. ⚡

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Talking meters save labor, improve service for rural Wyoming co-op

Small doesn't have to mean old-fashioned, as Carbon Power & Light is proving by being one of only two rural co-ops in the west to install "talking" meters throughout its service territory.

The Saratoga, Wyo., electric cooperative is about two-thirds through retrofitting each of its 5,600 meters with the Two Way Automatic Communications System. TWACS enables an operator in the CP&L office to request specific information from a meter. The meter sends the requested data back to the office, a process that takes a total of around 18 seconds.

Automated meter reading technology is based on more than two decades of development, testing and utility use. "TWACS has been around for several years, but most of the users are big utilities in the east," noted CP&L General Manager Chuck Larsen. "A utility in South Dakota was looking at the system the same time we were, and the manufacturer was looking for a way to introduce TWACS west of the Mississippi River. I guess that makes this sort of a demonstration project."

Detailed load data

Larsen read about TWACS in REA Magazine and realized that AMR could be a boon to a small rural utility. "Our linemen don't have to spend two days a month reading meters, and rural customers don't have to take their own readings anymore," he said. "We can take accurate, incredibly detailed readings without leaving the office."

And that is only the beginning

of the talking meters' capabilities. TWACS monitors power usage at 15-minute intervals, giving members a better understanding of their energy use and billing. "That's one of the biggest advantages to the system," said Larsen. "If someone feels they were overcharged, we can point to the day and time the kilowatts were consumed. It can help customers figure out how to reduce their energy costs."

The system has potential as a demand response tool. Detailed data can be used for load forecasting and pricing, while load control capabilities help utilities measure load management effectiveness. The two-way system enables operators to remotely record and reset peak demand.

Outages and service problems can be detected and corrected faster with TWACS. If a member reports a problem with blinking lights or thinks that the voltage isn't right, CP&L can check the data on that meter. Recently, the meters on two unoccupied homes in the same area stopped reporting at the same time. A lineman dispatched to the location discovered that a transformer had blown out. Without TWACS, the utility would not have found the problem until the residents returned home and called in complaints.

An extra component installed at the same time as the TWACS module allows electrical service to be connected and disconnected from the office. CP&L is installing the component on houses and apart-



Meter Technician Bill Dahlke installs the substation equipment necessary to operate the Two Way Automatic Communications System. (Photo courtesy of Carbon Power & Light)

ments that have frequent changes in service status.

Investment benefits

Such advanced technology turned out to be surprisingly easy to use, a good thing since a small utility cannot afford to tie up staff in extensive training sessions. CP&L sent a meter technician and a member of the billing department to the manufacturer to learn how to install and operate the system. The meter technician installs the TWACS module in standard meters in the shop. It takes linemen less than a minute to simply replace old meters on homes and businesses with new units. Customers experience only a brief outage followed by more accurate and precise bills.

The biggest issue in adopting a new technology for any utility is the cost. CP&L funded the purchase of TWACS equipment, with a \$600,000 loan from the Rural Utilities Service. "RUS announced that it was consid-

See TALKING METERS, page 12

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Minn. utility promotes heat pumps to tackle winter load

Energy conservation programs take money and staff to implement, so a utility the size of Thief River Falls (Minn.) Utilities needed a very good reason to throw itself into the all-out promotion of ground source heat pumps to its 4,200 customers.

That reason was simply stated by Utilities Director Arlo Rude. "We were looking for a conservation tool that would help our customers," he said. "Geothermal heat pumps can heat a home using about one third the energy of conventional systems,"

For the last several years, Thief River Falls has provided low-interest loans and incentives to customers installing or retrofitting ground source heat pumps. The current program offers up to \$8,000 at 5-percent interest and a rebate of \$2,000 to offset the cost of installing the system's external loop field.

The job of designing the program fell to Customer Service Representative Allan Newton. Newton does everything from installing readers for demand side management systems and responding to billing complaints to designing incentive programs. "My role is similar to the members services manager in a co-op, except that I'm the only person in my department," he explained.

Although Newton was familiar with heat pumps because he has an air-to-air system in his own home, he had no experience with geothermal technology. His interest was piqued when the member services manager at Clearwater-Polk Electric Co-op told him about the advantages of ground source pumps. Then Minnkota Power Cooperative,



The Thief River Falls City Hall is one of three city facilities to install a geothermal heat pump. (Photo courtesy of TRF Utilities)

Thief River Falls' power wholesaler, sponsored a two-day class on heat pump installation. His background in electricity and construction made Newton the logical choice to attend the training.

State requirements

Minnkota encouraged its customers to promote the technology as a way of complying with the state's Conservation Improvement Program. Passed in 1998, CIP requires municipal and investor-owned utilities to invest a percentage of their gross earnings in energy conservation. Local representatives are also working with the state legislature to qualify heat pumps as a renewable technology.

Newton attended Minnkota's class along with two local contractors, who became interested in the technology because of customer inquiries. Later, he became qualified to train contractors to install heat pumps at a weeklong program in

Stillwater, Okla. The International Ground Source Heat Pump Association offers the training through Oklahoma State University. "Stillwater has been a driving force behind geothermal heat pumps for years," he noted, adding, "Now Brookings [South Dakota State University] offers certification classes, too."

Thief River Falls has three active contractors qualified to install heat pumps, and two more who are getting trained. The utility didn't have to sell them on the idea, stated Newton. "They just saw the market for it."

