

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

Innovative ownership makes wind farm a good neighbor

The benefits of wind development to small towns and rural areas include a steady income for landowners who lease their property, increased property tax base, jobs and healthy home cooking—at least, that's what the Trimont Area Wind Farm did for its southwestern Minnesota community.

Shortly after the 100-MW wind farm went online in December, its operator PPM Energy and customer Great River Energy donated \$2,000 to help a volunteer-run restaurant buy the building it occupies. The Chocolate Moose Café, run by the Trimont Chocolate Festival committee, was a favorite lunch spot for construction workers building the wind farm.

Local business benefits

"Supporting the local economy is good for all of us," said PPM Energy

Communications Director Jan Johnson. "Besides, both the food and the sense of community at the Chocolate Moose are treasures."

"Great River Energy strives to be a strong community partner for economic development," said Great River Business Developer Tom Lambrecht. "Assisting the Chocolate Moose was a way to provide stability for a valuable resource to the Trimont area."

City officials were trying to keep local businesses afloat when they offered the empty restaurant space to the festival committee rent-free. Volunteers cleaned and decorated the old building, and a few paid employees and regularly scheduled volunteers now serve pancakes, pie and rib sandwiches to Trimont residents. The two-room restaurant also provides space for local meetings and family celebrations and catering service upon request.

Revenues from the café support Trimont's two-year-old Chocolate Festival. "It's an incredible event," said Johnson. "Last year, Garrison Keillor did a show from the festival and stayed afterward to sign autographs, in spite of the mosquitoes." Keillor was presented with a Trimont Area Wind Farm cap.



Sun sets over the Trimont Area Wind Farm. The facility is the largest landowner-developed, commercial-scale wind project in the country. (Photo by PPM Energy)

Grassroots spirit behind wind farm

The community spirit that rallied behind the Chocolate Moose also built the nation's first landowner-developed, commercial-scale wind project. When Great River Energy issued a request for proposals to develop 100 MW of wind power in 2003, a group of local citizens from Jackson and Martin counties responded.

A few farm families who owned several thousand acres near a Great River Energy generating station wanted to build their own wind farm instead of waiting for a company to develop the area and reap the profit. The group obtained agreements from about 40 landowners for the wind project, raised seed money, tested the wind and got permits.

See WIND FARM, page 2

What's inside

Ariz. fly ash	p.3
Peak-shifting cooling.....	p.4
Kansas City biotech	p.5
Colo. cooling rebates.....	p.6
Federal green power	p.7
Resort area utilities.....	p.8
Efficiency action plan	p.9
Wind simulator	p.10
Colo. RPS seminar	p.11

Wind farm *from page 1*

That hard work paid off when the landowners who formed Trimont Area Wind Farm LLC beat out 55 companies to win the Great River Energy contract. Their properties' proximity to Great River Energy's transmission lines helped the proposal. So did the fact that the landowners were customers of South Central Electric Association, a Great River member co-op.

"Working with a local partnership group is something that Great River Energy really enjoys," said Lambrecht. "This project will return numerous benefits to our members both financially and by meeting our alternative energy production goals using a local resource."

Partnership improves return

Once Trimont received the contract, members had a decision to make. "Our aspiration was to own the wind farm ourselves, but that came up against the reality of fund-

ing constraints," said Earl Cummings, president of TurningPoint Management, Inc.

Any form of leveraged debt would make it difficult to offer the wind farm's output at a competitive price, Cummings explained. "We decided that the project had to stand on its own—no grants or assistance other than the production tax credit," he said. "From our point of view, working with PPM gave us a similar rate of return to self-ownership, with a lot less risk."

So Trimont researched developers and approached Portland, Ore.-based PPM. "There were about six options, but PPM had the right kind of experience, and they were bullish on renewable energy," recalled Cummings.

PPM agreed to buy, build and operate the Trimont facility—67 towers on more than 8,500 acres with 100-megawatt total capacity. "From an interconnection and marketing standpoint, the project was ideal," said Raimund Grube, vice president of PPM WindPower. "It gave us a customer relationship with Great River Energy, which is really important in the Midwest, and the opportunity to enter into a community-based deal structure was intriguing."

The landowners get individual lease payments totaling between \$350,000 and \$400,000 per year. In addition, they will receive a share of the gross revenues received from the sale of energy from the project. "That's a percentage of the gross revenues that is not subject to PPM costs," explained Grube.

PPM receives the production tax credit and passes that savings on to Great River Energy.

Model for rural development

During construction, the project employed between 50 and 190 construction workers who supported the Chocolate Moose, among other Trimont businesses. The wind farm also created six full-time permanent jobs once it began generating in November 2005.

Meanwhile, the farms continue to produce crops as well as clean electricity that brings Great River Energy's renewable generation to 5 percent—halfway to its goal of 10 percent by 2015.

The TAWF business model may spread beyond a couple of southwestern Minnesota counties. Grube presented the case study to a member forum of the American Wind Energy Association in February. "We got a lot of questions," he said.

Cummings, whose first experience with wind development was the Trimont project, is now putting together similar deals for other rural communities. "The business model is ahead of its time in the way it improves the risk/return formula for individual owners," he said.

The project has been a great example of the role renewable energy can play in rural development. The infusion of revenue has helped Trimont's business community, as the Chocolate Moose Café's diners and operators would agree. ⚡

Energy Services Bulletin

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Arizona co-op cleans up with fly ash sales

Fly ash, a byproduct of burning coal to produce energy, can pose an expensive disposal problem for utilities with coal-fired plants, unless the utility is Arizona Electric Power Cooperative, which considers fly ash a marketable commodity with positive impact on its bottom line.

Years ago, the Benson, Ariz., co-op sluiced the fly ash from its Apache Generating Station into a landfill. But there are many costs associated with ash ponds, as the sites are called, said AEPCO Regulatory Affairs Manager Jim Andrew. "There's the cost of water for sluicing, and when a pond reaches the end of its life, you have to close the old one and build a new one," he said. "With the necessary environmental safeguards, closure and construction are very expensive."

