

One report meets Minnesota utility's needs

Integrated resource planning by any other name is still a useful tool for forecasting energy demands, so in 2000, Western revised its IRP guidelines to give customers like Moorhead, Minn., Public Service the option of submitting its biannual, state-required Conservation Improvement Plan in lieu of an IRP.

Since 1991, the Minnesota Public Utilities Commission has required investor- and publicly owned electric utilities to spend 1.5 percent of gross operating revenues on conservation, energy efficiency and load management. "We take the CIP very seriously because the measures are good not only for customers and the environment but for business, too," said Moorhead Energy Services Coordinator Kevin Bengtson.

Focus on conservation

Under updated IRP guidelines, the CIP qualifies as a minimum investment report. Western customers required by state, tribal or Federal law to invest a mandated minimum in demand side management may substitute the MIR for an IRP.

The most current version of the CIP stipulates that utilities spend 65 percent of the funding pool on load management. Moorhead addresses this requirement with a dual-fuel, space heating program. Customers who install electric heating systems can receive a rebate for adding a backup system to use during peak generating hours.

The rest of the funding is earmarked for direct impact energy efficiency—programs that show energy savings. A popular lighting replacement program helped the utility to meet this requirement. Customers receive rebates for replacing conventional light bulbs with CFLs and phasing out T12 fluorescent fixtures with electromagnetic ballasts in favor of T8 lights with electronic ballasts.

Installing LED lighting in place of incandescent bulbs in exit signs is a big source of energy savings, too, said Bengtson. "If you replace a 30-watt incandescent bulb with LED technology, consumption drops to two to three watts, and those things are on 24-7," he noted.



Moorhead residents turned out to commission the first of the city's two wind turbines. Under Minnesota law, a utility can invest a portion of its mandated load management budget in renewable energy. (Photo courtesy of Moorhead Public Service)

CIP boosts wind funding

Renewable energy is a line item in the CIP's load management portion. A utility can invest up to five percent of those funds on renewable technology. Moorhead Public Service used that provision to help build wind turbines. "Our CIP budget helped us to cover the marketing and operating costs of the wind turbines, such as maintenance and insurance," explained Bengtson.

The "Capture the Wind" program launched in 1999 with "Zephyr," the first of two 750-kW turbines, 425

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Issues management involves Colorado Springs ratepayers

Recognizing that customer input is as critical to the planning process as it is difficult to obtain, Colorado Springs Utilities came up with a comprehensive public outreach plan to accompany the reevaluation of its 2002 electric integrated resource plan.

In the two years following the implementation of the EIRP, a number of events occurred in the city at the foot of Pikes Peak that needed to be factored into the long-term strategic plan. Among those changes, the municipal utility implemented demand side management programs. Newer forecasts indicated that peak demands projected to grow 43 percent were likely to increase only 31 percent. Drought conditions reduced the capacity of the Manitou Springs hydroelectric plant, electric load for the new Southern Delivery System pumping stations was postponed from 2006 to 2009 and the ground water well pumping load was eliminated. Finally, increasing air conditioning levels changed the forecasted electric load profile from a winter, cold weather peak load to a summer peak load.

Energy Services Bulletin

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

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

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Rethinking public outreach

One event more than others, however, changed Springs Utilities' approach to engaging customers in discussing issues about their electrical service: The Department of Energy chose the city as one of eight demonstration projects for the Clean Coal Power Initiative. During the application process, Springs Utilities hosted a few meetings and talked with ratepayers who showed an interest in the initiative—in other words, the power provider held a routine public comment period.

Then, as Springs Utilities Issues Manager Lisa Mills put it, "Surprise! We got the project. The media gave the award a lot of coverage, and suddenly, stakeholders started voicing concerns," she recalled.

The Clean Coal project was discontinued due to changing load forecasts, but it showed the utility the need to get customers involved in project planning as early as possible. "That's the time to find out what their concerns are and to mitigate them," stated Mills.

Mills, a member of the Issue Management Council, favored a systematic approach to public outreach. "Issues management is a process to find out what stakeholders know about a project and what their values are. It's a way to identify risks and options and track results," she explained. "It mitigates those surprise front page headlines."

Issues management gave Springs Utilities a way to build a stronger relationship with its customers, closing the gap between its policies and programs and ratepayer expectations. In 2001, the utility established the four-person issues management de-

partment, which Mill heads. Revising the EIRP was the department's first chance to apply the comprehensive approach to a long-range project. "The EIRP is a great opportunity for customers to voice their concerns and opinions about their power supply," said Mills.

Customers learn about EIRP

Before Springs Utilities could take the EIRP process to its customers, however, issues management had to take its plan to other departments. "Successful public outreach has to be an integrated effort," Mills pointed out. "Survey materials were developed, and technical advisors helped with presentations. It's important to enlist all the expertise in your organization."

Starting in January, Springs Utilities held the first of four public meetings where participants learned about the EIRP and discussed concerns and options, about the process and the plan itself. An early lesson to come out of the meetings, recalled Gail Conners, who was in charge of the EIRP outreach project, was, "Keep it simple. So we came up with a conceptual graph to illustrate what an EIRP is for."

The surveys Conners developed with the customer research department were designed to collect feedback from people who might not attend public meetings. The first—not a statistically valid effort—was to learn about customer values. The second determined what customers knew about renewable energy and the final survey asked about their comfort zone with rate hikes. "The last two were statistically valid. However, for the first survey, we got a total of 800 back," she noted. "There is no way to reach

everybody who ought to have input, but it was a good cross section.”