Increased popularity

Customers learned about the efficient heating and cooling system from radio ads the utility placed and from the certified contractors who established vendor contacts. "They're set up now to enter some numbers in their computer systems and give customers a printout showing the

See HEAT PUMPS, page 10

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APPA recognizes customer programs, achievements

Innovative programming, community service and contributions to the public power industry brought honor to Western customers and their employees at the American Public Power Association's 2003 National Conference in Nashville, Tenn., in June.

The consortium of more than 2,000 municipal utilities commended Omaha Public Power District for "good neighbor" activities demonstrating the utility's commitment to its employees and community. The

Heat pumps

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initial investment, energy savings and payback time," Newton said.

Relatively low energy prices proved to be the biggest obstacle in persuading homeowners to make the move to heat pumps. The rising price of natural gas has started to change that, however. "I had two customers who were accountants. They crunched the numbers and figured out that they were going to save \$30 to \$60 a month with heat pumps," recalled the customer service rep. "The units do a really efficient job of heating, which is what people in this part of the country need."

Over the program's seven-year run, 10 homes in Thief River Falls installed heat pumps; three retrofitted and seven were new structures. In addition, Newton helped Clearwater-Polk install geothermal systems in some new homes in the cop's service area. "They were large homes built on an acre or more, so there was plenty of room for

City of Palo Alto, Calif., Utilities received the 2003 Energy Innovator Award for programs providing better service to electric customers or projects that increase the efficiency of utility operations.

Employees from three Western customers also received awards for their commitment and contributions to the electric utility industry. Individual awards went to Burwell, Neb., City Administrator Robert D. Beat; Westbrook, Minn., Public Utilities Superintendent Dennis Jutting; and

the loop field," Newton explained, "and the owners plan to stay in the houses for the long-term, so they will recoup their installation costs."

The town's elementary school, the utility's shop building and the city hall have installed ground source heat pumps also. The city hall is located in an old train depot in downtown Thief River Falls. The heat pump was part of an extensive renovation that converted the 1914 building to its current use.

In spite of all the inroads the ground source heat pump has made in Thief River Falls, the utility will continue promoting the technology. "Not all the contractors have gotten on board," explained Newton. "I guess it's new and different, and they're doing fine with what they know.

"But if you don't promote a system, it doesn't get used. We want customers to call us first so we can explain why ground source heat pumps are worth the investment." ⚡

G. Richard Judd, retired chief operating officer and general manager of Utah Municipal Power Agency.

Power Drive program

APPA gave one of five Community Service Awards to OPPD for its Power Drive program. Power Drive gives high school students the opportunity to design and build a one-person electric vehicle. Students showcase their creations in a series of rally competitions leading to a championship event each spring. The utility awards two participants each with a \$1,000 scholarship to continue their studies in math, science, industrial technology or other energy-related fields beyond high school.

"We were looking for a community involvement project that would spark awareness in renewable energy and alternative technologies," explained Senior Media Specialist Mike Jones. "A customer who was interested in alternative fuel vehicles came to us with the idea, and we saw a lot of potential in it."

The program's popularity and quick growth confirmed that belief. OPPD introduced Power Drive in the 1998-99 school year, and 12 high schools in the utility's service area participated. The following year, Nebraska Public Power District got involved in promoting the event, and 24 schools from throughout the state sent entrants. NPPD became a full partner in the third year, greatly expanding the program's reach. Students from 50 schools across Nebraska and northern Iowa built safe, energy-efficient vehicles and competed in the 2001 rallies.

Power Drive has attracted sponsors and support from U.S. Department

of Energy Clean Cities Program and the Nebraska Department of Education. OPPD provides most of the funding for the program, however, considering it a wise investment in the community's future. "Among the things we wanted from the event was a way to grow and improve our workforce," said Stone. "I've talked to students who said they would never have thought of going into engineering or the electric industry if it weren't for Power Drive. If OPPD is opening new doors for kids, then we're really accomplishing something big."

Sustainability plan

Sponsored by APPA's Demonstration of Energy Efficient Developments program, the Energy Innovator Award went to the City of Palo Alto Utilities for a program that helped the municipal government institutionalize efficiency measures such as improved purchasing practices, using life cycle costing analysis and better tracking systems.

Prompted by California's energy crisis, Palo Alto's city manager formed a committee in 2001 to look at the best sustainable practices, from energy use to choice of pesticides. "It was the first time we were able to take a systemic approach to creating a sustainable operation," said Utility Marketing Services Manager Tom Auzenne. "We had the outline of the plan, but we had to wait for the right opportunity to put it into action."

CPAU took the lead, helping the city manager's office, public works, planning and administrative services create the long-term plan that reduces energy consumption in city facilities with renewable or alternative technologies, while continuing to meet the energy needs of facility

users. Its guiding principles are responsible stewardship in all aspects of the city's functions, educating staff and citizens on those issues, and maintaining a healthy, safe environment for residents and staff.

The plan included adoption of utility-funded audits, promotion of efficient and renewable technologies in renovations, and operational changes to maximize efficiency. Using public benefits funds and state grant money, the city retrofitted lighting in 60 municipal buildings to reduce annual electric consumption by 1.5 million kWh and overall electric demand by 400 kW. Exchanging incandescent traffic-signal bulbs for LED replacements at 89 intersections, including all three traffic signal colors and pedestrian signals, saved another 1.4 million kWh and reduced demand by 161 kW.