Fly ash needed for concrete

Boral Material Technologies, a coal-combustion-product marketer approached AEPCO with a better idea: sell the fly ash to concrete manufacturers. Fly ash that meets the ASTM standard C-618, as AEPCO's does, makes concrete more durable, said Rick Hoelscher, utility services director for Boral's western and southwestern regions. "The spherical structure of fly ash causes little bubbles to form in the concrete," he explained. "Those air pockets keep hardened concrete from cracking when temperature causes it to expand or contract."

Boral pays AEPCO for fly ash, turning the former waste material into a source of income for AEPCO. "We enjoy the royalties, but the cost savings from eliminating disposal costs

are bigger," observed Andrew.

AEPCO's contract requires Boral to take 80 percent of the fly ash Apache Station produces. "We still keep a landfill for off-quality ash, but very little fly ash goes into it," said Andrew.

Quality maintains value

Several factors affect the quality of fly ash, said Hoelscher, starting with the collection method. "Once fly ash gets wet, the structure starts to change and it's no good for concrete," said Hoelscher.

Like most coal plants more than 30 years old, Apache vacuumed up its fly ash and sluiced it out to the holding pond. Boral had to change Apache's collection system from wet to dry.

Different types of coal produce different quantities, as well as quality of ash. High carbon content will ruin concrete, so the combustion process must burn as much carbon as possible. This presents a challenge, since running a cooler flame reduces the amount of nitrous oxide, a greenhouse gas, in plant emissions.

Maintaining the coal-grinding equipment is critical. "The finer the grind, the more complete the combustion," Hoelscher stated. "Over time, the ball mill wears down and the grind gets coarser, so it has to be regularly checked and adjusted."

Fly ash uses, demand growing

Arizona is experiencing a construction boom so there is plenty of demand for the concrete additive. The growing interest in green building practices promises to keep the market healthy. "The fly ash content in



The Apache Station coal-fired powerplant produces thousands of tons of fly ash annually that AEPCO markets to concrete manufacturers. (Photo by Boral Material Technologies)

concrete counts toward the recycled content credit for LEED certification," said Hoelscher.

The building industry has discovered that fly ash improves the performance and cuts costs of other construction materials besides concrete. Fly ash is a component in roofing tiles, carpet backing, wall board, siding and paver bricks. Different grades of ash are also finding use in road construction and even plastic piping.

The list of utilities turning waste into profit is getting longer, too. Boral currently markets fly ash for more than 30 electric utilities, including Tri-State Generation and Transmission's Craig and Laramie River stations. Fly ash from Great River Energy's Coal Creek Station is a key component in Flexcrete aerated concrete.

Utilities interested in moving fly ash out of their waste stream and into the growing market place can contact the American Coal Ash Association. As AEPCO has shown, it's hard to find a better win-win solution for a utility, its customers and the environment. ⚡

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California utilities test peak-shifting cooling technology

California's efforts to shave the state's peak demand may get some help from an innovative ice-based energy storage unit Southern California Public Power Authority is testing in partnership with 11 of its member utilities.

The Ice Bear, manufactured by Ice Energy, LLC, can be used to expand an air conditioner's capacity, or perform load-shifting, as it does in the SCPA demonstration. The system makes and stores ice during off-peak hours using a building's existing air conditioning system. The following day, a 100-watt pump circulates ice-condensed refrigerant to cool the building during peak hours, when demand is high.

"The pump's motor is small compared to the compressor a conventional air conditioner would use to cool, so our kWh demand is lower, too," said Hector Gutierrez, a business account representative for Glendale Water & Power.

Unit tested in different applications, climates

Gutierrez coordinated GWP's participation in the project. The utility installed two units—one at the Glendale Sports Complex and a second at the Casa Verdugo Library. The cities of Anaheim, Azusa, Burbank, Los Angeles, Pasadena and Riverside and Imperial Irrigation District are also participating in the demonstration.

Burbank and Anaheim installed Ice Bears at city fire stations, and Los Angeles put units into a restaurant and a senior center. "We were looking for buildings with diverse applications,"

explained Ice Energy Vice President Randy Zwetzig. "Because SCPA covers such a large territory, the units were spread across a good cross section of climate zones, too."

Both the sports complex and the library have five-ton air conditioning systems, and are open seven days a week. The Ice Bear is sized to offset the load from five- to 10-ton cooling systems. "Conventional TES systems are water-based and designed for buildings of more than 200,000 square feet. Usually, they are custom built," said Zwetzig. "Ice Bear 50 is refrigerant-based, which is less expensive to implement and suited to smaller applications."

Ice Energy installed the systems, but licensed HVAC contractors can install a new unit or retrofit using industry standard practices and conventional tools. Burbank reported completing the fire station retrofit in two days. "It's easy to adapt the Ice Bear to conventional HVAC equipment," said Gutierrez. "The icemaker is the only additional part."

Maintenance is routine, he added. "Just check the water level once a year, and the manufacturer suggests adding tablets to prevent mineral buildup. No need for special training."

Peak shifting benefits customers

SCPA provided \$100,000 to purchase and install the systems. Funding came from California's public benefit charge to support technologies that promote efficient use, storage, management or distributed generation of electricity.



From left: Al Summerall and Randy Zwetzig of Ice Energy Co., join Glendale Water & Power Director Ignacio Troncoso, GWP Business Representative Hector Gutierrez and Scot Hicks of Ice Energy Co., to launch the Ice Bear pilot project. (Photo by Glendale Water & Power)

According to the California Energy Commission, air conditioners consume up to 70 percent of the state's electricity on hot summer days. A technology that can shift that load from on-peak to off-peak hours can lower costs to customers, observed SCPA Executive Director Bill Carnahan. "It's cheaper to save a kilowatt of power than build a power plant to produce a kilowatt," Carnahan said. "Ice Energy didn't have to do a lot of convincing for us to give it the go-ahead."

SCPA is working with its members to monitor the system's performance, and so far, the Ice Bear is "performing as expected." Anaheim's preliminary results showed a 95-percent reduction in the fire station's peak demand, and Gutierrez reported that the unit at the sports complex is on track to deliver comparable savings.

