

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

## Public Power Week celebrates American tradition that works

American Public Power Association and its 2,000 member utilities will observe Public Power Week October 2-8. Since 1987, municipal utilities have set aside the first full week in October to remind their consumer/owners about the benefits of a community-owned power system. "The Power Week motto is 'Public power—an American tradition that works,'" said APPA Communications Director Madalyn Cafruny.

This year's theme is "Public power: good for consumers, businesses, communities and the nation." APPA produced a four-part brochure that addresses each aspect. It is part of the 2005 toolkit available to member utilities to promote their own Power Week events.

### Utilities open doors

Those activities range from open houses to media campaigns to utility-sponsored athletic events. "Our

members are very creative about understanding what kind of event is going to be right in their community," Cafruny said. "The ones that seem to work best are the ones that get the most people involved."

More than 250 visitors from local schools toured Lodi Electric Utility, in California's Central Valley. Students, teachers and chaperones picked up electrical safety tips, watched operations demonstrations and learned how electricity is delivered to Lodi residents and businesses. The tours ended with bucket-truck rides and Lodi staff snapping class pictures in front of a Public Power Week banner.

In 2003, Pasadena Water and Power gave tours of its recently renovated powerplant. Guides explained how two new 45-MW combustion turbines would help reduce the strain on PWP's system during peak demand and provide emergency backup during unexpected outages.

### Events reach community

Other utilities went out to meet their consumers. Los Angeles Department of Water and Power set up information and display booths in three sections of its service area. The booths included information on energy efficiency, water conservation, customer service, Trees for a Green LA, and electrical safety.

The City of Palo Alto Utilities produced the video which also ran in City Hall throughout the month of October. CPAU also held a successful solar home tour with 11 homes.



Public Power Week • October 2-8, 2005

Public Power Week is an annual celebration of the benefits of a community-owned power system. (Artwork by American Public Power Association)

One unusual event combined a football rivalry with charity fundraising. Murray City, Utah, and College Station, Texas, Utilities each committed to give \$500 to a charity chosen by the utility with the winning football team. The Utah Utes beat the Texas A&M Aggies and representatives of both utilities presented a \$1,000 check to the "Make-A-Wish Foundation" of Utah during Public Power Week.

### Promote accomplishments

Utilities often use Power Week to publicize their successes or launch a new program. In addition to holding a week-long open house, Woodbine, Iowa, Municipal Light & Power launched its "River Winds" green power promotion. CPAU accepted a "Green Power Leadership Award" from U.S. Department of Energy and the U.S. Environmental Protection Agency honoring the success of its "PaloAltoGreen" program.

IID Energy chose Public Power Week 2004 to communicate its recent accomplishments to the Imperial

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# Zero-energy building makes housing even more affordable

Imagine a struggling family whose dream of homeownership finally comes true only to learn that they cannot afford to heat and light their new home. Habitat for Humanity formed a partnership with the National Renewable Energy Laboratory and the U.S. Department of Energy's Building America program to make sure that doesn't happen in any of the houses the nonprofit organization builds and sells to low-income families.

Real Estate Developer Andy Blackmun, of Habitat's Metro Denver affiliate, said. "All of the homes we have built since 1999 have been energy-efficient houses. What we are trying to do with NREL is bridge the gap between high-end technology and day-to-day measures that will help families save money now."

The partnership is building Habitat for Humanity's first true net-zero energy home in Wheatridge, Colo. "The advantage of working with Habitat is that it builds so many houses. It gives us the opportunity to get new technology out of the lab and into homes," said Ron Judkoff, director of NREL's Center for Buildings and Thermal Systems. "Bringing energy use down makes sense with Habitat's mission, too," he added.

## Energy Services Bulletin

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## Cost, easy installation

The house is the second the partnership has built. In 2002, Habitat Metro Denver asked the DOE to help it improve its design and construction process. The result was a highly efficient demonstration home in Westminster, Colo., that improved on standard home benchmark energy consumption by more than 40 percent.

"When it comes to direct cost, though, we have to consider whether an incremental gain in efficiency is going to take resources away from building another house," explained Blackmun.

In addition to being cost-effective, the zero-energy Habitat house had to be volunteer-friendly to build, which ruled out certain types of technology. For example, "We looked at a recovery ventilation unit tied into the heating system, but it would have to be installed by highly trained contractors," said Blackmun.

The streamlined building process NREL researchers developed focused on improving the efficiency in four areas:

- Orientation and landscaping
- Building envelope design, including construction details to support heavy insulation, strategically located low-e windows and an extra long roof overhang
- Efficient lighting and appliances
- Solar water heating system

These measures bring the house's average energy consumption down to 64 MBtu annually compared to 90 MBtu for the 2002 energy-efficient Habitat home. The standard benchmark is 160 MBtu. The grid-tied, 4-kW solar array is expected to produce enough electricity in the summer to offset energy use in the winter, earning the 2005 home its "zero-energy" status.



Habitat for Humanity partnered with National Renewable Energy Laboratory to build its first true net-zero-energy home in Wheatridge, Colo. (Photo by Paul Norton)

## Orientation, design, systems

The thick walls have an R-value of 40—protection against outside noise as well as the elements. The floor plan places the living room and two bedrooms on the southern side of the house where most of the windows are. This layout allows the high-traffic rooms to take advantage of natural lighting and passive solar gain.

Low-e windows were used throughout the house. Judkoff noted, "We installed different 'flavors' of window depending on which way the wall faced. The south-facing windows allow more sunlight in."

The roof of the house has a raised heel truss, allowing room for insulation to R-60 and improving ventilation. The floor is insulated to R-30—more effective than insulating the crawl space walls.

The heavy insulation eliminates 80 to 85 percent of the heating load. The single-point, natural gas heater supplies the heat, with electric baseboard heaters installed as a backup.

An energy recovery ventilator located in the utility room will circulate the heat. "This unit maintains healthy ventilation and recovers air thermal energy," Judkoff explained.

*See ZERO-ENERGY BUILDING, page 3*

## Zero-energy building *from page 2*

The ventilator draws fresh air from outside and exchanges heat with exhaust from the kitchen and bathroom. The outside air needs to be warmed up by only 10 percent to reach the indoor air temperature.