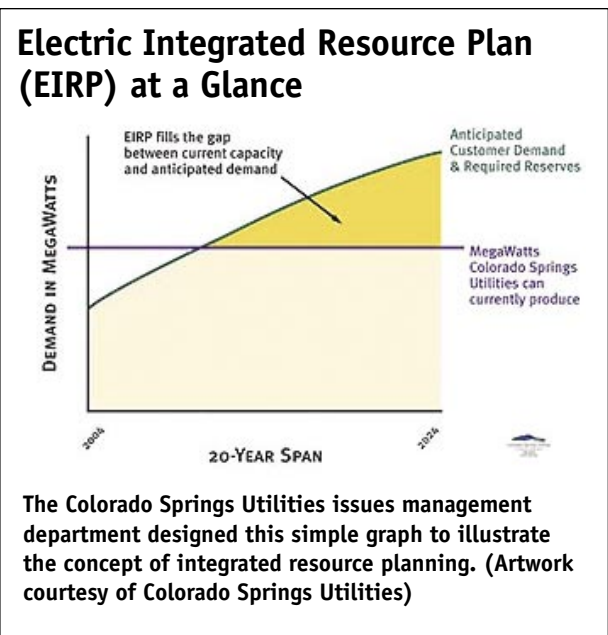
Springs Utilities ambassadors—employees who belong to outside organizations—circulated the survey among their groups. It was also posted on the utility’s Web site and inserted in a monthly billing. Conners interviewed individuals at community presentations to seniors, affordable housing managers and large commercial accounts, to name only a few groups. After the final public meeting in August, Conners and the customer research department compiled the findings to incorporate into the EIRP.

National recognition

The final issues management report goes into great detail, said Mills. “The challenge is to show stakeholders how their comments affected the analysis.”

Springs Utilities plans to submit its EIRP to Western in the first quarter of 2005, but the Issue Management Council didn’t wait to commend the utility’s public outreach efforts. “The council created a Special Merit Award for designing and launching an in-house issue management process,” Mills said proudly.

What really counts to Colorado Springs Utilities and its issue managers, though, is knowing that the process produced the best possible plan. “After thorough public participation, both our customers and Western



can see that we’ve chosen the best options,” said Mills, adding, “Kudos to Western for making the EIRP a requirement.” ⚡

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2004/october/oct041.htm

Minn. utility

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subscribers and a waiting list. The second turbine, named “Freedom” by program members, went online in December 2001.

Moorhead substitutes wind generation for coal power, which makes up about 35 percent of its mix. Combining the cost of the wind with its Western hydropower rate, the utility offers members a non-polluting product for an additional 0.5 cents per kilowatt. The low cost is a part of “Capture the Winds” customer appeal. The National Renewable Energy Laboratory ranks the green power program’s customer participation rate as the third highest in the country.

That may be putting the cart before the horse, observed Bengt-

son, since customer demand was one of the driving forces behind Moorehead’s wind development. “A lot of our customers come from farms with windmills driving water pumps. They knew we had the local wind resource and they wanted to use it,” he explained. “We’re also a very family-oriented community and people feel strongly about protecting the environment for their kids.”

Planning encourages evaluation

The state requires utilities to prepare a CIP every two years, while Western only requires an IRP every five years. That frequent exercise helps keep Moorhead’s conservation and renewable energy programs on

track. “We would be doing these programs anyway, but we probably wouldn’t be looking at the results in as much depth without the CIP,” Bengtson admitted.

Mandated planning makes utilities follow through on in-depth evaluation, which improves future as well as current programs. “If we see, for instance, that our load is 55 percent commercial and 45 percent residential, we may need to adjust our conservation spending to reflect that,” he said. “It helps us make sure that we use our customers’ money wisely.”

Since planning is the key to efficient use of resources—money, energy, electricity—Western supports it by any name. ⚡

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Planning gives Los Angeles head start on state RPS

The beauty of a carefully thought out plan is that it can prepare you for the unforeseen, the way the Los Angeles Department of Water and Power's 2000 integrated resource plan paved the way for the utility's voluntary compliance with the renewable portfolio standard California enacted in 2002.

As John Schumann, LADWP's director of power system planning and projects, explained, "The city could adopt a position mirroring the state standard without going back to add an entirely new component to the plan."

Instead, the municipality's IRP pointed the way forward in January 2004, when the mayor and the city council formally committed to incorporating more solar, biomass and wind energy into the utility's energy portfolio.

IRP predicts renewable need

Deregulation and a growing energy crisis were on the power industry's collective mind in 2000 when the Los Angeles City Council approved LADWP's IRP. The main objectives of the comprehensive blueprint included providing reliable service to customers at the lowest possible rates while demonstrating environmental leadership.

The IRP put forth a two-pronged strategy to meet those objectives. The first half, the installation of emission control equipment and a massive "repowering" program, aimed to increase the efficiency of 10 of the city's natural gas-fired powerplants. Over the last three years, the improvements have cut NOx emissions by 1,500 tons (about 70 percent). Repowering will improve efficiency by more than 30 percent and reduce the utility's expo-



The 533-MW, combined cycle Valley Generating Station is among 10 natural gas-fired powerplants LADWP is "repowering" as part of its IRP. (Photo courtesy of Los Angeles Department of Water and Power)

sure to natural gas price volatility.

The second part of the plan called for meeting 50 percent of the city's annual load growth through a combination of demand-side management, energy efficiency and renewable energy. "So, when the state set the standard of generating 20 percent of its power from 'green' sources by 2017, we were already working on ways to move in that direction," said Schumann.

Like most state portfolio standards, California's RPS targeted investor-owned utilities. Even then, Schumann added, "The RPS is a goal, rather than a requirement."

The bill did require local jurisdictions to enact similar programs to encourage renewable resources, subject to considerations such as rates, reliability, financial resources and environmental improvements.

City diversifies energy portfolio

At the time LADWP submitted its IRP, about three percent of the utility's power came from renewables, mostly

small hydro and digester gas. LADWP has since purchased an additional 1 percent, and has two projects in the pipeline that will diversify its mix and boost total renewable energy to 7 percent by 2008. The 120-MW Pine Tree wind project, now going through the siting process and environmental assessment, is expected to be commissioned in late 2005.

Earlier this year, the city council approved a contract to buy 40 MW of renewable energy from a biogas plant that will go into service in 2008. Owned by BioConverter LLC, the facility will use recycled green waste to generate electricity.

In late June, the city council passed a resolution recommending that LADWP report back with a formal plan to achieve the 20 percent by 2017. With an eye on reaching an interim goal of 13 percent of its load by 2010, LADWP issued an RFP in July to acquire up to 1,320,000 MWh of additional renewable energy.