Zwetzig said that several SCPA members are considering rate structure incentives for the Ice Bear and looking at wider deployment to key accounts. If the demand-side management tool can help utilities tame their unruly air conditioning loads, the Ice Bear may just become California's new state animal. ⚡

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BPU helps Kansas City's biotech industry grow

Whether it means helping a locally-owned business get on its feet or bringing a large key account to town, economic development is an important part of a utility's business and one that Kansas City Board of Public Utilities takes seriously.

The municipal utility works with Wyandotte Development Inc. and Wyandotte County/Kansas City, Kan., Unified Government to attract new businesses and grow existing companies. The partnership's efforts support the Bioscience Initiative, a key component in the Kansas Economic Growth Act passed in 2004.

Making old property fit

BPU's experience serving the needs of medical and research facilities is helping Paul Sudhaker launch a new business, Midland Pharmaceutical. Sudhaker, a local resident with 20 years' experience in the pharmaceutical business, decided to start his own full-service firm to develop and produce products. "There's a lot of growth opportunity here that you wouldn't find in an area that the industry has already saturated," he explained. "The community is really pushing for it."

Sudhaker bought a property in 2004 that had been occupied by another pharmaceutical company. "The multi-acre site was larger than Midland needed," said BPU Economic Director George Powell. "BPU was ready to work with Sudhaker to shed some of the space and reestablish electrical service to the facilities."

The first step was evaluating electrical reliability, determining amperage requirements and obtaining service

voltage. BPU installed an on-site distribution system and updated transformers, wires and poles. An older building was demolished and another converted to warehouse space. Midland bought new equipment to replace some of the older lab equipment that was still on the premises.

Incentives to help startup

The upgraded electrical service will cut Midland's power consumption, and BPU's five-year, stair-stepped energy discount will help the new company control costs during the first critical years. BPU offers this incentive to new and expanding businesses with a minimum electrical demand.

New business accounts receive a first-year, 50-percent discount on their costs per kWh, less fuel. Small businesses must have a demand of 200 kW or more to be eligible, while the minimum demand for large businesses is 500 kW. The discount decreases by 10 percent each subsequent year.

Existing manufacturers must grow their demand by 20 percent to qualify for the program. Those with a 200-kW load receive a three-year, stepped discount. The five-year discount is available to companies that meet the 500-kW minimum.

BPU also helped Midland apply for a state sales tax discount for manufacturers, and WDI coordinated the state and local connections for an economic development training grant, sales tax abatement on new equipment and machinery and real estate tax abatements. Midland began production of generic prescription medicines in March.



BPU helped Midland Pharmaceutical reestablish electrical service and update of a former pharmaceutical facility. (Photo by Midland Pharmaceutical)

BPU aids hospitals

That experience and understanding is a valuable resource to other BPU customers in the industry. The University of Kansas Hospital and the University of Kansas Medical Center are expanding with BPU's help. When the hospital separated from the university, BPU rebuilt five feeders over a distance of about three quarters of a mile and split the service lines that fed the entire facility.

The collaboration will continue on the 50,000-sq. ft. heart center and supporting utility plant the hospital is building. The center is expected to open in fall 2006.

BPU is consulting with KUMC on the construction of its 250,000-sq. ft. Biomedical Research Building, also set to open this year. Because loss of power in such a facility could destroy years of research, KUMC views BPU's input as critical.

As the high-tech industry grows, so will Kansas City's need for reliable electric and water service, and providing that to the community is BPU's business. That, and economic development. ⚡

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Updated cooling rebate program targets commercial customers

Experience can be a great teacher for a willing pupil like Platte River Power Authority which recently updated its four-year-old cooling rebate program based on lessons learned.

The northern Colorado utility launched its Ka\$h for Kilowatts program in 2002 to offset growth in electric demand by promoting efficient, productive use of electricity. The cooling rebate component targeted the steady increase in the utility's summer cooling load, and the response outstripped Platte River's expectations almost immediately. The first year, more than 1,400 customers received rebates. Since then, the program has paid out \$1.4 million in rebates and shaved 2.8 MW off summer peak demand.

Large unit process differs

The majority of the 5,400 customers who received rebates turned out to be residential, even though the program was open to small and medium commercial customers. That was mostly because the incentive applied only to smaller units, said Marketing and Community Relations Manager Jon Little. "The cut-off was at about 21 tons," he said. "We figured that the larger units were better handled under the Energy Efficiency Program because it had more stringent standards."

Platte River's EEP targets commercial and industrial accounts with incentives for lighting, motors, heating and cooling and mechanical systems. "It was a different application process than the cooling rebate program, one that was a lot more effort-intensive," said Energy Services Engineer Paul Davis, who manages the program.

And the more complicated the process, the less likely the customer is to go through it, program managers learned. C&I customers' participation in the cooling program was lukewarm compared to homeowners. Then energy prices started their sharp rise, and Davis and Little started getting calls. "Suddenly they had more money to spend on efficiency," observed Little. "That's when we decided it was time to streamline the program."

"The big units are pretty much the same, so the only thing the 21-ton distinction was doing was creating an obstacle for our larger customers," noted Davis. "Opening up the program to all sizes will make it easier for commercial customers to do something they need to do anyway."

Efficiency standards change

Changes in national efficiency standards offered another motivation for revamping the cooling rebate program. The Department of Energy revised its central air conditioning and heat pump specifications this year. As of January, 13 SEER became the minimum efficiency standard for residential air conditioning systems. "Our rebate started with 12 and 13 SEER units. Now that 13 SEER is the minimum efficiency, the rebate is for 14 and 15 SEER," said Little. "We also require that minimum EER levels be met. All qualifying equipment is included in the Consortium for Energy Efficiency's Residential Tier 1 or Tier 2 groups."

Platte River's annual customer survey showed that most people have been putting 10 SEER units into their homes, he added. "A lot of the market is new construction, and 10 SEER

has been the standard in the building industry," Little said. "Changing that market is very difficult."