Installing automated energy management systems capable of controlling lighting, HVAC and process systems in several large municipal buildings gave CPAU load control capabilities approaching 150 kW. The project inspired a large industrial customer with the same technology in its own building to reconfigure its system to get the full, energy-saving benefits.

The Palo Alto City Council embraced the concept of sustainability, adopting a green building policy that provides a lifecycle cost analysis for



Omaha Public Power District's Power Drive program sponsored by High school students drive electric vehicles in a rally. (Photo courtesy of OPPD)

major projects. Boilerplate language requiring bidders to include a life cycle costing analysis in construction and purchasing project requests for proposals is currently being drafted.

In addition to the APPA award, Palo Alto became the first governmental organization to be designated as a "Green Business" by Santa Clara County. "The awards validate the direction and the concept of the sustainability program," said Auzenne.

Honored for versatility

APPA gave the unique and varied challenges of managing small municipal utilities their due, honoring Robert Beat and Dennis Jutting with the Larry Hobart Seven Hats Award for service to communities of 2,500 or fewer electric meters.

Burwell, Neb., City Administrator Beat hinted that he wore more than seven hats to provide services for the town's 727 electric customers. Some of his initiatives to improve the municipal utility's load include a rebate program for energy-efficient appliances and promoting electric heat systems to business and residential consumers. "Last year, we had 30 customers install ground source heat pumps," he noted proudly.

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APPA

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As a city official, Beat is in the forefront of the on-going renovation of Burwell's downtown district. The project encompasses sidewalk improvements, water main replacements and sewer service upgrades. "The challenges change everyday," he admitted, adding that he enjoyed receiving the recognition of his peers.

Westbrook, Minn., Public Utilities Supervisor Dennis Jutting agreed with Beat's assessment of the job and the honor. Jutting has spent his 35-year career with WPU, "starting at the bottom," as he put it, and working his way up with vision and enthusiasm. "I enjoy doing it because it's always something different," he said.

Variety is to be expected when a utility offers electric, water, sewer, gas and cable television service to its 451 customers, as WPU does. It was under Jutting's leadership that WPU added natural gas and cable television to its services in the 1990s. More recently, he spearheaded the construction of a 2.2-MW Catepillar generator to improve the electric service reliability.



City of Palo Alto Utilities Director John Ulrich (rt.) accepts the APPA DEED 2003 Energy Innovator Award from Mark Crison, immediate past chair of APPA's board of directors. (Photo courtesy of APPA)

Career service award

One of four industry executives who earned the James D. Donovan Individual Achievement Award for contributions to the electric utility industry and the public power sector, G. Richard Judd spent his career in Utah's public power sector. From the beginning of his career as a grounds worker for Bountiful City until his retirement in 2002 from Utah Municipal Power Agency, Judd took an active role in shaping power

issues in the West.

Consumer-owned UMPA is dedicated to supplying reliable and economic power to its member municipalities. As one of UMPA's founders and then its general manager and chief operating officer, Judd worked closely with Western. The relationship proved especially valuable during the California energy crisis. "If I ever needed to have a good partnership with Western Area Power, it was then," he remembered.

In addition to working for UMPA, Judd served four terms as president of the Colorado River Energy Distributors Association and sat on the Operations Committee of the Western System Coordinating Council, responsible for promoting the reliability of the entire western power grid. He also served on APPA's board of directors for four years.

Western congratulates all the utilities and individuals honored at APPA's national conference, but we take particular pride in our customers' awards. Their commitment to their communities and to best practices set an example for the entire energy and utility industries. ⚡

Want to know more?

Visit www.es.wapa.gov/pubs/ESB/03dec/esb127.htm

Talking meters

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ering AMR systems for loan fund eligibility, so we didn't have to make a case beyond the usual application process," Larsen said.

All the co-op had to do was find the right AMR system for its needs. CP&L chose TWACS because it was a power line carrier system,

using existing power lines for data transmission. Radio transmission, another form of AMR data collection, was ruled out because of difficult terrain within the service area. Another advantage to TWACS was that delivery point substations are the only collection points, further simplifying the installation.

With more accurate billing, reduced field trips and faster re-

sponse to service problems, Larsen estimates that TWACS will pay for itself within four to five years. He credited the CP&L board of directors for taking an open-minded and progressive approach to new technology. "CP&L has always prided itself on being the little co-op with big ideas, and our members are the ones who ultimately benefit," he stated. ⚡

Energy efficiency breakthroughs turn science fiction into fact

The generation that grew up on science fiction movies promising personal jet packs and robot servants has high hopes for science, even if our dreams have shifted to the less glamorous, but more critical, goals of environmentally friendly energy and reduced U.S. dependence on imported fossil fuel. Some recent advances in existing technologies bring those goals closer, either through alternative fuel source development or more efficient energy use.

Tap water power

Generating energy from flowing tap water may sound like science fiction, but a research team at the University of Alberta, Edmonton, Canada claims it's possible. According to professors Daniel Kwok and Larry Kostiuk, the natural electrokinetic properties of liquid such as ordinary tap water produce energy when pumped through tiny microchannels. "This discovery has a huge number of possible applications," said Kostiuk.