Heating water consumes 28 percent of the average home's energy, so the solar hot water heater donated by the Institute for Sustainable Power is key to the zero-energy home strategy. The system consists of a super-insulated, 200-gal. storage tank in the utility room, solar collector panels on the roof, a coil to exchange heat with the pressurized water in the plumbing system and a pump to circulate the

water. A natural-gas flash heater brings the water up to the desired temperature on demand and acts as a backup.

### Lessons learned

Blackmun said that Habitat tries to take lessons away from each building project, but it may be six or seven years before some of the systems on the zero-energy home become standard. However, some practices can be applied much sooner. "We have always paid attention to the building's solar exposure, but the combination of window placement, orientation and shading really minimizes the heating and cooling needs of the building," he said.

Working with volunteers to build double-stud walls was another valuable experience. "It only adds \$1,000

to \$1,500 to the cost and it makes a big difference on utility bills," Blackmun observed.

The Habitat for Humanity zero-energy home was completed in September and the family has settled in for the winter. NREL will monitor the systems performance for a year. "We want to see if the house comes as close to zero-energy as predicted," said Judkoff.

Judkoff shares Secretary of Energy Samuel Bodman's belief that the zero-energy home is, "a glimpse into the future of home construction in America," as Bodman stated in a press release. "We are in business to bring down the cost of these technologies so they can go into any home, not just demonstration models," Judkoff declared. ⚡

Want to know more?

Visit [www.wapa.gov/es/pubs/esb/2005/oct/oct052.htm](http://www.wapa.gov/es/pubs/esb/2005/oct/oct052.htm)

## Public Power Week *from page 1*

Irrigation District board of directors and staff, and announce its goals for the coming year. The central California irrigation district had spent the previous year restructuring to focus on becoming a leading energy utility.

Local radio is another good venue for connecting with the community, Cafruny said. "Utility managers have made appearances on radio shows during Public Power Week to take questions from consumers," she explained.

### Support materials

Whatever the medium, the purpose of Public Power Week is to get

the message out. Public Power Week began, Cafruny recalled, as a grassroots response to a lack of understanding about community-owned electric providers. Spurred by government efforts to privatize Federal power marketing administrations in the mid-'80s, APPA set out to educate political leaders and the public about the benefits of public power.

An opinion poll the association conducted showed that most people didn't understand how public utilities worked. "This was the case even in communities that were served by municipal providers," said the communications director.

Public Power Week has given utilities an opportunity to establish a two-way dialogue with consumers,

Cafruny added.

APPA gives member utilities plenty of support to make the most of that opportunity. On APPA's Website under Special Utility Programs, utilities can learn how their peers celebrated Public Power Week and access promotion materials. Free resources include sample news releases, guest columns, public service announcements and more. Special event items, communication and marketing tools, educational material for children and Power Week bill stuffers can be purchased.

The materials are available throughout the year, so that utilities don't have to wait for the first week in October. After all, we use electricity every day, so Cafruny insists, "Every week is Public Power Week." ⚡

Want to know more?

Visit [www.wapa.gov/es/pubs/esb/2005/oct/oct051.htm](http://www.wapa.gov/es/pubs/esb/2005/oct/oct051.htm)

# Apartment residents benefit from solar power

Many affordable housing developers have discovered that solar energy makes economic as well as environmental sense.

## PV in California

Not surprisingly, solar-friendly California boasts several PV-powered complexes ranging from modest to ambitious. In spring 2003, Oakland University installed a 10-kW demonstration project on a new student apartment complex. The integrated system offsets the campus's electricity use, and any excess is fed back onto the grid.

At the other end of the spectrum are two large-scale projects that also use integrated technology. Watsonville, Calif., claims the largest solar apartment complex in the United States, according to its developer Clarum Homes. The 132-unit Vista Montaña powers its community center, laundry rooms, outdoor landscape lighting and car park lighting with integrated roof tiles.

The cost savings from lower energy bills will fund social services at the affordable housing complex.

Colorado Court in Santa Monica, Calif., is the first affordable housing complex in the country to be 100-percent energy neutral. The 44-unit building earned gold LEED certification for its combination of innovative design and materials, energy efficiency measures and state-of-the-art systems.

## Success stories

Riverside Public Utilities played a central role in one of California's most impressive solar affordable housing stories.

The 81-kW PV system on the Autumn Ridge Apartment complex reduces overall electricity costs for residents of the 27 units by about two thirds.

The Oak Tree Apartment complex is larger—51 units—with a smaller, 46-kW system. The common areas use the solar power, and the Riverside Housing Development Corporation, which owns the building, gives residents a credit on their electric bills.

The RHDC acquires rundown properties and refurbishes them to rent to low-income families. During the renovation of the Autumn Ridge complex, RPU Director David Wright suggested using Public Benefits funds to install solar panels on the complex. "The electricity generated assists RPU in reaching their renewable portfolio requirements and counts toward Riverside's internal goal of one MW of renewable power within city limits," explained Michael Bacich, RPU public benefits/business relations manager.

## Systems tailored

Most of the existing buildings at the Autumn Ridge facility had to be demolished, and the new complex consisted of a group of one-story fourplexes. Each fourplex has four meters—one for each unit—and a house meter. Arrays of approximately 2 kW on the roof of each unit and adjacent garage roofs are hooked into each meter. "RPU went with conventional, roof-mounted arrays as space was at a premium," said Bacich.

At the three-story Oak Tree complex, the 46-kW array was designed based on available square footage and



**PV panels on the roof of the Autumn Ridge affordable apartment complex reduces resident's electric bills. (Photo by Riverside Housing Development Corporation)**

the electric load of the common areas.

## Projects meet goals

National, state and local government agencies; energy industry organizations and local community groups have lavished praise on both projects. Autumn Ridge met all four criteria for Public Benefits funding. It assists low-income populations, uses new renewable energy, promotes demand-side management and has a research or demonstration component.

The effect on the surrounding neighborhoods was as important to the city as the recognition. Following Oak Tree's revitalization, other properties in the area also invested in significant renovations and improvements.

Solar power is helping to change the perception and reputation of neighborhoods, beautifying cities and helping families make ends meet. And all that while reducing tons of air pollutants over the 25- to 30-year life span of the systems. That's a lot to ask of a resource, but solar apartments are proving that renewable energy is up to the task. ⚡

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# Farm makes history with “cow-powered” hydrogen fuel cell

Once an agricultural business starts thinking about renewable energy, it doesn't stop. A hog farm decides to build a wind turbine next to its anaerobic digester, or a feedlot realizes that its composting operation could fuel a new digester, or a dairy farmer wonders if his prize-winning digester could power a hydrogen fuel cell.