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Large customer plans make up power supplier's IRP

Developing an integrated resource plan has a lot in common with putting together a jigsaw puzzle for the Colorado River Commission, which must balance the needs of small utility customers with full requirement end users.

The publicly owned utilities receive only a portion of their power from CRC, comprising 55 percent of the commission's sales. Each submits its own IRP directly to Western, and a copy to CRC.

Large retail customers, including six industrial accounts, consume the rest of the hydropower CRC sells. With individual customers that big, a power provider has to know what customer needs will be in order to plan for its own future supply. Each of the six companies prepares a five-year IRP that CRC combines into the single report it sends to Western.

The main energy issue to businesses is how much electricity is going to cost, said Hydropower Program Manager Malvin Ware. "It shifts the focus of planning from the resource mix to demand-side management," he observed. "Load management and conservation are areas where these customers have control—and have incentive to make changes."

Different conservation strategies

All six companies have a history of maximizing conservation measures as a matter of economic necessity. The use of electrical capacity and energy make up a large part of the raw material needed to produce their final products. Each company dedicates a portion of its budget to maintenance and operating costs to keep its equipment functioning efficiently. All

have benefited from infrared inspections, retrofitting lighting systems and replacing failed electrical motors with more efficient new units.

Beyond those general strategies, however, CRC's industrial customers used their 2002 IRPs to outline conservation measures specific to their operations. For example, chemical manufacturer Pioneer re-coated anodes used in production processes to reduce voltage. AMPAC, another chemical manufacturer, leases a cell line from Pioneer and factors that company's conservation savings into its own IRP.

To increase equipment efficiency at its Henderson, Nev., plant, Chemical Lime Company implemented a maintenance management program.

Basic Water Company, which supplies water to CRC's other industrial customers, updated pumping equipment, while Titanium Metals Corporation implemented a management procedure to reduce production cycles. Kerr-McGee Chemicals improved the operation of its electrolytic cell line, reducing its power requirements per ton of product. The chemical producer has also considered proposals for co-generation projects that would produce electrical power and steam for industrial plants in the area.

Drought hits pocketbook

Comparing the cost of electrical resources with demand side options is an ongoing process, so the pieces of CRC's planning puzzle are always changing. In addition to IRPs, customers submit monthly and annual load estimates the commission compares to estimated resources available and

makes recommendations, focusing on least-cost options.

Nature threatens to complicate this already intricate process by raising the cost of hydropower. "The recent drought brought the frailty of hydropower to light," Ware commented. "Long-term plans will have to look at known fuel sources to replace lost hydropower."

In the near term, load management-oriented IRPs have helped to protect customers from the affect of drought. "None of them have had to alter their plans," said Ware.

Interest in renewables grows

The drought may push forward CRC's effort to acquire or develop new renewable energy, as Southern Nevada Water Authority did when it adopted the state renewable portfolio standard. To help its only non-industrial retail customer reach the goal of 15 percent renewable energy by 2013, the commission is investigating a variety of advanced solar technology projects.

Those projects would represent the Colorado River Commission's first significant new renewable resources. "Due to the nature of industrial customers and small utilities and the reliability of hydropower, we haven't pursued alternative energy," said Ware, "but renewable resource planning is getting closer."

And when it arrives, Colorado River Commission should have no trouble fitting load management and renewable energy together to provide a diverse customer base with affordable and reliable electric power. After all, it has had plenty of practice putting together puzzles. ⚡

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Visit www.wapa.gov/es/pubs/esb/2004/october/oct043.htm

Polling supports NPPD wind power acquisition

Ask a simple question, and get a simple answer. Take a little time to explain the question, as Nebraska Public Power District did in its Deliberative Polling project, and the answer might be a little more complicated but a lot more useful.

As part of its long-term energy supply strategy to meet customers' future energy needs, Nebraska's largest public utility plans to add five percent renewable energy to its portfolio by 2010, if it can prove to have significant value compared to cost. Before pursuing that goal, however, NPPD management wanted to find out what the people who owned the system—the ratepayers—thought of the strategy.

Survey educates

"Past customer surveys indicated support for including renewable energy in our resource mix, but very few customers had signed up for our 'Prairie Power' program," explained Renewable Energy Development Manager Frank Thompson. "That disconnect led us to question our green energy offering."

Clearly, a survey stuffed in an electric bill couldn't answer that question, so NPPD began to look for a way to collect more comprehensive data. The information would have to come from a customer sample representative of NPPD's service area. It would also help if the consumers were knowledgeable about renewable energy.

Deliberative Polling seemed to offer an alternative to conventional surveys. The technique tests participants' opinions about an issue after they have had a chance to read,

think, discuss and ask questions of experts and advocates.

NPPD's use of the method in planning its energy supply strategy was significant for several reasons. It was the first new deliberative polling data on energy alternatives in five years and the first application by a publicly-owned utility.

The poll was also the first of its kind to be conducted in the Midwest and contained the highest rural sampling in such a study.

Recognizing the technique's potential value in the resource planning process, the U.S. Department of Energy supplied a \$55,000 grant through Western to help defray the cost of the in-depth approach. The Nebraska Energy Office and American Public Power Association also contributed to the effort.

Renewables compared to fossil fuel

Survey participants were selected through random calling and each completed a questionnaire on electricity issues over the phone. They were then invited to attend a day-long customer meeting to learn more about energy generation alternatives and share their opinions. Two weeks before the meeting, participants received a packet that introduced the issues to be discussed, defined useful terms and explained factors they needed to consider.

The meeting alternated between small and large group sessions. Participants had the opportunity to question an advisory panel that



A customer participating in NPPD's Deliberative Polling project poses a question about renewable energy to an expert panel. (Photo courtesy of Nebraska Public Power District)

provided diverse perspectives on energy, environment, costs, economic development and political views. Discussions centered on whether NPPD should continue, decrease or expand its commitment to renewable resources.

Specific projects to build 200 MW of wind power by 2010 and five MW of methane generated from animal manure over five years were offered as examples of renewable energy. Participants compared those resources to fossil fuel generation represented by a combined cycle gas plant and a coal plant using "best available control technology."