The key to electrical power generation is to create a sustainable electrical charge separation, which occurs at solid-liquid interfaces. When a liquid, like water, comes into contact with a non-conducting solid, the solid surface becomes charged with a thin layer. This region, known as the electric double layer, ranges from several nanometers to a few micrometers thick. The research team constructed a solid-liquid interface with microchannels comparable with the thickness of the EDL and forced the liquid through

the channels, transporting the net charges in the EDL downstream.

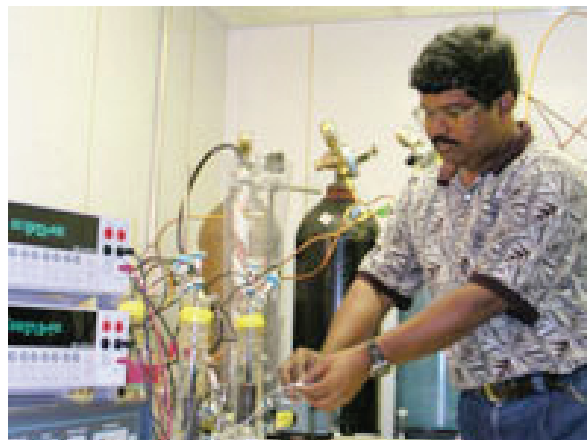
When an external electric circuit is added by placing electrodes at the ends of the channel, electrical energy is extracted as current flows between the electrodes. The work of pushing the liquid through the channel is the source of that energy. Although the power generated from a single channel is extremely small, millions of parallel channels increase the power output, said the developers.

While the new clean alternative energy source could eventually rival wind and solar power, it would need huge bodies of water to work on a commercial scale. The most promising applications for "microhydropower" are in electronics and micro-electronic devices. "This technology could provide a new power source for devices such as mobile phones or calculators, which could be charged up by pumping water to high pressure," said Kostiuk.

So, in the future, you may be charging your pocket communicator—er, cell phone—at the kitchen sink, instead of the electrical outlet.

Efficient microbial fuel cell

Or perhaps you would rather use sugar to charge up your cell phone battery. The Geobacter Project has developed a fuel cell powered by a bacterium that converts sugar into



Dr. Swades K. Chaudhuri operates the microbial fuel cell developed by the Geobacter Project. The fuel cell uses the bacteria, *Rhodospirillum rubrum*, which harvests electrons from the medium very efficiently because it attaches directly to the electrode. (Photo courtesy of the Geobacter Project)

electricity with more than 80-percent efficiency.

Microbial fuel cells have been around for a while, but the device built by researchers at the University of Massachusetts—Amherst differs in two crucial ways. "We are harvesting a much higher percentage of the electrons available," said Microbiology Professor Derek Lovley. "Typically, the efficiency is of 10 percent or less."

The researchers immersed a graphite electrode into a solution containing glucose and the bacteria, *Rhodospirillum rubrum*. The microbes attached to the electrode and began to feed on the sugar, producing electrons that were collected by the electrode and flowed to an external circuit. Once the glucose was fully consumed, the researchers replaced the solution, and electricity production rapidly resumed.

Previous versions of microbial fuel cells required chemicals to help transport electrons from the me-

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dium containing the bacteria to the electrode. The so-called “mediators” are expensive and toxic, and have to be refueled frequently in the cell. The microbe Lovley and researcher Swades Chaudhuri isolated from marine sediments from Oyster Bay, Va., doesn’t require a mediator because it attaches directly to the electrode.

Finding a microbe that efficiently harvests electrons and doesn’t need a mediator represents a major advance in microbial fuel cell technology. Applications for hardworking *Rhodospirillum rubrum* could range from powering handheld devices to producing electric energy on a larger scale from sugars found in waste material—even in sewage in remote communities.

Nanotechnology

Bacteria aren’t the only tiny units with big energy savings potential. Scientists from Research Triangle Institute in North Carolina believe that nanotechnologies can lead to more efficient and reliable refrigerators and air conditioners.

RTI developed a nanometer-scale thermoelectric film that can heat and cool and convert heat to energy with unprecedented speed and efficiency. A module with just one square centimeter of the material can provide 700 watts of cooling under a nominal temperature gradient.

At a recent American Chemical Society meeting, the RTI research team unveiled a prototype device containing a semiconductor chip that consists of about 1,000 layers of the material. “This is the first nonscale material-based device that can achieve a cooling effect suitable

for everyday functions like refrigeration or power production,” claimed team leader Rama Vankatasubramanian.

Functioning as a heat pump in laboratory tests, the postage stamp-sized prototype cooled a block of solid steel from 79 degrees to 64 degrees in about two minutes, much faster than a conventional refrigerator. The performance approached the cooling efficiency of current thermoelectric devices, but in a much smaller package. With ongoing improvements, researchers believe the device can increase its efficiency by two to three times.

The new devices may initially serve as tiny heat pumps that could spot-cool microprocessors or communication lasers, said Venkatasubramanian, adding, “We can imagine the possibility of replacing most of the mechanical refrigerators and air-conditioning systems with chlorofluorocarbon-free, solid-state, no-moving-parts—and therefore reliable—electronic heat pump technology.”

Induction cooking

As fascinating and promising as these developments are, they don’t mean much to the average consumer looking for ways to save money and energy at home. On the other hand, an electric kitchen range that uses magnetic induction to provide superior cooking performance at record energy efficiency might be



This electric induction range, developed by Luxine, Inc. with support from the Electric Power Research Institute, generates a high frequency, alternating current magnetic field to cook at record energy efficiency. (Photo courtesy of EPRI)

very interesting indeed. Luxine, Inc. of Malibu, Calif., with support from the Electric Power Research Institute, has developed a new generation of more reliable, high performance, commercial and residential induction ranges.