“We want to prove that agriculture can produce energy as well as food,” Dennis Haubenschild said of the demonstration project that will run a hydrogen fuel cell on biogas captured from dairy cows.

For the last six years, Haubenschild Farms in Princeton, Minn., has run on electricity generated by the anaerobic digester he built with AgStar funds. He sold the excess—enough to power about 78 homes—to his electricity provider, East Central Energy. Great River Energy, ECE's generation and transmission provider, now buys Haubenschild's excess generation.

## New use for biogas

Haubenschild's interest in tying hydrogen production to anaerobic digestion began almost as soon as he commissioned his biogas powerplant. “A solid-oxide fuel cell could produce enough heat to maintain the digester,” he explained. “If the demonstration goes well, we might be able to scale up from the PEM (proton exchange membrane) cell we're working with now.”

The 5-kW, proton exchange membrane fuel cell provided by Plug Power, Inc. is the typical size for standard residential applications and good for research.

It won't make much of a dent in Haubenschild's 60- to 80-kWh load, however, but that is not the point of

the demonstration. The goal is to see if a fuel cell can make electricity from predigested, pre-collected biomass. “Fuel cells have generated electricity from methane, but this is the first time it's been done in an operation like this,” said Dr. Philip Goodrich, the principal investigator on the project.

Goodrich is an associate professor with University of Minnesota's Department of Biosystems and Agricultural Engineering, one of the sponsoring partners in the project. Other project partners include the Minnesota Department of Agriculture and the Minnesota Project. Great River Energy, Electric Power Research Institute, John Deere, Inc. and Plug Power are among the contributing partners. The Environmental and Natural Resources Trust Fund provided a \$200,000 grant for the project through the Legislative Commission on Minnesota Resources.

## Clean gas, clean emissions

U of M researchers have run fuel cells on biogas intermittently, but continuous biogas operation poses some challenges. The gas from the anaerobic digester is composed of methane, carbon dioxide, water vapor and caustic trace gases that can damage a fuel cell.

A wastewater treatment plant in the state of Washington does clean up digester gas to pipeline quality, but a visit to the site convinced Goodrich that, “Just because one facility was doing it doesn't mean that it is going to work in different circumstances,” he said. “That option wasn't available to us.”

Goodrich developed a specialized water scrubber for the fuel cell, but it is not foolproof, he said. “We had to rebuild the system.”



**This PEM fuel cell installed at Haubenschild Farms is the first in the world to generate electricity from biogas captured from an anaerobic digester. (Photo courtesy of Philip Goodrich, PE)**

Once the biogas is cleaned, it is converted to hydrogen fuel, which produces electricity in the fuel cell. The unit uses only two cubic feet of biogas per minute, compared to the 50 cfm Haubenschild's Caterpillar generator consumes. The fuel cell is much quieter than the internal combustion unit.

Even more important, because the gas has been cleaned and the electricity comes from a chemical reaction instead of combustion, the water vapor exhaust contains near-zero emissions. A standard engine burning straight biogas emits 2,900 ppm NO<sub>x</sub>, 280 ppm SO<sub>2</sub> and 800 ppm CO. The fuel cell emissions contain less than 1 ppm of those gases.

## Head start

Those factors could help people accept electrical generators in their midst and get used to the idea of farmers supplying energy for their neighborhoods, Haubenschild believes. His vision doesn't stop with generating electricity, though. “I would like to produce hydrogen to

*See COW-POWERED, page 11*

# Deal puts Colorado Springs Utilities near renewable goal

After voters passed Amendment 37, Colorado Springs Utilities crafted a compromise that honored the spirit of the Renewable Portfolio Standard while protecting ratepayers from increases.

The deal allowed Colorado's second-largest utility to count electricity from its Tesla Hydro Plant as renewable energy. "We consider hydro renewable energy to be an eligible resource, and we wanted to be able to count that power," said Government Affairs Manager Andrew Colosimo. "It saved our ratepayers tens of millions of dollars."

As a bonus, adding Tesla's 28 MW to 4 MW of existing small hydro and wind puts Springs Utilities 70 percent of the way to getting 3 percent of its electricity from renewable energy sources from 2007 to 2010.

## Innovative plant

Initially, Amendment 37 specified that only small hydro plants of 10 MW or less would qualify as renewable energy. Even though hydropower is a renewable resource, many RPSs disqualify it because it is well-established and large projects might require new dams on rivers.

However, the Tesla plant at the Air Force Academy facility does not get its power from a river. It is located at the mouth of a nearly vertical pipeline Springs Utilities built to carry water from Rampart Reservoir to the city.

"The fact that Tesla runs off a reservoir instead of a river made the environmental community much more receptive to including it," said Colosimo. "This is actually the type of innovative use of resources they want to encourage."

In a compromise, language was added to the bill to allow existing medium-sized hydropower projects of up to 30 MW to count toward the RPS, while new projects must be 10 MW or less. Other changes in the rules clarified eminent domain issues, home rule restrictions, exceptions to compliance and how to deal with newly eligible utilities.

## Public involvement

One of the reasons Springs Utilities was able to make the case for Tesla was that it was already in the process of evaluating its resource mix when Amendment 37 made it onto the ballot. "We were updating our electric integrated resource plan to come up with the best mix of renewables, conventional generation and demand side management to meet future demands," said Colosimo.

"Because public participation played such a big role in the process, we knew our EIRP had the community's buy-in," he added.

Springs Utilities customers supported demand side management strategies; a voluntary green power program; a 10-MW, small wind purchase and hydropower. "We raised concerns throughout the Amendment 37 campaign because it didn't count existing hydro," Colosimo recalled.

The bill gave municipal utilities the option to let ratepayers vote whether to comply at all. Since Amendment 37 did not have strong support in the city, there was a real possibility that customers would vote against compliance.



**The waterflow from Rampart Reservoir to the Tesla Power Plant generates 28 MW that Colorado Springs Utilities can count toward the state's renewable energy goal. (Photos by Colorado Springs Utilities)**

## Successful negotiation

That gave bill supporters incentive to work with the municipality. The state's major utilities sat down with the Colorado Public Utilities Commission and the environmental community to work out the details of Senate Bill 143, implementing Amendment 37. "It was a very positive process," recalled Colosimo. "We went in with clear objectives, and there was a real willingness by all the parties to negotiate a fair package."