Changing the program's focus to a market segment with a growing interest in efficiency is easier. The partnership network of local vendors is well established, although there are only a handful of commercial dealers in the area. "We made an effort to meet with them in person, since they had less experience with the program than residential dealers," Little said.

Otherwise, dealers are pretty familiar with the cooling rebate program after four years, he said. Each year, Platte River sends vendors a package with program rule updates, flyers and applications. "They are very supportive," Little acknowledged. "The higher initial cost of high-efficiency units means a bigger commission for them."

Utilities market program

Dealers do most of the marketing to consumers. The retail utilities Platte River serves—the cities of Estes Park, Fort Collins, Loveland and Longmont—help. "They promote the program with billing inserts, and customer newsletters. We all do a minimal amount of advertising," said Little.

Fort Collins and Longmont also promote the program with links to Platte River on their utility Web sites.

That strategy worked well for the first version of the cooling rebate program, so Platte River plans to continue it in 2006. And if marketing to commercial customers means learning a few new tricks, Platte River Power Authority is a quick study. ⚡

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Air Force leads Federal government in green power purchases

The Federal government's largest green power purchaser is also the Environmental Protection Agency's No. 1 green power partner.

The U.S. Air Force received a Green Power Leadership Award from the EPA and Department of Energy in October. The awards recognize individuals and organizations that are significantly advancing renewable energy development through green power markets.

In fiscal year 2005, 32 Air Force installations purchased more than a million megawatt hours of green power, a threefold increase over FY04. "Air Force purchases account for 47 percent of all Federal green power purchases," said Master Sgt. Michael Ward, spokesperson for the Air Force Civil Engineer Support Agency.

Renewables provide multiple benefits

AFCESA, located at Tyndall AFB, Fla., provides leadership and oversight of the Air Force's green power purchasing program. "Renewable energy improves security and reliability for the base and protects the environment," Ward explained of the Air Force's policy.

Dyess AFB, Texas, was the first Air Force installation to receive 100 percent of its power from renewable resources, and it was named Green Power Partner of the Year in 2003. Other facilities quickly followed the green power path, including several in Western's territory. Through its Renewable Resources for Federal Agencies program, Western has purchased both renewable energy and RECs for bases,

including Kirtland in New Mexico and Ellsworth in South Dakota.

The Air Force's program is not limited to buying green power. Currently, 10 bases have on-site generation projects active or under development.

The most recent project to come online is a 1.3-MW wind farm at FE. Warren AFB in Wyoming. Warren also bought green tags from Western, but the wind resources were too good to pass up.

Regional resources differ

The Air Force recently performed an evaluation of resources at all U.S. bases. The study showed many potential sites for renewable generation.

Regional industries can provide another source of renewable energy that helps both the bases and the surrounding communities. Poultry farms on the East Coast have waste disposal problems, said Jim Snook, AFCESA renewable energy program manager. "A couple of bases are working with developers to collect turkey and chicken litter to burn in generators. If the project goes forward, the bases get the renewable energy credit and a long-term cost break on power. It will also help to improve the water quality in the area."

Partnerships with developers have played an important role in advancing the Air Force's renewable energy program. "Developers have the technology, but often they don't have the money for construction," said Snook. "A long-term power contract with the government can help them secure financing. The Air Force gets the renewable attribute as part of the contract."



Warren AFB's 1.3-MW wind farm helps make the U.S. Air Force the Federal government's largest green power user. (Photo by United States Air Force)

Goals met, new goals set

A few weeks before the Green Power Leadership Award winners were named, DOE announced that the Federal government had surpassed the renewable energy goals set by Executive Order 13123.

The 2005 Energy Policy Act will be setting new goals for Federal agencies, however, and that may require some changes in the Air Force's plan.

What won't change is the Air Force's commitment to renewable energy. The new goals will only challenge AFCESA to make the wild blue yonder greener. ⚡

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Resort area utilities grapple with price of popularity

The mountains, deserts and beaches in Western's territory inspire people with their great beauty. Frequently, what people are inspired to do is build vacation homes that are occupied only a few weeks or months a year, posing challenges to the towns and utilities that serve them.

One solution to the difficulties large homes with part-time occupants create for the usually small towns is to limit the size of home that can be built in the area. That is exactly what officials are considering in Pitkin County, Colo., where the resort towns Aspen and Snowmass are located.

Houses create demand

Capping the size of houses at 15,000 square feet will help to control growth, said County Commissioner Mike Owsley. The county currently limits homes to a maximum of 5,750 square feet, but owners can get around the rule by purchasing transferable development rights. Owsley noted that Pitkin County gets one or two requests each year for homes exceeding the proposed limit.

"Houses that size have an impact on county infrastructure that is far greater than just the house alone," he said.

Phil Overeynder, public works director for the city of Aspen, understands the need for controlling growth. "Most of the vacation homes are outside town so they get electric service from Holy Cross [Energy], but we still have to extend water service to them," he said.

Uneven load

Aspen Electric Utility serves 2,600

meters within the city limits, while Holy Cross provides power for the rest of Pitkin County. Many of Aspen's customers are commercial, and, "About 70 percent of our base is less than full-time use," said Overeynder. "I can tell when everyone is in town because the load goes way up. That's in the winter—especially Christmas week—and around the Fourth of July."

The demand for vacation properties in Aspen has led to tearing down permanent residences with good load factors, and replacing them with vacation homes with a poor load factor. "We end up spinning power for non-occupants—people who are only going to want power on peak," Overeynder pointed out. "How you charge for that is an issue. You don't want one user group subsidizing another."

The municipal utility's answer is an inverted block rate. Customers using up to 700 kWh pay the lowest rate. The average user—between 700 and 2,000 kWh—pays a slightly higher rate, and those with more than 2,000 kWh pay the most. "Large residences use much more power than smaller ones, even when no one is home," the public works director added.

More customers, more stability

The majority of the luxury vacation homes in Pitkin County get power from Holy Cross Energy, which serves about 43,000 meters. "Our members are mostly residential, with some fringe businesses," said Member Services Supervisor Stephen Casey.