Tradeoffs change attitudes

With an eight-hour crash course in alternative energy under their belts, participants took another survey. The post-meeting polling showed that 96 percent favored adding 200 MW of wind power to NPPD's generation fuel mix and 37 percent thought the utility should add even more. "The overwhelming support for five percent of NPPD's energy from renewable resources by 'informed' customers was higher than anticipated," Thompson observed.

Also surprising was the strong preference voiced for blending

renewable energy into the resource mix as opposed to marketing green energy as a separate product. “In spite of their support for renewable energy, customers were not willing to sign up for a separate green energy product,” said Thompson. “The polling results put the slow growth of ‘Prairie Power’ into perspective.”

Pre- and post-event polling allowed NPPD to track shifts in participant’s attitudes. Initially, customers showed the most interest in wind and solar generation. After a discussion of tradeoffs with fellow customers and experts, wind was even more highly rated, but solar dropped considerably. Conservation was seen as an important strategy both before and after the meeting, while methane garnered more support once a variety of options had been examined.

Good publicity

The Deliberative Polling project proved that both utilities and their ratepayers can benefit from in-depth studies, especially when it comes to far-reaching issues like resource planning. On post-event evaluations, 93 percent of the participants said the experience was valuable. Many commented that they appreciated the opportunity to learn about renewable energy and offer input on their utility’s power resources.

NPPD’s board of directors factored the polling results into its decision to develop a 60-MW wind facility near Ainsworth, Neb. The utility also gained new insight into its green energy marketing program. “When it became clear that our customers wanted renewable energy in the mix, we decided to discontinue ‘Prai-

rie Power’ and save on marketing and administrative costs,” recalled Thompson.

As a bonus, the project resulted in positive publicity for NPPD. The announcement of the project received statewide coverage, and four television stations and eight newspapers did stories on the event. Nebraska Educational Telecommunications recorded the meeting and broadcast a one-hour program on the project at a later date.

Although in-depth polling is too time- and cost-intensive to use frequently, Thompson believes that utilities should consider it an option for large projects and long-term planning. “I think we learned as much from the process as our customers did about energy alternatives,” he said. ⚡

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Head start

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The city is more interested in projects in which it can retain ownership and operation of the facilities, and hopes that tapping new sources of energy will create jobs. “Ideally, the projects will develop local resources, then in Southern California, then those connected to LADWP’s transmission grid,” Schumann stated.

Mayor forms commission

Shortly after the RFP was issued, the Green Ribbon Commission held its first meeting. Mayor Jim Hahn appointed an advisory panel that

included city council members, commissioners, environmentalists, labor, academics, neighborhood council members and business leaders to move the development of Los Angeles’s RPS forward. City Councilman Tony Cardenas and LADWP Acting General Manager Henry Martinez are co-chairing the Green Ribbon Commission.

The panel will review acquisition plans, promote public participation and awareness of renewable energy sources and set milestones for integrating the RPS into the IRP. Its report, due in January 2005, will be incorporated in the utility’s recommendations to the city council in

February.

That draft will lay the groundwork for LADWP’s 2005 IRP. Schumann recalled that the municipal utility had hoped to revisit its IRP every two years. “With deregulation and the renewable portfolio standard, evaluation became more of an ongoing process,” he admitted.

But the experience undoubtedly prepared the Los Angeles Department of Water and Power well for the next round of planning, demonstrating yet another benefit of a good plan. Not only does it help you deal with the unexpected—it gives you a head start on the expected, too. ⚡

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2004/october/oct042.htm

Montanans learn about small wind interconnection

Interconnection brings more elements together than a mere power generator and the electrical grid—sometimes in a confusing tangle. At a meeting in Havre, Mont., in July, Hill County Electric Cooperative invited power industry officials to untangle the complex process for customers interested in developing small wind projects.

Experts answer questions

“We get a lot of calls from people who are thinking of installing small turbines to generate power for their own use, and maybe sell the excess to us,” explained Hill County Electrical Engineering and Operations Manager Rollie Miller. “We decided to take a proactive approach to educating our customers about the issues involved.”

“People hear that there is grant money available for development, and they rush into projects,” added Ed Weber, transmission system planning manager in Western’s Billings, Mont., office. “They don’t realize there are processes and procedures to follow.”

Weber was one of the speakers at the meeting, along with Member Marketing Manager Ron Rebenitsch of Basin Electric Power Cooperative. “We asked Ed and Ron to speak because they are known for their expertise in distributed generation and renewable energy,” Miller said.

A representative from Montana Electric Cooperatives’ Association was on hand to provide an overview on tariff policies, net metering and power purchases. MECA co-sponsored the seminar with Hill County Electric.



Upper Great Plains Transmission System Planning Manager Ed Weber explains interconnection requirements to Montanans interested in developing small wind projects. (Photo courtesy of Hill County Electric)

Nearly 100 people attended the half-day event, a crash course on the issues and procedures involved in becoming a power producer. The theme that tied the presentations together was that adding a connection is usually more complicated than just hooking the turbine up to the power lines.

Study shows project effect

A customer who wants to build a turbine and connect it to Hill County Electric’s system must go through an application process. The co-op charges a variable fee to evaluate the proposed system and study the impact the turbine will have on its plant. For a turbine producing less than 10 kilowatts, it is \$500. If the application process costs less, the co-op can refund the balance; however, if it costs more, the applicant will have to pay the difference.

A thorough evaluation process protects both Hill County Electric and its customers. “We want to en-

sure that our ratepayers don’t end up picking up the tab for the project,” Miller said.

“We have to ensure that the power is high quality, that it is not sending any noise into the system that could interfere with telephone or Internet service,” he added.

Safety is another issue the study must resolve. “If a turbine is not properly interconnected, it could generate back into high voltage lines, which could kill or injure a worker,” Miller pointed out.

More evaluation for larger turbines

Western shares many of the utility’s concerns and requires additional applications—with higher fees—for projects that put 150 kilowatts or more on the region’s system. “It can cause real problems for our workers if they don’t know that a generator is tied to a co-op’s system,” Weber declared.

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Building shows state's commitment to efficiency

The mission of North Dakota's energy efficiency and renewable energy programs is to promote energy conservation and efficiency, encourage renewable energy use and development, control operating costs and win awards.