Councilman Richard Skorman, who helped broker the compromise, felt that the extra flexibility helped to persuade the utility board to support compliance with the RPS. "I think this sets the ground firmly for us to comply with this," he observed.

Colosimo credited much of the city's success to Skorman. "Mr. Skorman did an extraordinary job of presenting our efforts to develop an effective resource plan," he said.

Self-certification, compliance administration and other cost-recover efforts have yet to be addressed. For its part, Springs Utilities must figure out the details of establishing a "sub-

*See CO. SPRINGS UTILITIES, page 11*

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# Wyoming ranchers test renewable-powered stock pumps

Facing a fifth year of drought, the Wyoming governor's office announced that the state would put up \$500,000 to help ranchers install solar- and wind-powered stock pumps. "My hope is that this new technology can help ranchers water their livestock using the means and areas that make the most sense for their operations," Freudenthal commented in a press release about the initiative.

## Technology solves problems

The governor noted that stock water pumps powered by renewable energy will solve several problems at once. The new pumps will allow ranchers to reach underground water supplies in remote areas of their property. Since livestock rarely venture far from water sources, more watering locations can mean improved range use.

Remote electric pumps require long, expensive distribution lines that cost \$15,000 to \$20,000 per mile in Wyoming and often don't produce enough revenue even to pay for maintenance. "Our minimum charge for electricity is \$13 per month," said Electrical Technician Dan Watson of Bridger Valley Electric Association. "If the line needs repair, we can end up losing money on it."

Many ranchers choose either to truck water to cattle or use pumps powered by small diesel or propane engines. Solar stock water pumping offers a cost-effective and environmentally friendly alternative in remote applications.

Russell Waldner director of engineering for Carbon Power and Light, speaks from experience when he agreed that renewables-powered equipment has many benefits for ranchers. "I have one that has run year-

round for four or five years with no trouble," he said.

## Small investment

Phase I of the plan calls for two to four ranchers in each of Wyoming's 23 counties to receive systems developed by researchers at the University of Wyoming. "The university's involvement helps to ease the concerns some ranchers have about adopting a relatively new technology," said Dr.

Sadrul Ula, energy advisor with the governor's office. Ula is a professor in the UW Electrical and Computer Engineering Department.

University staff and engineering grad students designed the systems to match the specifications ranchers provided on their applications. The specs were submitted to three or four experienced vendors throughout the West.

The university will install the units and maintain them for two years. The rancher must grant the research team two year's access to the pump and put up 20 to 25 percent of the system's cost in in-kind matches. That may include building the foundation and supports for the solar panels or wind turbines, digging or repairing the well, fencing and labor. "Since the system is basically free to the project participants, we want to make sure they are serious about it," said UW Staff Engineer Steve Fletcher, who is in charge of the installation.

## Committees weigh factors

The initial \$500,000 grant will buy equipment for the systems. The money is coming from the state's



Engineering grad student Kala Meah (left) helps Robert Tarver and his father Bob Tarver (right) of Campbell, Wyo., install a 300-watt solar direct system. (Photo by University of Wyoming Electric Motor Training and Testing Center)

petroleum violation fund, administered by the Wyoming Business Council. The state is encouraging participants to apply for matching funds from EPA grants; U.S. Department of Agriculture programs like Environmental Quality Incentives Program, Conservation Innovation Grants and Wildlife Habitat Incentives Program; and other sources.

The Wyoming Association of Conservation Districts publicized and distributed the application in cooperation with local electric utilities, county extension agents and ranching organizations. Dr. Ula suggested that conservation districts ask electric co-ops to help select participants. Watson and BVEA had cooperated with Ula on installing a solar stock pump demonstration in the early '90s, so Ula recommended Watson to the Uinta County committee.

About 150 ranchers from across the state submitted applications for two rounds of evaluations. The selection criteria focused on improving distribution of livestock, reducing grazing in riparian areas, providing water for wildlife and whether the

*See STOCK PUMPS, page 11*



# Biomass purchase furthers forest rehab project

Salt River project of Phoenix, Ariz., entered into an agreement with Snowflake White Mountain Power to buy 10 MW of biomass power. Under the agreement, at least 80 percent of that power will come from dead and burned forest residue and thinnings in Arizona. SWMP's wood-fired powerplant is scheduled to come online in late 2007.

"We are pleased to be part of a process that will benefit not only SRP's renewable energy supply, but also responds to the state's forest management challenges," commented Richard Hayslip, manager of SRP's Environmental, Land and Risk Management departments.

He added that surplus biomass available from thinning the unnaturally overgrown forest areas is a large renewable energy resource. Carefully planned forest thinning activities can preserve wildlife habitat, minimize soil erosion and reduce the fire danger to homes near the forest.

## Providing disposal

The Rodeo-Chediski fire of 2002 destroyed hundreds of thousands of acres of forest and 426 buildings in east-central Arizona. The blaze left behind tons of burned and dying trees on the Fort Apache Indian Reservation and the adjacent Apache-Sitgreaves National Forest. That charred residue had to be removed to rehabilitate the forest, so the U.S. Forest Service launched the Rodeo-Chediski Fire Salvage Project.

NZ Legacy, SWMP's parent company, purchased some of the USFS timber salvage sale contracts on the Rodeo-Chediski burn area. The

contracts allow the removal of dead trees, the larger of which are sold for saw logs while the smaller trees, tops and branches are chipped and ground. The energy developer is also subcontracting on a USFS stewardship contract on several individual community thinning projects.

Both operations produce tons of biomass that must be disposed of in an environmentally responsible way. NZ Legacy is turning that residue into renewable energy, a plan that only works if there is a buyer for the power. "Salt River Project's RFP for 10 MW of biomass power made the Snowflake project happen," said Scott Higginson, NZ Legacy executive vice president. "SRP deserves great credit for its work to clean up the damage done by the fire."

## A new resource

Linking forest rehabilitation to renewable energy was an easy connection for a utility that is always on the lookout for new sustainable resources. A series of devastating forest fires had prompted Arizona's governor to launch a task force on forest health and stewardship. "Combining the Healthy Forest Initiative and cleaning the forest to provide fuel for the biomass plant seemed good for the overall environment," recalled SRP Environmental Initiatives Manager Lori Singleton.