Induction ranges generate a high frequency, alternating current magnetic field to heat an iron-based cooking pan through a ceramic-glass cooking surface. Because the energy transfers through the ceramic top, the cooking surface stays cool, while efficiency is very high—92 percent, including the energy to heat the pan. Actual cooking efficiency is 95 percent.

In comparative performance tests of several gas, electric and induction ranges, the Luxine unit was 92 percent energy efficient, compared to 72 percent for the radiant electric range. The residential gas range rated 47 percent, while the commercial gas range had an energy efficiency

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**Want to know more?
Visit www.es.wapa.gov/pubs/ESB/03dec/esb128.htm**

Equipment Loan Program helps university maintain efficiency, safety

The University of North Dakota keeps its campuswide electrical system in prime condition because the facilities department treats maintenance like athletic training—they “just do it”—and they use the right equipment for the job, borrowed from Western’s Equipment Loan Program.

“The Equipment Loan Program has been a godsend,” declared Electrician Darrel Iverson. “Especially with budget cuts, we don’t have to neglect preventive maintenance just because the necessary tools aren’t in the university’s budget.”

UND’s relationship with the Equipment Loan Program dates back to 1986, when the preventive maintenance program borrowed equipment to improve the university’s energy efficiency. “We had gotten a lot of use out of the Equipment Loan Program,” said Iverson. “It started with point radiometers, which we still use today between equipment loan periods.”

“The university has a number of different types of point radiometers. It is inspection by hunt-and-peck, but it still helps us find hotspots.”

The preventive maintenance crew disbanded in 1996, but the staff took their experience back to their original departments. For the electricians from the PM crew, that meant continuing to use Western’s infrared detection equipment in the facilities electrical department.

New camera

Western’s equipment helps with

regular maintenance, like the two annual inspections of the electrical system with infrared cameras. In the winter, an electrician walks the overhead distribution system; the summer inspection focuses on below-ground components—high-voltage and distribution transformers and connections in enclosures and manholes. “This year, we needed to get a look at some splices near the top corners of some electrical manholes,” explained Iverson. “I explained the situation to Rich Burnkrant, and he recommended a new camera with a removable, remote-control LCD screen.”

The Equipment Loan Program recently added two FLIR ThermaCam P20 infrared cameras with liquid crystal diode screens to its stock of more than 400 pieces of technical equipment customers can borrow at little or no cost. Few small utilities or maintenance departments could afford to buy one of the \$26,000 units, but many will find the cameras valuable for repairs in tight spaces. “We acquired the ThermaCam for just the kind of situation Darrel described,” said Equipment Loan Manager Richard Burnkrant, who works out of Western’s Lakewood, Colo., headquarters. “I sent it right out to him the minute it came in.”

The camera arrived at UND still wrapped in its plastic packaging. Lowering the camera into the manhole, Iverson found that a few resourceful “modifications” were needed to get a clear picture of the affected splice. “We secured the camera in a plastic bucket with a



The FLIR ThermaCAM P20 infrared camera is one of nine types of infrared cameras Western customers can borrow from the Equipment Loan Program.

hole cut in it for the lens and a safety line on the equipment,” explained the electrician, “I tied a string from the side of the bucket opposite of the lens opening to my thumb. That way, I could tip the bucket from the handle to move the camera up and down while watching the screen.”

The combination of technology and creativity allowed the electrician to inspect the connection under the manhole rim without physically going inside. To go into the manhole, OSHA regulations would have required the maintenance department to get a permit to check the air quality inside, place a blower in the space to maintain the air quality, equip a specially trained worker with a body harness and set up a tripod to lower the worker below ground.

The UND Safety Office still required an air check for the presence of any gases in the manhole that could be affected by using imaging equipment below the manhole rim. However, Iverson noted, the specialized equipment saved two electricians several hours’ work. “Safety is critical when you are crawling into a space with 12,470 volts, but crews are safest when they don’t have to go into a confined space at all.”

**Want to know more?
Visit www.es.wapa.gov/pubs/ESB/03dec/esb129.htm**

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Loan program

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Detailed records

Regular infrared camera inspections of the electrical system help the facilities department with the challenge of scheduling maintenance and repairs at a large university. "There's a window of opportunity between summer school and the fall term," Iverson explained. "We like to schedule repairs when the campus is quiet, and it saves time to have an idea of where the potential problems are."

Inspection records tell the department which connections need immediate repairs and which ones can be monitored. "Checking the whole system is time consuming," Iverson admitted, "but it should be

done every year. It beats having to tighten and clean every connection," he added.

The facilities department has records dating back to 1990. "Over time, patterns come up that help us identify trouble spots, like equipment that isn't performing," stated Iverson. "Now, when an area loses power, the first questions are, 'When was the last time you shot it? What do your records say?'"

Record-keeping paid off during an incident at UND this summer. A painting crew got tangled in overhead lines and tore them down. Fortunately, no one was hurt, but UND had to call in a line crew from East Grand Forks to make repairs.

While fixing the damaged lines, the crew repaired a corroded con-

nection identified during the winter inspection. When the power came back on, however, a splice further down the line was opened. "That one had shown up on the camera before, so we knew right where to look for the weak link," Iverson observed.