The last two are results rather than goals that have come from energy efficient building projects like the Century Center building built by Workforce Safety & Insurance to house its main insurance operations and five other state agencies. "The anticipated cost of heating and cooling a much larger facility with natural gas definitely shaped our choice of technologies," admitted Energy Program Manager Kim Christianson.

As for the awards, Christianson and WSI Facility Manager Curt Zimmerman recently submitted an application to designate the Century Center an Energy Star building. Although not directly related to the office building, the Energy Efficiency Forum's 2002 Governor's Leadership Award recognized the commitment that made the project possible.

Larger-scale geothermal system

"The Commerce Department is a big supporter of geothermal technology, and this was a good opportunity to put it to work on a large-scale application," said Zimmerman.

At almost 116,500 gross sq. ft., the Century Center building is the largest North Dakota office building to use a geothermal heating and cooling system. State Park, a Job Service North Dakota service center in Bismarck and the State Historical Society at Pembina, N.D.



Large windows on the north face of Century Center wed aesthetics and efficiency by bringing natural light into the office building. (Photo courtesy of Steve Silverman, Grand Forks, N.D.)

The State Buildings Energy Conservation program has awarded grants to many state facilities installing geothermal systems. The Century Center project received \$34,600 from the program to cover a portion of the incremental system costs and the cost of engineering fees related to the geothermal site testing. "We wanted to make sure the system was a good fit for the building," Zimmerman said.

The system consists of 216 heat pumps controlling the temperature throughout the building and providing snow melting capabilities for the north side sidewalk. There are 11 zone-circulating pumps that circulate water to 286 geothermal wells that are divided into 22 zones. The zone-circulating pumps are programmed to stagger on and off, one at a time, according to demand.

When the coolant in the heat pump loop dips below 45 degrees F, or rises above 75 degrees, one or more of the pumps kicks on. "By cycling on demand, the zone-circulating pumps are able to transfer heat from the geothermal zones and transfer it to the building heat pump

loop," said the facilities manager.

When the heat pump loop is between the temperature parameters, the zone pumps shut off and the temperature is maintained by transferring the heating/cooling loads within the building, so the building balances itself.

As a result, the heating and cooling systems experience no hard seasonal switchovers, Zimmerman added. He cited low maintenance as another advantage of geothermal technology.

Heat recovery system

Century Center's air handling system works with the geothermal system to increase efficiency.

Located in the fifth-floor penthouse, the unit continually draws outdoor air into the building during occupied hours, and switches the direction of the air flow every 90 seconds during operating hours. Fresh air passes over stationary aluminum plates and the heat is transferred by exhausting indoor air over the same plates every 90 seconds. In the winter, the plates warm the

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Commitment

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outdoor air, reducing the amount of energy needed to heat the fresh air. The system works in reverse during the summer. Zimmerman estimates that the system is 80 to 90 percent efficient, and with only one moving part, requires minimal upkeep.

Controlling the HVAC equipment is an Andover software-driven energy management system. In addition to controlling the temperature on a room by room basis, the system manages the geothermal well pumps and generates activity reports. "Monitoring a system really helps to control electricity consumption," Zimmerman observed.

Efficient lighting

Lighting, a big electricity con-

sumer in any office building, is managed by a programmable lighting control system with low-voltage lighting switches and relay panels. Outdoor lighting is on the control system, too. At 10 p.m., lights in the outlying parking lot switch off automatically.

Using natural light not only reduces electricity costs, it improves employee morale and the look of the building. The architect joked that in the old building, many offices had posted "tornado shelter" signs outside the door. The building's north face includes a large glass curtain wall which houses breakrooms and employee work areas. A glass atrium in the facility's south side gives employees access to the third and fourth floors from the

middle of the building.

Total construction cost for the Century Center building was just under \$11 million. Energy saving features added approximately \$100,000, most of which paid for drilling wells for the geothermal system, said Zimmerman.

He estimates that the payback on the features will be five to seven years "That estimate may not have included avoided maintenance costs," he added.

Not bad for a public building that will be saving workers compensation premium dollars for many years to come, and not surprising for a state that plans for its energy future with programs today. "It takes long-term energy savings to manage long-term energy costs," said Zimmerman. ⚡

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2004/october/oct047.htm

Interconnection

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To eliminate safety hazards and to evaluate the impact of a project on the local and regional transmission system, Western has a two-part application process. The first step is to request interconnection with Western's transmission system. A written request from the developer launches a study on local issues affecting interconnection.

Paralleling the interconnection process, the transmission service request process addresses larger issues of moving energy across the region-wide network. Western's Open Access Transmission Service Tariff details the environmental

review required by the U.S. Department of Energy.

These measures ensure that the transmission line can handle the amount of power being put into it. Even if the generator's power input is less than 150 kW, Weber advised seminar participants to talk to their utility to make sure its lines can handle the transmission.

Outreach increases understanding

Feedback from the event has been very positive, according Miller. "We've gotten e-mail, letters and phone calls thanking us for hosting the seminar," he said. "It answered questions that people might not have known to ask."

The co-op's general manager and board of directors approved Miller's idea for the seminar last spring. Hill County Electric promoted it through radio and newspaper ads in Havre, and the Montana Farmers Union and regional agriculture and stock industry magazines ran announcements. "People from all over the state showed up," Miller said.

Although the thicket of issues surrounding interconnection may seem daunting, events like the Hill County Electric seminar ultimately encourage sound renewable energy development. Western and its customers are willing to work with anyone to bring projects online that meet the shared standards of safety and reliable transmission. ⚡

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2004/october/oct046.htm

Grocery stores get more energy saving tips from Power Line

Editor's note: Grocery stores often represent large commercial accounts for small electric cooperatives. In this second of two features, the Western-sponsored energy information clearinghouse provides resources and advice to help those consumers control operating costs.

In the August Energy Services Bulletin, the Power Line offered a menu of low and no-cost measures to help grocery stores save money and electricity on refrigeration, the industry's No. 1 energy consumer. Part II looks at advanced energy-efficient equipment and opportunities in other areas to reduce energy use.