Biomass is a relatively inexpensive renewable energy source. The fact that it is firm power, available whenever it is needed, makes it even more attractive. Singleton said, "That makes it a good supplement to the intermittent sources in our portfolio."



The 2002 Rodeo-Chediski fire threatened homes near the Apache-Sitgreaves National Forest. Salt River Project is purchasing electricity from a wood-fired powerplant that will burn thinnings cleared from the recovery area. (Photo by U.S. Forest Service)

SRP will add the biomass power to an already-diverse renewable portfolio that contains more than 80 MW. Its resources include 50 MW of wind, 25 MW of geothermal, 4 MW of landfill gas, more than 1 MW of solar and 750 kW from a low-head hydropower plant. Customers support renewable development by subscribing to SRP's voluntary EarthWise Energy Program.

## Meeting the RPS

SWMP expects to break ground on the 20-MW facility by the end of the year and begin providing power to SRP no later than January 2008. Although SRP requested only 10 MW, Arizona Public Service Company agreed to buy the additional generation to meet the state's renewable portfolio standard of 2 percent renewable energy by 2010.

SRP's board of directors voluntarily adopted the RPS in April 2004, and has been acquiring new renewable resources ever since. By 2010, the utility will have to obtain approximately

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See *FOREST REHAB*, page 9



# Co-located plant turns Great River's by-product into product

Great River Energy gave the phrase, "waste not, want not," a new meaning when it signed an agreement with Headwaters Incorporated to build a new ethanol plant near the power wholesaler's Coal Creek Station powerplant in Underwood, N.D.

The Blue Flint Ethanol plant will use waste steam from the powerplant to process corn into 50 million gallons of ethanol annually. "We were looking for a way to use that steam instead of just cooling it down," said Lyndon Anderson, Great River's North Dakota communications director.

## Widespread benefits

The deal turns the waste steam into a small but significant revenue stream by making Great River a minority owner of the plant. It also increases the power wholesaler's load by three to four MW. Great River will provide ancillary services to the plant and build the path for McLean Electric, the utility servicing the area, but no major system upgrades will be necessary. "That's the advantage of co-locating and was one of the factors that made the project feasible," said Anderson.

For Headwaters, co-locating the ethanol plant at Coal Creek Station eliminates the need to build a boiler. It will also reduce emissions compared to a "stand-alone" plant.

The community will benefit from the project, too. The economic impact of the plant is projected to be about \$160 million annually.

In addition to ethanol, the plant will also produce enough dried or wet distillers grain for approximately

225,000 feeder cattle on an annual basis. It will require 200 jobs during construction, and approximately 30 jobs when operating.

## Creating products

The idea for the ethanol plant originally came from Great River engineers, said John Ward, vice president of marketing for Headwaters Inc. "This is only the latest project in a long relationship," he said.

Headwaters, which supplies pre-combustion and post-combustion services to coal-based electric utilities, has a long-term contract with Great River to market fly ash from Coal Creek Station. Fly ash, a waste product from coal-fired generators, is a key component in an aerated concrete developed by Headwaters called FlexCrete. The two companies are cooperating on commercializing the building material, which diverts waste from the landfill.

FlexCrete requires less energy to manufacture than conventional aerated concrete and offers many other environmental benefits. According to Headwaters, using just one ton of fly ash conserves landfill space equal to 455 days of solid waste produced by the average American. It reduces CO<sub>2</sub> emissions equal to two months' worth of automobile emissions and saves enough energy to provide the average home with electricity for 24 days.

## Improving efficiency

Great River and Headwaters are collaborating on another project that also uses the waste steam from Coal Creek Station. Headwaters is marketing a coal-drying technology

Great River developed that reduces the moisture in lignite coal from 38 percent to less than 30 percent. "Drier coal burns more efficiently with fewer emissions," said Anderson.

The technology could reduce annual emissions per 10 GW by 6,890 tons of NO<sub>x</sub>, 18,360 tons of SO<sub>2</sub>, more than 7 million tons of CO<sub>2</sub>, 9,340 tons of particulates and almost 300 pounds of mercury.

In August Great River cut the ribbon on the prototype module coal dryer, designed to operate off one of the 546-MW units at Coal Creek. In the second phase, Great River will design, build and test a full suite of module dryers for full operation.

Construction on the Blue Flint Ethanol plant is beginning this fall, and it is expected to be operational by fall 2006. This will be Great River's first foray into co-located manufacturing facilities, but the utility hopes it will be a template for future projects. ⚡

## Forest rehab

*from page 8*

610,000 MWh from sustainable sources each year to meet the state goal.

That is a big challenge, but the benefits to the community are worth the effort, as the biomass purchase proves. In addition to improving forest health, the deal comes with the usual perks of new jobs for the region and, of course, expanding the diversity and capacity of the Salt River Valley's energy supply. Not a bad day's shopping for the Salt River Project. ⚡

Want to know more?

Visit [www.wapa.gov/es/pubs/esb/2005/oct/oct058.htm](http://www.wapa.gov/es/pubs/esb/2005/oct/oct058.htm)

# Green power purchase brings buyers, sellers together

**B**uying in bulk saved several Federal agencies money on the purchase of renewable energy certificates, and it provided a market for green power providers scattered around Western's territory.

Rocky Mountain Regional Energy Services Representative Peggy Plate organized the purchase of 117,000 MWh for five years for six DOE labs, three other DOE organizations and an Army installation. Western will receive 15,000 MWh of the RECs, enough to cover the needs of 15 Western facilities. "It's part of our stewardship role, to find ways to reduce pollution," she said.

## RECs bridge miles

The other agencies participating in the purchase include:

- Department of Energy's Berkeley Laboratory, Lawrence Livermore Laboratory and Stanford Linear Acceleratory Center
- DOE's Pantex Plant in Amarillo, Texas
- DOE's Kansas City Plant
- DOE's Sandia National Laboratories, New Mexico
- DOE's Los Alamos National Laboratory, New Mexico
- Fort Carson, Colo.
- DOE's Golden Field Office and Central Regional Office
- DOE's National Renewable Energy Laboratory

The Federal Energy Management Program funded the development of the request for proposals, interagency agreement and marketing materials. FEMP representatives also worked with Western to promote the project to other Federal agencies.

David McAndrew, FEMP renewable power purchasing team lead, and Chandra Shah, senior project leader

with NREL FEMP, brought several DOE sites into the purchase. Plate worked with facilities in Western's Rocky Mountain region and Energy Services Manager Paula Fronk of the CRSP Management Center added the agencies in New Mexico to the agreement.