Part-time residents do not have a significant effect on Holy Cross's larger,

more stable load. "You build infrastructure with full-time users in mind," said Casey, "so any time the system is being under used, it's less than efficient. It's a problem that all utilities have to deal with to some extent."

While Holy Cross does not have a special rate structure, it does have a minimum monthly service charge. "The policy is to discourage homeowners from stopping and starting service in part-time residences," said Casey. "Even if they are not occupying a house for a few months, they still need the electrical connection when they return."

Casey added that large vacation homes do not automatically represent poor load factors. "It is possible for one large home to use electricity very efficiently for four months, while half a dozen small homes could be inefficient all year," he noted. "Rates can be designed to encourage efficiency among all users, and that can be valuable for mitigating the environmental impact of generating electricity."

Commitment to environment

Both utilities are strongly committed to balancing customer demand with environmental protection. Pitkin County's luxury tax on energy requires homeowners who exceed Aspen's strict energy "budget" for new buildings either to install a renewable energy system or to pay a mitigation fee. The fees fund energy efficiency projects and renewable energy development.

See RESORT AREA UTILITIES, page 12

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Energy organizations make plans to encourage efficiency

The power industry truism that the cheapest kilowatt is the one you don't use may be even truer for consumers than it is for suppliers, so why are there still utilities and businesses that resist investing in energy efficiency?

This question has implications that extend beyond the energy market to the economy, the environment and national security. The Department of Energy and the Environmental Protection Agency are sponsoring an initiative to find answers and develop an Energy Efficiency Action Plan.

The goal of the action plan is to identify key barriers limiting greater U.S. investment in energy efficiency. The next step will be to develop strategies to address the barriers and compile business cases to demonstrate the value of energy efficiency. Once the plan is completed, participants will look for opportunities to put recommendations into practice and to promote the measures to others in their fields.

Experts span industry

A leadership group drawn from different energy industry sectors is spearheading the effort. Members include representatives from utilities, state regulatory agencies, energy services providers and consumer and advocate groups. An observers group culled from energy-related associations such as the American Public Power Association is also providing input and comment on plan development.

The common denominator for participation is expertise in energy

efficiency, said EPA Program Manager Stacy Angel. "We looked for people who have been leaders in energy efficiency for several years," she said.

"The diversity of agencies involved shows how broad and how important this issue is," said Energy Services Representative Ron Horstman. "The industry is coming to understand one of the guiding principles behind Western's Energy Services program—that energy efficiency is a resource."

Specific issues addressed

At its first meeting last December in Washington, D.C., the leadership group formed four working groups to develop specific work plans and products:

- **Energy Efficiency Program Best Practices** – One reason businesses are slow to adopt energy efficiency is a lack of knowledge about effective and affordable measures. This group will examine successful state and utility program models for residential, commercial, industrial, low-income and small business sectors.
- **Utility Ratemaking and Revenue Requirements** – Power suppliers, particularly investor-owned ones, may resist energy efficiency because it reduces their earnings. This group will identify cost-recovery strategies that have successfully removed financial disincentives to energy efficiency. Incentives that make energy efficiency investments as rewarding as capital investments will also be considered.

■ **Planning Processes** – Resource acquisition planning processes rarely incorporate energy efficiency and other customer-side resources.

This group will evaluate utilities' planning approaches and metrics for integrating energy efficiency resources into the process.

■ **Rate Design** – Rates do not encourage customers to conserve. Some regions are successfully using rate designs such as time-of-use or seasonal rates that more accurately reflect the cost of providing electricity and encourage customers to conserve. This group is collecting information on strategies to identify rate designs that motivate customers to save energy.

Plan to answer interest

The December meeting resulted in working group plans that set goals, outlined study methods and established a timeline. Facilitation teams will work with each group to prepare a report explaining the barriers to energy efficiency within its topic area and offering strategies to overcome those challenges. Reports will provide business cases for those approaches and resource lists of libraries and experts. Summaries and recommendations will provide direction for the next steps and completing the action plan.

The facilitation teams presented draft reports to the leadership group at a March 23 meeting. The partnership expects to complete the action

See ORGANIZATIONS, page 12

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EPTC wind farm simulator answers interconnection questions

Western's Electric Power Training Center and the National Renewable Energy Laboratory are developing a new tool to help power system operators understand how wind generation affects the grid.

A 50-MW wind farm simulator will be added to the EPTC's miniature power system this fall. Classes that will incorporate simulator exercises include Power Plant Operations, Realtime Operations and Reliability Readiness, Overview of Electric Power Systems and Fundamentals of Electric Power Systems.

"It will demonstrate the operational issues unique to wind-powered generation and how it might affect the system operator's job," said Instructor Brad Nickell. "This is the first training simulator of its kind in the country."

One-of-a-kind training

Like the wind farm simulator, the self-contained, fully-operational miniature power system is unique to the EPTC. The hands-on experience gained in the MPS sets it apart from computer-based training.

Live generators produce electricity, which is distributed over power lines to loads and substations that behave as if they are hundreds of miles apart and are monitored by real protection equipment. Every time a student operates a breaker, a real, physical contact is opened or closed. "Solving problems in real time, on a real system, is different from sitting in front of a computer screen," said Nickell.

Product of teamwork

Training opportunities were what

Western Renewable Resource Program Manager Randy Manion had in mind when he coordinated a meeting between the EPTC team and members of NREL's Wind Team out at the NREL's Wind Technology Site near Boulder, Colo.

The groups discussed the information they wanted to present and how they hoped to do it. From that brainstorming session came the idea for a simulated wind farm to give students experience with handling intermittent wind generation.

It was such a good idea that NREL, DOE's Wind Powering America Program and Western's Renewable Energy Program provided funding for the simulator. Design and equipment specification took about four months, with the entire EPTC and NREL staff participating in the design process. Nickell expects testing on the unit to run through the end of April, and installation at EPTC will take place over the summer.

The simulator was built from scratch, using off-the-shelf parts. The unit has controls that look like real wind plant controls, said Nickell. "Realism is the No. 1 priority," he declared.