Technology investment increases savings

Stores with the equipment budget to support major upgrades may want to look into additional energy-saving devices to boost refrigeration system efficiency. Ambient sub-cooling uses oversized condensers and an additional condenser to give more cooling to the refrigerant. It's like adding a larger radiator or an oil-cooler to your car. Oversized condensers can save from 1 to 9 percent of cooling costs.

Mechanical sub-cooling adds a small pump to boost the pressure of the liquid in a refrigeration system. During the refrigeration cycle, the refrigerant changes from gas to liquid. In the liquid stage, the pump increases the pressure to improve system capacity and efficiency. Sometimes called liquid pressure amplifiers, these devices can cut systems' energy use by as much as 25 percent.

HySave Refrigeration holds the patent on mechanical sub-cooling and also supplies the equipment. The technology has great savings potential,

but must be installed by a fully qualified refrigeration technician. Problems with leaking pumps have been reported, and the cost of replacing lost refrigerant can cancel out or even exceed energy savings.

Harnessing the byproduct of an electrical system to meet another energy need is the ultimate in efficiency. For every unit of cold a refrigeration system produces, it generates a greater unit of heat. A recovery unit added to the refrigeration system can capture heat as hot water or put it through a heat exchanger for heating in the winter. A 7.5-HP compressor is able to supply nearly 100 percent of the hot water in a medium-sized grocery store.

Efficient lighting for better displays

Lighting, the second largest energy-user in grocery stores, offers several opportunities to save energy and to improve product presentation and customer satisfaction. For best results, consult a lighting professional when designing or upgrading store lighting.

Many technologies save energy and improve lighting quality. The general rule in all applications is that new lighting is more efficient than old. Replace old fluorescent T-12 (1-1/2 inch) lamps and magnetic ballasts with T-8 lamps (1 inch) and electronic ballasts. Use compact fluorescents in place of incandescent bulbs. Compact fluorescent bulbs that work in coolers are now available.

Stores with high ceilings may consider metal-halide lamps with bi-level ballasts that allow the wattage and the lighting levels to be reduced when less light is needed. Avoid high-pres-

sure sodium lamps because they give off a pink or yellow color that doesn't enhance product displays.

Customers and storeowners both benefit from fixtures that tailor lighting to time of use. Walking into a brightly lit store at night can be overwhelming, even painful. At night, lighting can be reduced by as much as one-third without the customer noticing a difference. Many stores use fluorescent fixtures with three separately controlled bulbs. During the day, all three bulbs in the fixture are lit. At night, only two bulbs are lit, and if the store is closed during stocking, only one bulb is lit. This greatly reduces the energy requirements while maintaining worker safety.

Occupancy sensors offer relatively low-cost energy savings in rarely used areas where lights are usually left on. Offices, bathrooms, maintenance closets and storerooms are good locations for occupancy sensors.

Borrowing a page from the retail clothing industry, supermarkets can use spot lighting to attract customers to product displays and save energy in the process. It takes less energy to light adequately for safety and highlight products than to light everything brightly, as most stores do. Energy-efficient compact fluorescent lights can be used for spot lighting and spot reflectors can direct the light. This kind of light adds great effect for sales while reducing energy use.

Thanks to local utilities and the Web, there are many resources to help with energy conservation in lighting. Contact Western's Power Line for more detailed information about grocery store lighting, or visit Energy Solutions online.

See TIPS, page 15

Western support makes planning manageable

Whether a person loves to map out intricate strategies or dreads the mere thought of writing a simple outline, planning is a chore, so Western Energy Services offers resources to help busy customers complete their integrated resource plans.

The Energy Policy Act of 1992 mandated that every five years, Western customers had to submit a long-term plan to Western for securing and delivering safe, reliable, low-cost power to their ratepayers. The IRP process calls for all firm power customers to forecast their future electric power demand and thoroughly analyze ways to meet it. The goal of the program is to extend Western's existing firm power resource commitments, and to promote energy diversity and efficient practices.

In addition to the five-year plan, Western requires annual progress reports on the anniversary of the current plan's approval. Annual progress reports describe the customer's accomplishment of projected goals laid out in the action plan. Utilities using the small customer plan submit update letters measuring or estimating their achievements against small provider-tailored action plans.

Western changes requirements

Power providers found those first IRPs valuable for helping to evaluate resource acquisition and plan for transmission. The reports were also a lot of extra work for often understaffed cooperatives and municipal utilities. In 1999, Western began a review of the IRP program to deter-

mine how to streamline the process while still giving customers the benefit of thorough planning.

The updated requirements, established in 2000, acknowledged the diversity of Western customers' size and structure. For example, the revised regulations allow customers that belong to member-based associations to submit IRPs and annual progress reports either individually or cooperatively. In some situations, customers may set action plan timelines instead of five-year schedules.

In place of a complete load forecast, a utility can now provide a brief summary verifying that it has conducted one. Instead of providing methods of validating whether they met IRP objectives, customers can choose to submit a brief description of measurement strategies.

Under the revisions, IRP alternatives were simplified, too. Small customer plans meet Western's requirements for customers that sell or use less than 25 GWh per year. Utilities required by state, tribal or Federal regulation to have demand-side management, renewable energy or energy efficiency programs may be able to file those reports with Western in lieu of IRPs.

Online tools help

After revising the planning machine to make it more efficient, Western Energy Services came up with some useful tools to make the five-year overhauls easier. General energy services, such as Western's Power Line, publications, regional workshops and the Equipment Loan

Program, provide information and technical assistance to help customers develop plans and meet goals.

Long-term firm power customers can request IRP-specific, direct assistance from their regional representatives with the online IRP Assistance Request Form. General IRP assistance, including IRP review policies and procedures, privacy information, forms and checklists, are also among Western's IRP Resources and Tools.

A series of Microsoft Excel-based spreadsheets developed by Western makes annual IRP updates easier, too. Individual entities can use the IRP Annual Progress Reporting Spreadsheet. The IRP Annual Progress Consolidation Spreadsheet allows multiple-member entities such as co-ops and member-based associations to consolidate information from the Progress Reporting Spreadsheets their customers submitted.