If the connections had not been repaired, some dormitories and the cafeteria might have lost power and the nursing facility might have lost air conditioning. Even without a cost analysis of repairs, the price of a power outage is clear to Iverson. "In North Dakota in the winter, people can't work in a building that loses heat," he stated. "If a research facility loses power, you lose data as well as man hours. Infrared scanning is a great tool and a great program." ⚡



ENERGY SHORTS

Energy professionals share expertise, network

Western is urging all its customers to save the dates of May 5 to 7, 2004, to attend the 24th annual Utility Energy Forum at the Granlibakken Conference Center in Tahoe City, Calif.

"Energy Efficiency & Renewables: The First Response Strategy" will provide participants with a high-quality, low-key opportunity to exchange information and learn from the experts about current and emerging industry issues.

The registration fee of \$550 includes two nights' lodging, all meals, materials, tax and tips. The May 5

pre-conference workshop is an additional \$50 fee. Contact Guy or Linda Nelson to register or visit the Utility Energy Forum Web site for more information. The Utility Energy Forum is a non-profit consortium of utility sponsors including Western Area Power Administration.

New Web sites cover state, national wind

The Environmental Assessment Division of Argonne National Laboratory launched the Wind Energy Development Programmatic EIS Information Center for the U.S. Bureau of Land Management.

This Web site provides an online

public information and involvement center for the Wind Energy Development Programmatic Environmental Impact Statement.

Wind in Montana, a Web site developed by the state Department of Environmental Quality, gives wind developers in that state a new resource for state-specific information.

State and national Web sites providing information on wind and other forms of renewable energy respond to the residential and commercial sectors' growing interest. Utilities can support the industry and their customers by including links to these sites on their own Web sites.

Compressed air users learn to plug leaks

Ask not if your compressed air system leaks; ask how much it leaks and what those leaks are costing your company, industry expert Hank Van Ormer advised participants at the Aug. 28 workshop, “Mastering the Most Expensive Utility—Your Compressed Air System.”

Nebraska Municipal Power Pool Energy coordinated the daylong session, the third that Van Ormer has presented for Western. “The goal is to promote tools to use energy efficiently in business,” explained John Pankratz, Energy Services manager for Western’s Upper Great Plains region. “With more 40 years of experience in compressed air system design and management, Van Ormer knows how to do that.”

Power providers team up

The workshop drew 42 participants, including utility representatives and compressed air system operators, to NMPP Energy’s Lincoln offices. “We invited utility managers, account representatives, system owners and maintenance people to attend,” said NMPP Energy Member Development Manager Corrinne Pedersen. “It turned out to be a great opportunity for municipal utilities to look at their key accounts and see which ones might really benefit from this kind of training.”

Although NMPP Energy coordinated the event, Pedersen stressed that teamwork made the workshop a success. “It was a dual effort, with power providers working with Western to get the word out to customers.”

Lincoln Electric System, Nebraska Public Power District and Omaha Public Power District helped promote the workshop. Several utility superin-

tendents invited customers, and LES paid the registration fee for some of its key accounts. Everyone got involved because the workshop was such an important service to end-use customers with compressed air systems, Pedersen said. “Learning about the technology is far more cost effective than waiting until there is an obvious problem and calling a consultant.”

Familiarity with technology

In his presentation, Van Ormer confirmed that being able to identify and improve inefficiencies in a system could help plants minimize operating costs. He recommended regularly scheduled system audits to prevent costly leakages. A centrifugal compressor, for example, should be adjusted every quarter. Modern equipment that detects leaks while the plant is operating makes auditing more efficient.

Unfortunately, Van Ormer added, a lot of people are afraid to touch their machinery. Because modern rotary systems are simpler to install and require less maintenance than older models, fewer plants keep highly trained engineers on staff. “It’s easy for owners to make the mistake of treating a compressor like an appliance instead of the delicate piece of equipment it is,” he noted. “I asked one owner what the set point on his system was. He said he didn’t know, that it was adjusted five years ago.”

Training is the key to demystifying compressed air systems. The workshop covered everything from basic terminology to evaluating a system management program. First-hand case studies demon-



At the Aug. 28 compressed air workshop, speaker Hank Van Ormer (right) shows steam analysis tools to (left) Bob Meade of NMPP Energy; John Pankratz, Western Energy Services manager; Phil Euler of Lincoln Electric System; and Craig Knoell, Western field representative. (Photo courtesy of NMPP Energy)

strated system design, appropriate applications, common problems and troubleshooting. “With fewer maintenance folks around, facility staffs need to understand the equipment,” Van Ormer declared. “Just knowing the right question to ask can save hundreds of dollars.”

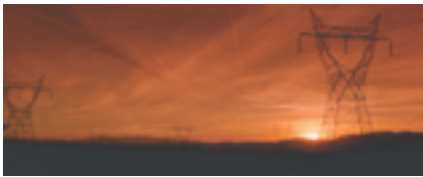
Learning to save money—and energy—are what Western-sponsored workshops are all about, and four out of five participants indicated on their evaluations that the workshop met or exceeded their expectations. “It’s a pleasure to know that people left with information they can use to positively affect their systems,” said Pankratz.

Western regularly provides technical assistance through hands-on workshops and other training, either directly—usually cost-shared with customers—or by another source. Visit the events calendar for upcoming workshops, or suggest one using the online suggestion form.