Wind boom creates need

That realism will help answer questions that arise with each new wind farm. "Western's Rocky Mountain Region alone has more than 600 MW of wind interconnection requests on its books," observed Nickell. "Not all of those requests will become generation, but it shows that the resource is here to stay, and power operators need to know how to deal with it."



Employees from NREL's National Wind Technology Center in Golden, Colo., worked with Western staff to help operators understand how wind generation affects the grid. (Photo by National Renewable Energy Laboratory)

Nickell believes that another audience will be interested in the simulator, too. "Wind developers will be able to see how their facilities interact with the grid," he said, which will smooth the road to interconnection. "Too often in the industry, there's a disconnect between developers and utilities. The simulator can help both parties understand the process from the other's point of view."

The response to a preview of the simulator at a wind interconnection workshop in January suggests that both utilities and developers are ready for the simulator.

The good advanced buzz does not surprise Nickell and the rest of the EPTC instructors. Identifying utilities' needs and providing one-of-a-kind service to meet them is what Western's Electric Power Training Center does.



Want to know more?
Visit www.wapa.gov/es/pubs/esb/2006/apr/apr069.htm

Seminar prepares public for Colorado RPS

As rulemaking for Colorado's voter-enacted renewable portfolio standard nears completion, utilities are asking how Amendment 37 will affect their customers and their business. A group of energy industry experts assembled at Tri-State Generation and Transmission Association Feb. 22 to answer some of those pressing questions.

Western teamed up with a "Who's Who" list of renewable energy advocates to present "Under 2 MW Interconnection and Net Metering for Renewables: What Utility Decision-Makers Need to Know." Sponsors included Colorado Energy Science Center, the state Office of Energy Management and Conservation, Colorado Renewable Energy Society, Interstate Renewable Energy Council, Solar-Bound, Solar Electric Power Association and DOE's Solar Powers America.

Seminar meets need

"The passage of Amendment 37 is a wake up call to utilities," explained Peggy Plate, Energy Services representative for Western's Rocky Mountain Region. "The tax incentives are coming and ratepayers will want to take advantage of them. Power providers must be ready with interconnection standards and net metering policies."

Although organizers were anticipating rather than responding to a need when they planned the seminar, more than 100 people attended. Along with utilities representatives, the presence of renewable developers, facility managers and even a few homeowners pointed to a broad, growing interest in alternative energy systems.

Michael Haddorff, president of Collins Control and Electric, Inc. in Fort Collins, attended in hopes

of getting the big picture from the utilities perspective. "Contractors are really interested in making it work," Haddorff said. "The industry seems to have matured a lot since the last big solar push, but vendors are still concerned about whether or not this will last."

RPS locally, nationally

The daylong program examined the issues and challenges of integrating small renewable generators into the power mix. Speakers explained the history of Colorado's RPS, Federal and state regulations, safety codes and standards and rates and incentives. The OEMC has made the presentations available online.

Participants learned about the evolution of interconnection standards and net-metering rules from Rusty Haynes of IREC. Haynes recommended visiting the Database of State Incentives for Renewable Energy to learn more about how other states are addressing those issues. Other presentations provided background on Amendment 37, explained FERC regulations, looked at net-metering provisions in EPAct 2005 and offered a case study on overcoming utility objections.

Colorado's two investor-owned utilities, Xcel Energy and Aquila, discussed their plans to comply with the RPS. For example, Xcel plans to net meter projects up to 2 MW, installing a single meter on projects generating 10 kW or less. Those systems will receive an upfront incentive of \$4.50 per watt. Systems of 10 kW to 2 MW will be dual-metered and receive a two-part incentive—\$2-per-watt in upfront capital, and a dollar-per-watt REC or energy payment over a 20-year contract term.



Incentives will encourage consumers to build small generation systems. Utilities must be ready for those systems with interconnection standards and net-metering policies.

Public power policies

Representing the municipal and cooperative viewpoints were Colorado Springs Utilities, Fort Collins Utilities and Platte River Power Authority. Springs Utilities launched a pilot program available to the first 50 customers to sign up before the end of 2007. Current participants include a middle school and two residential customers, with a new rebate program expected to attract more. Rate schedules are posted on the utility's Web site.

PRPA, which supplies electricity to Fort Collins, Estes Park, Longmont and Loveland, Colo., is not directly connected to any distributed generation systems. Member cities report grid-parallel generators in their territory and use their own discretion in purchasing power from systems under 50 kW. PRPA will purchase from 50 to 1,000 kW at avoided cost, and negotiates purchases greater than 1,000 kW. Longmont and Fort Collins are the only PRPA customers with net-metering policies.

Fort Collins developed a net-metering policy before A37 in response to customer interest. The city has five residential PV systems, one 10-kW commercial system and three commercial systems between 50 kW and 1 MW, for a total of 1.3 MW. The

See SEMINAR, page 12

Seminar *from page 11*

commercial systems are paid under a different rate structure than the residential systems, which are part of a pilot program to gather data on the benefits of distributed solar power.

Practical concerns

Ken Regelson of Five Star Energy Consultants talked about net metering as it relates specifically to solar. A 2002 Colorado law allows RECs to call dual metering net metering, but dual-metered customers pay more for their electricity than net-metered customers. That combines with the fact that many co-ops don't offer renewable system rebates to create the perception that consumer-owned utilities are unfriendly to PV. Regelson

recommended clearly defining metering terms for customers.

Another concern for co-ops is that member-owners without systems are paying for member-owners with net-metered renewable systems. Regelson suggested polling members to see if they would accept a small rate increase to support solar development.

Although solar got most of the attention because of A37's PV requirement and because the technology lends itself to cities and suburbs, wind development is an option for many rural customers. Jim Green of NREL's National Wind Technology Center noted that rural co-ops faced tight budgets and that no eastern Colorado co-ops offered net metering. Price signals to customers were often confusing, he added. However, given the economic development opportu-

nity wind offered rural communities, utilities would be getting requests and needed to clarify their policies.