Western created the spreadsheets for customers' convenience, but their use is not mandatory. Customers can report the required data in any format they choose, as long as it is submitted by the annual deadline.

There are a number of choices for securing low-cost energy, including investment in plants, power purchase contracts, transmission upgrades and renewable resources. Careful planning and regular evaluations help remove the guesswork, surprise and risk from the selection process. It's a big job, but Western helps customers do it right, because when it comes to providing power, certainty is always worth a little extra effort. ⚡

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2004/october/oct049.htm

Western shops for green products for Federal agencies

Things that are good for us can also be just plain good, as several Federal agencies concluded when they recently asked Western to issue Requests for Proposals to purchase renewable energy and renewable energy certificates on their behalf.

The green products will help the agencies comply with Executive Order 13123, directing Federal offices to increase renewable energy use to 2.5 percent by 2005, to reduce energy use 30 percent by 2005 and to reduce greenhouse gas emissions 30 percent by 2010. Renewable power could also help agencies manage their exposure to volatile energy prices and stimulate local development—the same benefits that private-sector businesses enjoy.

Western's Renewable Energy for Federal Agencies program is helping to spread those benefits and move the executive order's goals closer to reality, said Western Renewable Energy Manager Mike Cowan. "We've made presentations in partnership with the Federal Energy Management Program, distributed program brochures, posted program information on our Web sites and published articles on the program, and the agencies are coming to us," he said.

The Environmental Protection Agency asked Western to buy 17,375 MWh annually of renewable energy certificates for five offices in the Rocky Mountain and Sierra Nevada regions. Western's Colorado River Storage Project Management Center is seeking proposals to supply 66 GWh of green power to Sandia National Laboratories, Kirtland Air

Force Base and Los Alamos National Laboratory, all in New Mexico.

Greentags offer flexibility

The five EPA facilities face different power purchasing options. Western's one-stop, renewable energy service allowed the agency to meet each office's specific needs. "Access to retail transmission of renewable generation varies widely from region to region," explained Cowan. "Renewable certificates offer a multiple-office agency like the EPA a simple and cost-effective way to support green energy and meet its objectives.

Renewable energy certificates, or green tags, are the environmental benefits associated with generating one megawatt-hour of electric energy by a renewable resource. This option requires no transmission or ancillary services and makes no impact on the customer's existing power supplier.

Green tags also allow flexibility in choosing the characteristics of the renewable resources. Two offices specified that 25 percent of the power come from zero-emissions generation, the others requested 100 percent zero-emissions generation.

Proposals for certificates generated from Native American-owned renewable resources or renewable resources located on tribal property received favorable consideration. "A version of the Energy Bill that seemed about to pass included a provision requiring Federal agencies to purchase a certain percentage of Native American renewable energy," EPA Green Power Coordinator Justin Spenillo said. "Adding that specification to the request

seemed like a good way to support tribal economic development while getting a head start on a congressional mandate."

Customers help other facilities

The New Mexico request for proposals called for purchasing 26 GWh for SNL and KAFB, and 40 GWh for LANL annually for five to 10 years. Western accepted proposals from suppliers that could provide from 5 GWh annually to the total requirement of 66 GWh.

Solar, geothermal, biomass or wind technologies were eligible to compete for the contract. Proposals were expected to include both firm deliverable power and green tags. "Initially, the agencies wanted Western to purchase only firm power to encourage development of local resources," said General Engineer Sam Loftin.

However, Holloman and Cannon Air Force bases—two more facilities that wanted to participate in the proposal—could not accept power. "The other three agencies agreed to buy renewable certificates and sell them to the two bases to meet their Federal requirements," Loftin explained.

The flexibility of renewable certificates has helped to move Federal facilities closer to the goal of Executive Order 13123 and a greener future. As of March 2004, the Federal government was three-quarters of the way to meeting its 2.5 percent renewable energy goal. With support from the Renewable Resources for Federal Agencies program, Western will help take them the rest of the way. ⚡

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2004/october/oct0410.htm



TOPICS from the POWER LINE

Find solar technology and finance information online

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:

We are currently working on gathering some solar data. Do you have any information or resources on the following topics:

- Projected efficiency improvements for solar technologies, photovoltaic and concentrating solar (including dishes, troughs and power towers); and projected years for achieving those goals with continued research and development.
- Capital cost information for solar technologies mentioned above.

Answer:

The Power Line did an extensive search on emerging solar technologies and costs, and came up with several excellent resources that you should find useful.

U.S. DOE Office of Energy Efficiency and Renewable Energy Solar Energy Technologies Program gives an overview on developing solar technologies. Within this site, Photovoltaic Systems Technology Development addresses technology status and costs in a general way.

Check out Concentrating Solar Power and Sun Lab, a joint program of Sandia and National Renewable Energy Laboratories, focusing on activities in the area of concentrating solar power. Research and Development Advances in Concentrating Solar Power looks at technology improvements and costs.

An overview of equipment costs and business and market opportunities also can be found here. In addition, there is information about markets for CSP including capital costs on troughs, power towers and solar dishes or engines.

SolarPACES is the International Energy Agency's program for CSP economics and financing. Information specific to CSP plant costs is available at this site.

A U.S. DOE planning process produced the Trough Technology Roadmap. Technology roadmapping is a needs-driven planning process that helps identify, select and develop technology alternatives to satisfy a set of product needs.

Financial side of solar

Papers and presentations that examine the financial aspects of solar technologies are also available online. "The Commercial Path Forward for CSP Technologies," by Frederick Morse of Morse Associates, Inc., discusses the steps needed to bring

the technology to market. Morse is a consultant for government agencies and utilities on the application of and markets for renewable energy.

"Due-diligence Study of Parabolic Trough and Power Tower Technologies," by Hank Price for the National Renewable Energy Laboratory, is a PowerPoint presentation that includes capital costs for specific projects.

Presented at the 1999 conference, Renewable and Advanced Energy Systems for the 21st Century, "Parabolic Trough Solar Power for Competitive U.S. Markets" looks at what is necessary for large-scale parabolic trough solar powerplants to compete with U.S. state-of-the-art fossil power technology in a competitive U.S. power market.