As Pedersen noted, making time for training is challenging, but the rewards, for both the power provider and the end use customer, are well worth the effort. ⚡

Want to know more?

Visit www.es.wapa.gov/pubs/ESB/03dec/esb01210.htm



TOPICS from the POWER LINE

Standards offer utilities, customers guidance on power quality

Editor's note: The Energy Services Bulletin features real answers to real questions posed to our staff at the Energy Services Power Line. We hope you find it useful.

Q: We are looking for power quality specifications or guidelines for electrical distribution voltage. We know of the one produced by the American National Standards Institute, but that is plus or minus 10 percent. Is there another standard or guideline for power quality? An example of vulnerable loads from one utility customer was a hospital that has MRI equipment, X-rays, etc. We were told that it can't take "events" outside of normal limits. What are these normal limits? Are these specifications or guidelines different for different customers?

A: ANSI C84.1-1995 defines voltage levels, giving a range of service voltage and use voltages for different nominal system voltages. Generally, the service voltage is not supposed to deviate from nominal by more than 5 percent. This standard includes "soft" language that allows some unquantified deviation so long as it is not frequent.

The standard also gives direction on balance suggesting that unbalance be kept within 3 percent at

no-load. But that is pretty loose. Power Line staff recommends that it be kept within 2 percent at no-load conditions. The unbalance is only going to get worse at the point of use when there are unequal single-phase loads.

Power Line staff are not aware of any standards for sags, swells, transients or harmonics that apply to what the utility should provide. The well-discussed IEEE 519 pertains to what the customer must do to control harmonics. Other facility- or customer-oriented standards are:

- Surge protection ANSI Standard C62.41
- IEEE Standard P1250: Guide on Equipment Sensitive to Momentary Voltage
- IEEE Standard P1100: Guide for Powering and Grounding Sensitive Equipment

Sags and third harmonics (which cause a reduction at the peak of the sine wave) are one of the big problems that interfere with sensitive equipment. In-plant sags are often caused by switching and starting large loads like large motors. Sags originating from the utility are most often caused by wind storms. Third harmonic problems are usually commercial, i.e. building phenomena, and rarely originate with the utility. ⚡

Energy efficiency

from page 14

of only 30 percent. A 3.5-kW Luxine induction range boiled 20 pounds of water in about 15 minutes, virtually the same time as a 5.1-kW electric resistance coil.

The secret to induction ranges is that all the energy goes into the pan through direct energy transfer of electricity through a magnetic field to the cooking pan. No energy is wasted to heat an electric coil or a ceramic cooking surface. As soon as the pan is removed, no further energy radiates into the kitchen. Cooler kitchens use less electricity for air conditioning and ventilation, resulting in additional energy and cost savings.

The Luxine Power technology is only available through four major commercial equipment manufacturers. However, the company is working with Viking Range to introduce the concept to the residential market. Luxine Chief Executive Officer Nick Bassill anticipates that Luxine Power technology will be available to consumers in early 2004.

It may not be quite the same as having a robot servant to cook dinner, but the money saved on your electric bill could be put away for that jet pack you've had your eye on. ⚡