A discussion of safety codes completed the program. Tom Basso of the Institute of Electrical and Electronic Engineers reviewed current rules for interconnection and talked about the changes needed to accommodate distributed generation. Like most other aspects of RPSs, procedures are still evolving and states are implementing them individually.

At the end of the day, the seminar may have raised as many questions for utilities as it answered. It will take time and cooperation for Colorado's power providers to work out the details of implementing the renewable portfolio standard, but knowing what the questions are is the first step to getting the answers. ⚡

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2006/apr/apr0610.htm

Organizations

from page 9

plan by summer. "Companies that weren't asking about energy efficiency a year ago are starting to express an interest," said Angel. "The sooner the action plan gets out there, the sooner the leadership group can reach out to those parties."

Horstman looks forward to seeing the final plan. "An effort that brings so many energy professionals together should create some great resources. Energy Services will welcome new ideas and strategies to help Western customers increase their energy efficiency," he added. ⚡

Resort area utilities

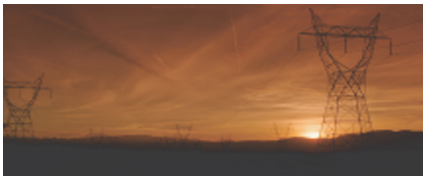
from page 8

Also, the new 3,000-unit affordable housing complex is a LEED project that the city would like to power with wind energy. Estimating the size of the purchase hasn't been easy, said Overeynder, because, "The average apartment of that size uses 700 kWh monthly, but the project managers think these units will only use 300 to 400 kWh."

Holy Cross members are enthusiastic supporters of renewable energy. The utility's voluntary offering consistently appears on

the National Renewable Energy Laboratory's annual ranking of top 10 utility green power programs. Customers can become Wind Power Pioneers or choose electricity generated by member-owned, small-scale hydro facilities or solar installations.

The tug of war between development and preservation is a fact of life in resort areas, but residents generally support measures like housing size caps and renewable energy programs, said Owsley. "People like to know that we are trying to protect what they moved here to enjoy in the first place." ⚡



TOPICS from the POWER LINE

Select the right heat pump for residential heating and cooling

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:

Do you have information about the efficiency of residential heat pumps? We plan to replace our existing system with an air-to-air heat pump for heating and air conditioning. The house is about 1,200 square feet and 14 years old.

Answer:

One of the best sources of information on energy-efficient appliances is the American Council for an Energy Efficiency Economy. Their publication Consumer Guide to Home Energy Savings is quite useful. It provides some selection guidelines and shows the make and model number as well as the heating and cooling efficiency of the most energy-efficient heat pumps available at the time of publication.

For heating and cooling equipment, the most popular source of product information is the Air Conditioning and Refrigeration Institute's Directory. The information comes from independent testing labs, so it should be useful in comparing one brand to another. The air-source heat pump section alone is almost 600 pages. The directory is available in many libraries, including ours. You

will find the information you are looking for in the Unitary Directory.

If you provide the specific capacity and configuration of equipment you are looking for and the brands you are considering, the Power Line could search this for you and send you the most relevant pages. The directory also includes instructions on using the energy ratings in making energy savings comparisons.

Another source of information is the EPA's Energy Star Residential Heating and Cooling Program. Although much more limited in scope than the ARI directory, it contains useful information.

Additional resources

The following publications will provide further information for your own research:

- ASHRAE's *Green Tips* (276K.pdf) A list of 29 sustainable design elements for building designers that includes a description, pros and cons, applicability, key elements of cost and additional resources. A resource excerpted from the ASHRAE GreenGuide.
- *Ductless, Mini Split-System Air-Conditioners and Heat Pumps* DOE's Consumer Guide on non-ducted heating and cooling systems, which are small and flexible units for room conditioning.

- *Earth Comfort Updates*: Current and archived issues of the Geothermal Heat Pump Consortium's newsletter
- *Energy Efficient Home Cooling, a factsheet by Western Area Power Administration* (152k pdf) Choosing an air conditioning system is an important decision. The best system depends on your climate, cooling needs and the design of your house. ⚡

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/2006/apr/apr06coe.htm>

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2006/apr/apr0611.htm



Energy Shorts

Illinois Rural Electric Cooperative named wind co-op of the year

DOE announced Feb. 17 that the Illinois Rural Electric Cooperative won the 2005 Wind Cooperative of the Year Award. The utility was cited for its leadership, demonstrated success and innovation in its wind power program.

The member-owned utility in Winchester, Ill., is the first co-op in the state to install a wind power project. IREC serves more than 10,000 consumer/owners throughout 10 western-central Illinois counties.

Federal and state funds partially financed the 1.65-megawatt project, which was completed in May 2005. Highlighting the project's potential, a recent wind resource assessment indicates that Pike County, Ill., could support as many as 100 projects of this size, adding as much as \$7 million to the local tax base.

Sponsored by DOE's Wind Powering America effort, the National Rural Electric Cooperative Association and the Cooperative Research Network, the award was presented at the opening session of NRECA's TechAdvantage 2006 Conference and Expo in Orlando, Fla. The Illinois co-op was one of six rural member-owned utilities nominated this year.

Geothermal power plants moving ahead in Idaho and Utah

Geothermal power development will get a boost from two contracts to purchase power from a new 10-megawatt geothermal plant in south-central Idaho and a new 42-megawatt plant in southwest Utah.

In Idaho, U.S. Geothermal entered into an agreement with Ormat Nevada, Inc. for engineering, procurement and construction on its first 10-MW powerplant at Raft River, with an option to build two more plants at the site. U.S. Geothermal signed power purchase contracts with the Idaho Power Company for three 10-megawatt geothermal power plants.

PacifiCorp signed a 20-year agreement to purchase the output of a 42-megawatt geothermal electric plant near Cove Fort, Utah. The project is anticipated to be on line before Dec. 31, 2007.

Amp Resources LLC will develop, own and operate the project which will be built on the site of a smaller geothermal plant the company acquired from the Utah Municipal Power Agency and the city of Provo, Utah.