RECs proved to be the most cost-effective product for meeting the needs of requesters located in five different states. Even though some of the generation sources are located on Western's transmission system, "None of the requesters were close to the sources," explained Plate, "so the transmission service fees would have driven up the cost of the electricity."

## Broker reaches market

Sterling Planet, Inc., a third-party green power marketer, is supplying all the certificates from a mix of biomass and wind generation. Sierra Pacific Industries' sawmill sites in Anderson, Lincoln and Sonora, Calif., are supplying electricity from wood chips. The wind RECs are being generated by Mountain View wind site in Palm Springs, Calif., and the new Ainsworth Wind Farm built by Nebraska Public Power District.

"Selling the environmental attributes helps NPPD pay for the costs of the facility," explained Doug Mollet, NPPD water systems and renewable energy manager.

Using a third-party broker is a good way for a smaller utility like NPPD to sell green tags for several reasons, he added. The renewable energy market is still new and evolving quickly. "We just don't have enough staff to follow it full time," Mollet said.

Selling RECs also allows NPPD to take advantage of the global nature of

renewable energy. "The environmental benefits of renewable energy are not bound by sticks and wires and state lines, like the generation itself," he noted.

Mollet anticipates that NPPD will continue to use marketers. "It costs a few dollars—think of it as a finder's fee—but it saves staff hours and gives a utility access to markets it wouldn't have otherwise."

Renewable energy developers should look at a green tag marketer's customer base and whether or not the company is an aggregator, Mollet advised. "It's rare to find one customer that can buy your entire output," he said.

## Western helps

Aggregation is good for both buyers and sellers, agreed Plate. "Because of the competitive price, we were able to get enough certificates to cover 15 Western's facilities this time," she said. "This REC buy helped DOE meet its renewable energy directive to purchase 3 percent non-hydro renewable energy by 2005 and 7.5 percent by 2010."

Federal agencies are the largest buyers of RECs in the United States, and Western has been recognized for its role in green power purchases for Federal customers. "Our program makes it easy and cost effective for Federal agencies to support renewable energy," said Theresa Williams, Western's Renewable Resources for Federal Agencies project manager. "By working with our customers and looking at renewable energy, we can all reach our goals."

To learn more about how Western can help your agency "green" its operations, visit Western's Renewable Resources Web site. ⚡

**Want to know more?**

Visit [www.wapa.gov/es/pubs/esb/2005/oct/oct059.htm](http://www.wapa.gov/es/pubs/esb/2005/oct/oct059.htm)

## Cow-Powered

from page 5

run our tractors and to sell to cities for buses,” he said.

Researchers at U of M are working on technology that would allow hydrogen to be mixed with diesel, “Preferably biodiesel, to reduce emissions even more,” Goodrich noted.

Also, at this point, it is not clear that the fuel cell will produce more hydrogen than it needs to generate electricity. Goodrich hopes to find that out in the next two years.

In the meantime, the Haubenschild Farms digester will continue

to deliver reduced odors and emissions, enhanced fertilizer for sale to local growers and, of course, clean electricity. If the fuel cell demonstration yields one more benefit of sustainable business, Dennis Haubenschild will not be surprised. “The by-product of animal agriculture is a non-depletable resource,” he declared. “You have to think of it as product, not waste.” ⚡

## Co. Springs Utilities

from page 6

stantially similar renewable energy standard,” submitting a certification statement to PUC and evaluating additional renewable energy options to meet the 2007-2010 goal, and beyond. Two more small hydro projects are in the works, as is a wind purchase and expanding its DSM program. “Developing aggressive demand-side management gets the numbers down,” Colosimo said. “Use less electricity, and the proportion that comes from renewables goes up.”

And DSM can potentially save customers money in the process, proving that a creative utility can turn the problems of meeting a renewable portfolio standard into opportunity. ⚡

Want to know more?

Visit [www.wapa.gov/es/pubs/esb/2005/oct/oct054.htm](http://www.wapa.gov/es/pubs/esb/2005/oct/oct054.htm)

## Stock pumps

from page 7

producer could obtain matching funds from other programs.

### Full season needed

During the 2005 summer grazing season, the university installed six pumping systems of various sizes, all solar. The smaller ones were powered by a 260-watt array and pumped about 1,000 gallons per day. The large, 660-watt systems can pump 2,000 to 5,000 gallons daily depending on the depth of the well, said Fletcher.

It is too early in the project to judge how well the systems are meeting their owners’ needs—that

will take about a year’s worth of operation. Waldner warned of two potential drawbacks ranchers might encounter with their solar-powered systems. “The biggest problem is pumping enough water for the amount of stock in the area,” he observed.

The grazing may support more cattle than the pumping system can. The solution is to install either a big storage tank or a big pump, said Waldner, adding that combining a wind turbine with the system could pick up the extra water needed.

The intermittent nature of solar and wind could also keep the system from pumping enough water. Waldner said that Carbon customers with solar-powered pumps still have backup gas generators.

The researchers are looking forward to collecting data on stock pump performance over the next two years, and offering tours of the working systems to other ranchers and the general public. “We hope the neighboring ranchers who didn’t apply will see the pumps and be convinced,” said Ula.

If that happens, Wyoming ranchers may eventually count sun and wind as a resource that is nearly as valuable as water. ⚡

Want to know more?

Visit [www.wapa.gov/es/pubs/esb/2005/oct/oct056.htm](http://www.wapa.gov/es/pubs/esb/2005/oct/oct056.htm)



# Web tours help customers get more from Energy Services

Suppose there was a tool utilities could use to improve their operations, the bottom line and customer service, free of cost, from the convenience of their own offices. That is a good description of Western's Energy Services Web site, as customers in Western's Desert Southwest region have recently been discovering.

Letting customers know about the many resources and benefits Western's Energy Services program provides is all in a day's work for Energy Services representatives. DSW Representative Dewey McLean frequently attends customer meetings to discuss the products and services available to utilities through Western. "I started using the Web site as a way to make the presentation more dynamic," McLean said.

The Web site is the most cost-effective and convenient way for customers to access Energy Services, so McLean decided to make it the focus of the presentation. He teamed up with DSW Power Resource Manager Penny Casey to develop a tour through the Energy Services site. "It's a good way to meet the customers face to face and build relationships," said Casey.