Finally, Western's Renewable Energy Program Manager Randy Manion can provide technical support and expert contacts. E-mail him or call 720-962-7423. Manion also produces the Green Power and Market Research News, a newsletter about these and other renewable technologies for Western. It is available on-line at or by e-mail. Western's Renewables Web page also lists several resources. ⚡

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2004/october/oct0411.htm

Technology Spotlight: New heat pump technology won't freeze up

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

by Craig Meredith, P.E.

As the name implies, cold climate heat pumps are optimized for use in cold weather areas. This technology borrows from commercial refrigeration systems to maximize efficiency. The systems are capable of operating efficiently at outside temperatures far lower than standard heat pumps, and with a SEER

rating of 16, are almost as efficient as the geothermal variety.

The difference comes from a combination of technologies blended together to enhance performance. First, they use zero-ozone-depleting R-410, a refrigerant that is more efficient than R-22 and has a higher heat transfer rate. The compressor has two cylinders, two stages of compression, and a two-speed motor. This allows the system to run under a variety of conditions to optimize performance for the conditions.

An additional backup booster compressor operates when the

outside conditions are between 15 and 35 degrees F. An economizer is then added to allow it to work below 15 degrees F.

Finally, an intelligent control system senses the outside and inside temperature to determine the best operation mode for peak efficiencies. All of this comes together to make a high-efficiency heat pump for cold climates.

For further information about this technology, contact the Power Line at 1-800-POWERLN (1-800-769-3756) or submit your question online. ⚡

Tips

from page 11

Regular heating maintenance

The third-place energy user in a grocery store is heating, since the chilling effect of the refrigerated cases helps to cool the building in warm weather. As with the refrigeration system, regular maintenance is the key to keeping equipment running in peak condition.

One savings opportunity often overlooked is changing air filters. Restricted airflow reduces equipment efficiency and can cause major maintenance problems, not to mention potential health issues. Condenser coils on heat pump systems must be inspected and cleaned at regular intervals to maintain peak efficiency.

Economizers allow filtered outside

air into the building under the right conditions reducing energy used for heating or cooling. In the summer, for example, the store may be getting too cool from the effect of the refrigeration equipment. Instead of turning on the heating system, use warm outside air to heat the space.

Reward energy-saving habits

A grocery store is a unique blend of industrial equipment operated in a commercial environment. Store staff focus on selling products rather than maintaining that equipment. Educating the staff is the key to striking a balance between making sales and running an energy-efficient operation. A dollar of product sold is not a dollar of profit if it must be used to pay for wasted energy.

An easy-to-follow maintenance

program can help managers keep equipment operating at peak efficiency. Employee training should include simple energy-saving measures like turning off lights, closing doors, cleaning up spills in cases and properly stacking products in refrigerator cases. Enlisting the store's utility to take infrared photos of display cases is an effective way to demonstrate how stacking affects energy use and product temperature. Incentive programs that reward efforts to save energy are another good way to promote efficiency.

Even small steps can bring big rewards in controlling operating costs. In rural areas, where both independent retailers and power providers are struggling with shrinking customer bases, energy efficiency is an important tool for keeping local businesses healthy. ⚡

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2004/october/oct048.htm



Energy Shorts

Farm bill renewables amendment passes in House

The U.S. House of Representatives voted to restore FY 2005 funding for the Section 9006 program of USDA grants to farmers installing energy efficiency or renewable energy equipment.

According to the Solar Energy Industries Association, Section 9006 is substantially more solar-friendly as well. It contained a revenue-neutral amendment offered by U.S. Rep. Marcy Kaptur to shift \$8 million in funding from a USDA facilities account to Section 9006.

Because the 2002 Farm Bill authorized \$23 million to the program, a significant number of viable projects will not receive funding this year.

Aspen Skiing Company commissions micro-hydro project

At an Aug. 9 ceremony, Aspen Skiing Company threw the switch on a Pelton-type turbine at the bottom of the slopes near Fanny Hill, turning its snowmaking equipment into a 115-kW micro-hydroelectric plant. The generator will harness the water runoff from spring snowmelt and feed power back into the town's grid during the summer months.

ASC Environmental Services Director Auden Schindler said that the company started looking into the idea of a micro-hydroelectric plant

four years ago. It took six months to build the turbine at a total project cost of \$150,000.

If the first micro-hydro is successful, ASC will look at installing more systems in the Colorado resort area. "This is intended as a prototype for any ski resort," Schendler said.

And he has high hopes for the micro-hydro project. "We do have some awesome streams that explode in the spring," he said.

IID's geothermal use honored

The Geothermal Energy Association and the Geothermal Resources Council honored IID Energy with the Geothermal Excellence Award at their trade show and annual meeting on Sep. 1.

California's sixth largest energy provider earned the award for its outstanding efforts to promote geothermal energy use. IID Energy's 1,300-mile transmission network, the "Green Path," exports the renewable resource from its service area to energy providers throughout the West. The Green Path currently wheels energy from multiple projects in the Imperial Valley for CalEnergy and Ormat, two geothermal producers.

To meet growing customer demands, IID Energy is negotiating with CalEnergy to purchase approximately 200 MW of energy from the producer's Salton Sea Unit 6, now under construction. The new geothermal resources will put IID

Energy over its voluntarily adopted 20 percent renewable portfolio standard.

Renewables sales in 2003

Preliminary sales figures for Green-e certified renewable electricity in 2003 showed an 86 percent increase in total volume of certified renewable energy sales over the previous year, according to the Center for Resource Solutions.

The un-audited results indicated that more than 1.8 billion kWh of "green tags" were purchased in 2003—a twelve-fold increase over 2002. Utility green pricing sales also grew by 12 percent in 2003.

The verification numbers represent un-audited sales for 98 marketers selling 59 Green-e certified products in 2003. Renewable-generated electricity comprised 30 of those products, 23 were green tag products and 6 were green pricing products.

Green-e provides independent, third party certification to ensure renewable energy products meet strict environmental and consumer protection standards set by a board of environmentalists, consumer advocates and energy experts.

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/2004/october/oct04coe.htm>

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2004/october/oct04es.htm