The Cove Fort project was selected as part of a request for proposals PacifiCorp issued in February 2004 to acquire up to 1,100 megawatts of renewable resources. In response,

PacifiCorp received more than 50 bids for some 6,000 megawatts of renewable energy projects including wind, geothermal, hydro, solar and biomass.

OEMC creates Colorado landowners small wind guide

The Colorado Governor's Office of Energy Management and Conservation unveiled its "Small Wind Applications Guide" at the Colorado Agricultural Outlook Forum in February. The tool for landowners interested in harnessing wind energy consists of a video and handout covering projects from 35 kW to 300 kW, rather than large-scale wind farms.

The video gives a virtual tour of a Colorado hog farm where electricity from a 65-kW wind turbine "blends" with generation from a methane digester. The Guide breaks the development process into three different phases. The first phase covers the feasibility study through assessing the site, energy usage, financing and other considerations. The second phase covers installation, and the final third phase discusses ongoing maintenance and measuring actual turbine performance.

OEMC received funds from DOE's Wind Powering America Program to help produce this video and its handout. Download the guide for free at the OEMC Website.

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2006/apr/apr06es.htm

Arizona gets aggressive new RPS

With an eye on the state's abundant solar resources, the Arizona Corporation Commission recently passed a renewable portfolio standard requiring regulated electric utilities to generate 15 percent of their energy from renewable resources by 2025. The standard calls for renewable resources to account for 1.25 percent of retail energy sold in 2006.

Solar, wind, biomass, biogas, geothermal and other technologies qualify as "clean" energy under the rules, which also allow for new and emerging technologies to be added as they become feasible. The Commissioners also included a distributed energy requirement starting at 5 percent of the total portfolio in 2007, and growing to 30 percent of the total renewable mix after 2011.

The current Environmental Portfolio Surcharge of \$0.000875 per kilowatt-hour will increase to \$0.004988 per kilowatt-hour to help offset the increased cost of meeting

the higher standard. The monthly caps limiting the total impact on customer bills will also increase from 35 cents to \$1.05 for residential customers. Nonresidential customers will see their cap rise from \$13 to \$39.00, and the cap for energy-intensive commercial users will be \$117, up from \$39.

The state's original renewable energy standards, called the Environmental Portfolio Standard, topped out at 1.1 percent in 2007. In a move to keep Arizona in the forefront of renewable energy development, the Commissioners voted to review the rules and consider a more aggressive standard in February 2004. The aggressive new standards are designed to encourage new generation and emerging opportunities.

DOE sets higher bar for dishwasher efficiency

Dishwashers must now be even more energy efficient to earn the Energy Star label. The Department of Energy recently released more stringent energy-efficiency criteria for

Energy Star dishwashers that could save American families more than \$26 million a year. The new criteria will also give tax credits to manufacturers producing energy efficient appliances under the Energy Policy Act of 2005.

The new ENERGY STAR criteria require dishwashers to be a minimum of 41 percent more efficient than Federal energy efficiency standards. The standard will save more than 160 million kWh of energy per year, enough to light every household in Washington, D.C., for six months.

The new qualifying levels will go into effect on Jan. 1, and dishwashers that meet the criteria will be eligible for manufacturer tax credits under EAct 2005.

The Energy Star program is a joint effort of DOE and the U.S. Environmental Protection Agency. The Energy Star label appears on more than 40 kinds of consumer products. ⚡

The rising cost of steam

This column features helpful information, innovative equipment, systems and applications utilities around the nation can use to save energy and improve service.

With rising natural gas prices, industrial and large commercial facility managers and engineers are paying closer attention to the cost of generating steam. However, there can be confusion due to different understandings of what “the cost of steam” means. Here are some different ways to look at the cost of steam production:

- Total cost includes the combined cost of fuel, operating personnel, maintenance, water treatment, insurance, equipment replacement and payments on powerplant debt service.
- Effective cost is the cost of steam delivered to a process. This increases the total cost of steam by considering losses between the powerhouse and the point of use.
- Fuel-related cost considers fuel purchases divided by the quantity of steam produced.
- Fuel cost (in \$/1,000 lbs. of steam) is dependent upon fuel type and composition, unit fuel cost, boiler efficiency, feedwater temperature and steam pressure. This value can be particularly useful in tracking the efficiency of a steam system.

One fuel cost example

Steam Tables, published by the American Society of Mechanical Engineers, indicates that producing one pound of 150 psig saturated steam requires 1,078 Btus using 150° F feedwater. Under these conditions, with a natural gas price of \$8 per MMBtu (million Btu) and a boiler efficiency of 80 percent, the fuel cost of steam production is:
$$\begin{aligned} & \$8/\text{MMBtu} \times 1 \text{ MMBtu}/1,000,000 \text{ Btu} \\ & \times 1,078 \text{ Btu/lb.} \times 1,000 \text{ lbs} \times 100/80 \\ & = \$10.78/1,000 \text{ lbs.} \end{aligned}$$

Heat requirements for other conditions can be about 10 percent higher or lower, as shown on the DOE Tip Sheet, Benchmark the Fuel Cost of Steam Generation (pdf).

Improvements become cost-effective

The bad news is that the fuel cost component of producing steam has dramatically increased. The good news is that many improvements that can be made to steam systems are now cost-effective. For example, a DOE energy assessment in 2002 at an Illinois manufacturing plant recommended a \$70,000 boiler replacement that would have had a payback of 5.4 years. The Alliance to Save Energy now reports that the project would have a payback of only 3.7 years.

Resources for improving steam systems

DOE's Industrial Technologies Program has an extensive collection of technical resources available to help facilities improve their industrial energy system efficiency. Fact sheets, tip sheets, optimization software, case studies, workshops and more are available at no cost through the ITP website.

In response to rising natural gas prices, ITP recently launched Save Energy Now to help manufacturers cut their energy bills, particularly through steam and process heating system efficiency improvements.

Call the Power Line at 800-769-3756 for further technical assistance or submit your questions on-line. Western's Energy Services also offers many other resources on steam system efficiency. ⚡

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2006/apr/apr06spot.htm