Want to know more?
Visit www.es.wapa.gov/pubs/ESB/03dec/esb01211.htm

Calendar of events

Dec. 2-5	Optimizing Boiler Efficiency Online Seminar; Association of Energy Services Professionals International; online seminar. Contact: Valerie Oviatt; phone: 770-925-9633.
Dec. 2-4	Hydraulic Training; National Technology Transfer, Inc.; San Diego, CA. Contact: Customer Service; phone: 800-922-2820; Fax: 800-338-8441.
Dec. 3-5	Hydrogen Production & Storage Conference; Intertech Conferences Washington, DC. Contact: Brian Santos; phone: 207-781-9618; Fax: 207-781-2150.
Dec. 4	Design Considerations for Energy Effective Lighting; Lighting Design Lab; Spokane, WA. Contact: Elizabeth Ellisor; phone: 800-354-3864; Fax: 206-329-9532.
Dec. 4	Heating Your Home; Sacramento Municipal Utility District; Sacramento, CA. Contact: Jodi Newman; phone: 888-742-7683.
Dec. 4	Hydrogen Education Development Solicitation (DE-PS36-03G093016); U.S. Department of Energy; nationwide. Contact: James Damm; phone: 303-275-4788.
Dec. 4	Energy Effective Lighting for the High Performance Environment; Lighting Design Lab, Northwest Energy Efficiency Alliance; Spokane, WA. Contact: Lighting Design Lab; phone: 800-354-3864.
Dec. 4-6	Renewable Energy Expo; Energy Outfitters; Las Vegas, NV. Contact: Energy Outfitters; phone: 800-467-6527.
Dec. 6	Heating Your Home; Sacramento Municipal Utility District; Sacramento, CA. Contact: Jodi Newman; phone: 888-742-7683.
Dec. 6	Zero Energy Home Workshop, Colorado Energy Science Center, National Renewable Energy Laboratory; Golden, CO. Contact: CESC; phone: 303-216-2026.
Dec. 8-10	14th National Energy Services Conference; Association of Energy Services Professionals International; online seminar. Contact: Valerie Oviatt; phone: 770-925-9633.
Dec. 9-11	Mid-West Electric Consumers Association Annual Meeting; Denver, CO. Contact: Fara Tippit; phone: 303-463-4979.
Dec. 9-13	80th Annual Congress of Cities and Exposition, The National League of Cities, Nashville, TN. Contact: Registration; phone: 888-319-3864; Fax: 202-626-3043.
Dec. 10	Lighting Design Lab Open House; Lighting Design Lab; Seattle, WA. Contact: Elizabeth Ellisor; phone: 800-354-3864; Fax: 206-329-9532.
Dec. 10	Strategic Energy Planning Online Seminar; Association of Energy Services Professionals International; online seminar. Contact: Valerie Oviatt; phone: 770-925-9633.
Dec. 16-18	Instrumentation & Process Control; National Technology Transfer, Inc.; Phoenix, AZ. Contact: Customer Service; phone: 800-922-2820; Fax: 800-338-8441.
Jan. 1 - June 3	Building Operator Certification LEVEL II Training; BOC National; Seattle, WA. Contact: Teresa Squillace; phone: 206-292-4793 x2.
Jan. 15	Installing a Solar Heating System; Colorado Energy Science Center, National Renewable Energy Laboratory; Golden, CO. Contact: CESC; phone: 303-216-2026.
Jan. 14-16	NET2004 New and Emerging Technologies Conference; Touchstone Energy Cooperatives; Miami, FL. Contact: Kathryn Momot; phone: 703-907-5707; Fax: 703-907-5554.
Jan. 19-22	International Builders' Show, 2004; The National Association of Home Builders; Las Vegas, NV. Contact: NAHB; phone: 800-424-5249; Fax: 847-940-2386.
Jan. 20, 27 and Feb. 3	3 Session Home Efficiency Course; Colorado Energy Science Center, National Renewable Energy Laboratory; Golden, CO. Contact: CESC; phone: 303-216-2026.
Jan. 22	Heating System Efficiency; Colorado Energy Science Center, National Renewable Energy Laboratory; Golden, CO. Contact: CESC; phone: 303-216-2026.
Jan. 22	EnergyValue Housing Award; NAHB Research Center; nationwide. Contact: NAHB; phone: 800-638-8556.
Jan. 22	Hydraulic Training National Technology Transfer, Inc.; Portland, OR. Contact: Customer Service; phone: 800-922-2820; FAX: 800-338-8441.
Feb. 1-4	APPA Legislative Rally; American Public Power Association; Washington, DC. Contact: Monica Epps; phone: 202-467-2950.
Feb. 1 to Nov. 1	Built Green™ Seattle Design Competition: Call for Entries; City of Seattle, Department of Design, Construction and Land Use; Seattle, WA. Contact: Lynne Barker; phone: 206-684-0806.
Feb. 3	Energy Management Summit for Intelligent Buildings; Continental Automated Buildings Association; Chicago, IL. Contact: Rawlson O'Neil King; phone: 613-993-0390.
Feb. 4	Water Efficiency for Building Operators - BOC Continuing Education Class; BOC National; Tacoma, WA; Contact: Teresa Squillace; phone: 206-292-4793 x2.
Feb. 11	Energy Features to Look for in a New Home; Colorado Energy Science Center, National Renewable Energy Laboratory; Golden, CO. Contact: CESC; phone: 303-216-2026.
Feb. 12	Installing a Solar Heating System; Colorado Energy Science Center, National Renewable Energy Laboratory; Golden, CO. Contact: CESC; phone: 303-216-2026.
Feb. 17	Introduction to Building Commissioning - BOC Continuing Education Class; BOC National; Everett, WA. Contact: Teresa Squillace; phone: 206-292-4793 x2.

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Feb. 18	Renewable Energy Atlas of Colorado; Colorado Energy Science Center, National Renewable Energy Laboratory; Golden, CO. Contact: CESC; phone: 303-216-2026
Feb. 18-19	Wind Energy and Rural Development in North Dakota V; Energy & Environmental Research Center; Fargo, ND. Contact: Dee Kraft; phone: 701-777-5068; Fax: 701-777-5181.
Feb. 24 to April 1	Mechanical Engineering; University of Washington; Seattle, WA. Contact: Emily West; phone: 866-791-1275; Fax: 206-543-2352.
Feb. 26 to April 1	Civil Engineering; University of Washington; Seattle, WA. Contact: Emily West; phone: 866-791-1275; Fax: 206-543-2352.
Feb. 26	An Energy Efficiency/Green Building Renovation; Colorado Energy Science Center, National Renewable Energy Laboratory; Golden, CO. Contact: CESC; phone: 303-216-2026.
March 1-3	Power-GEN Renewable Energy: Cleaning the Air; American Council on Renewable Energy; Las Vegas, NV. Contact: Lisa Gasaway; phone: 918-832-9245.
March 24-26	72nd Annual Conference & Policy Makers' Seminar; California Municipal Utilities Association; Monterey, CA. Contact: Ann Linnekens; phone: 916-441-1733.
April 13-14	Colorado Wind & Distributed Energy: Renewables for Rural Prosperity; Colorado Governor's Office of Energy Management and Conservation, U.S. Department of Energy's Wind Powering America; Denver, CO. Contact: Megan Castle or Ed Lewis, OEMC; phone: 303-894-2383 x 1211.
May 5-7	24th Annual Utility Energy Forum, Energy Efficiency & Renewables: The First Response Strategy; Western, Bonneville Power Administration & more; Tahoe City, CA. Contact Guy or Linda Nelson; phone: 541-994-4670.