## New resources

The tour begins with an introduction to the many features on the Energy Services site. "We familiarize them with the navigation, and visit all the different pages," McLean said.

Special Assistant for Operations Susan Lozier of Wellton Mohawk Irrigation and Drainage District said, "I've visited the IRP page when doing our annual planning, but I was surprised to learn how involved the site is and how deep it goes."

The Yuma, Ariz., water and electric provider recently hosted a Web tour, and a group of employees learned that Energy Services offered irrigation resources, too. Once customers get a feel for what is on the site, McLean asks about a specific issue the utility is facing. WMIDD, for example, is trying to improve its pumping efficiency.

Selecting "Energy Solutions" from the right hand menu, he searched on the key word "pumping" in the agricultural sector. The results included questions and answers on the subject and links to additional resources. One link to DOE's Industrial Technologies Best Practices Web site offered a downloadable Pumping Assessment Tool.

"I tailor the presentation to the customer's needs to show that the Web is a living tool they can use to educate themselves," he said.

## Tools stretch budgets

Energy Services publications have sparked a lot of interest as well. "Many customers weren't aware that they can order fact sheets branded with their logos to use as bill stuffers," said Casey.

For smaller utilities with limited budgets for consumer education, those resources can be a gold mine. High peak demands and high rates for supplemental power convinced the city of Needles, Calif., Public Utilities that it needed a residential conservation program.

McLean presented the Web tour for several officers, including Utilities Administrative Support Manager Anne More. "The main experience we had with the Web site was from technicians borrowing equipment from the Equipment Loan Program," she said.

They were pleased to discover fact

sheets on residential conservation that were perfect for the developing program. "It will absolutely help to extend our outreach program."

## Western learns

McLean estimates that he has given about 30 Web site tours, both to individuals and to groups. The presentation is not targeted at any one type of customer. Even Web-savvy utilities with extensive sites of their own could learn a thing or two. "It doesn't matter if the agency is large or small, they'll find something they need that they didn't know was there," said McLean. "If people don't know what Western's Energy Services program has to offer, they don't think to visit the site when they have a question."

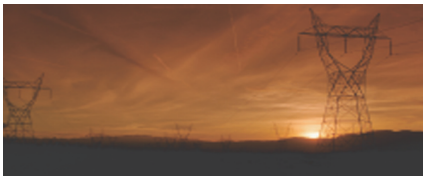
Casey agrees that the hands-on tour is the best way to get customers to use the Web site. "Dewey did the same presentation in-house without the Web site," she recalled. "Seeing the pages and working with the different tools made a 100-percent difference."

Walking customers through the Energy Services Web site has helped Western, too. Over the past year, the Westernwide Web site has been undergoing a transformation to make it more user-friendly, and feedback from users is a critical part of the process. Each tour teaches us more about our customers' needs and how to use the Internet to meet them.

That information has been incorporated into Energy Services Web site's new look and new features. You can help Western continue to improve the site—and help your own business—by contacting your regional representative to schedule a tour. ⚡

Want to know more?

Visit [www.wapa.gov/es/pubs/esb/2005/oct/oct0510.htm](http://www.wapa.gov/es/pubs/esb/2005/oct/oct0510.htm)



## TOPICS from the POWER LINE

### Sustainable schools good for students, districts

*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.*

#### Question:

Our school district is in the siting phase for a new high school. Do you have information about the importance and benefits of an efficient building?

#### Answer:

For most school budgets, operating costs are second only to salaries, so designing an efficient building that also enhances occupant comfort and learning can yield significant savings. Additional considerations only make sustainable building more attractive:

- Recent studies have shown a strong connection between daylighting and learning. Natural daylighting and passive solar design provide better learning environments and conserve resources, while reducing utility bills.
- Indoor air quality is a major issue for many buildings. Using non-toxic materials can reduce indoor air toxins that, if not controlled, can result in expensive and disruptive remediation or even total loss of the building.
- Energy efficiency and more sustainable practices are gaining

importance and can have very positive impacts on the life-cycle cost of a project.

- Wildly fluctuating energy costs wreaked havoc on many operating budgets in the past, and are likely to do so in the future since energy supply/demand and cost tend to be cyclical.
- In most areas of the country, the number of voters without school-age children far outnumber those with them. A project that benefits the whole community—by providing or maintaining local jobs, for example—may be more appealing to more voters.

Depending on specific features chosen, the technologies can also provide educational opportunities, making them even more beneficial to schools.

- Xeriscaping, a landscaping practice that saves water and protects the environment, illustrates lessons in plant biology, geography and climatology.
- Green roofs can mitigate storm-water run-off, while providing science lab opportunities.
- Renewable energy resources can provide uninterruptible power supplies for computer systems and demonstrations for science, physics and engineering classes.

It is critical that key players agree on what type of facility they want

at the beginning of the project. If you decide on a high-performance, resource-efficient building that uses sustainable practices, the next task will be finding an architect who is also dedicated to those practices. Start by talking to school districts that have already built this type of facility.

All of this can seem almost overwhelming when the need to build a new school is immediate. Fortunately lots of help and information are available, including the articles and case studies listed below. Since you're in the early planning and siting stage, the list focuses on this stage and on the benefits of building a resource efficient school.

### Articles and fact sheets:

*Green Development* — Guiding principles for green development, case studies, financing tools and more from US DOE's Smart Communities Network.

*Greening Federal Facilities* (pdf) — The Federal facility manager's resource guide covers reducing energy consumption and costs, improving the working environment and reducing the environmental impact of operations.

*Ten Shades of Green Exhibit—Architectural Perspectives: Ecological, Technical, Social, Cultural, Psychological and Economic* - Examples showcase various aspects of green buildings: low energy/high perfor-

*See POWER LINE, page 14*

Want to know more?  
Visit [www.wapa.gov/es/pubs/esb/2005/oct/oct0511.htm](http://www.wapa.gov/es/pubs/esb/2005/oct/oct0511.htm)



# Energy Shorts

## Energy efficiency gets cheaper

The cost of energy conservation has dropped by more than half in the last decade, according to a new report from the Northwest Power and Conservation Council, a four-state agency charged with ensuring affordable, reliable hydropower.

Conserving an average megawatt of electricity cost \$3.9 million in 1991. The price for that same megawatt has dropped \$1.6 million today. The figures came from surveying regional utilities, calculating savings from new state and Federal energy codes and adding sales of energy-efficient appliances and machinery.

The survey found that saving energy was cheaper than ever, and that the amount of energy saved increased as the cost of saving dropped. Bonneville Power Administration and its utility customers spent almost \$180 million on conservation in 2004. Tougher Federal standards and tightened state energy codes saved about 550 MW each.

More savings are possible, the report concluded, now that investments in conservation yield more than twice the energy efficiency than they did 15 years ago. The council's regional power plan predicted that about half the electricity the growing region would need over the next two decades would come from energy conservation instead of new powerplants.

## LEED for Homes

The U.S. Green Building Council announced the launch of a one-year pilot program to demonstrate its newest green building rating system, LEED for Homes.

The voluntary Leadership in Energy & Environmental Design for Homes Rating System will recognize and reward the top 25 percent of green home builders for environmentally sound construction. New homes built to the LEED standards will use less energy, less water and fewer materials and provide improved indoor air quality and improved controls of pollutant sources.

Pennsylvania's Executive Order 1998-1 to "incorporate environmentally sustainable practices into [Executive Agencies'] ... operations."

## College goes solar

The Butte-Glenn Community College in Oroville, Calif., recently commissioned a 1.06-MW, on-site solar generating system. It is reported to be the second largest at a community college in the nation.

The 5,700-panel PV array is ground-mounted on a four-acre field. It will generate 1.6 million kWh annually, and real-time data will be posted to the Web and an interactive kiosk on the college campus.

The college estimates that the system will reduce its utility bills by \$300,000 annually. It prevents 1,238 tons of carbon dioxide, 870 pounds

of nitrogen oxide and 21 pounds of sulfur dioxide from being released into the atmosphere each year.

Pacific Gas & Electric's self-generation incentive program gave the college a rebate of \$3.7 million toward the system's total \$7.4 million price tag. The program helps utility customers offset the costs associated with installing solar, wind, fuel cell, microturbine or internal combustion engine cogeneration systems. ⚡

## Power Line

*from page 13*

mance, replenishable sources; recycling; total life cycle costing; access; place and community context; health and happiness.

### Case Studies:

- *Campus Greening* - A history of case studies on campus greening compiled by the National Wildlife Federation.
- Case studies of certified green buildings in the United States - The Green Resource Center compiles case studies of certified buildings and links to information on sustainable buildings. ⚡

Want to know more?

Visit [www.wapa.gov/es/pubs/esb/2005/oct/oct05es.htm](http://www.wapa.gov/es/pubs/esb/2005/oct/oct05es.htm)



## Technology Spotlight: When the flood comes, will you be ready?

by Johnny Douglass, P.E.

In the wake of Hurricane Katrina, it is a good time to remind ourselves that floods happen nearly everywhere, sometimes with cataclysmic results. A devastating flood has the potential to affect everyone, at least indirectly, whether they are located in the flooded area or not. Are we prepared to survive and make a timely recovery from it?

### Restoring electrical apparatus

Getting electric power back on is a top priority, and utility personnel from around the country are working night and day to restore power knocked out by Katrina's flooding. However, the wheels of industry and commerce will not turn until flooded transformers, motors and other electrical apparatus go through an urgent triage and are repaired or replaced.

Flooded motors and transformers will be sent all over the U.S. to be restored to serviceability. According to the Electrical Apparatus Service Association, even motors submerged in salt water may be restored if properly cleaned, dried and tested.

Owners must take the first step of trying to keep the windings flooded, or at least wet, until they can be flushed in clean fresh water. If salt water dries in a winding,

it is much harder to dissolve and remove the salt by flushing.

Utilities, industries, commercial facilities and electrical apparatus service centers need to know something about restoring flooded equipment. EASA provides several resources on its website, including two good articles on flooded motors by EASA Technical Support Specialist, Chuck Yung:

- *Procedure for Flushing Saltwater from Windings* describes how to construct a large washing tank from available materials to remove saltwater from windings. Even saltwater-submerged motors and transformers can recover if salt and other contaminants are flushed out and the equipment is properly dried before being tested and powered. Drying cannot happen in any reasonable time without heat, so the following article is critical to the process.

- *Field-Expedient Ovens* addresses how to construct a temporary oven to dry out large or multiple motors after flooding. The article also describes a method to determine when the windings are dry while the apparatus is still in the oven.

After the windings are dry, they need to be tested. *Insulation Resistance Testing: How Low Can*

*Megohms Go?*, by Tom Bishop, can be helpful. Other information on resistance testing in repaired motors is available in ANSI/EASA Standard AR100-2001. Select the "Industry Info" button on the EASA home page to download the recommended practices.

The EASA articles are intended for service centers swamped with flooded equipment. However, they describe ways to conduct tests of dryness and insulation integrity using commonly available materials. If service centers are backed up for weeks, major industrial facilities may be able to set up temporary "field hospitals" for flooded motors. However, this work needs to be at least supervised, if not performed, by trained electrical equipment service personnel.

### Before a flood happens

There are not a lot of ways to waterproof motor drive systems, but keeping critical systems on high ground can help to protect them. Here are some suggestions to help prepare for large or small equipment damage.

- Motor systems management software like MotorMaster+ can track motor inventory and identify in advance which motors are candidates for replacement if they become compromised. Be sure

See *TECHNOLOGY SPOTLIGHT*,  
page 16

Want to know more?  
Visit [www.wapa.gov/es/pubs/esb/2005/oct/oct05spot.htm](http://www.wapa.gov/es/pubs/esb/2005/oct/oct05spot.htm)

## Technology spotlight

from page 14

to back up these records in an off-site location.

- Multi-facility companies should store some critical spare parts at various facilities so they will survive a disaster that hits one facility.
- Determine if company service centers have a plan for restoring a large volume of flooded motors.
- Invest in a predictive maintenance program for motors

and transformers, including diagnostic equipment that assesses insulation integrity. This will provide baseline information on insulation condition and identify problem equipment that needs rewinding or replacement. It can also help improve equipment reliability even in dry times.

Not all catastrophes can be avoided, but you can lay the ground work in advance for your recovery.

**(Note: Douglass is a registered professional engineer with the Energy Services Clearinghouse.)**

## Calendar of events

Visit Western's regularly updated Energy Event Calendar for a complete list of seminars, workshops and conferences. <http://www.wapa.gov/es/pubs/esb/2005/oct/oct05coe.htm>