

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

Madison, S.D., keeps demand response simple for success

Hot summer afternoons and cold winter mornings are a fact of life in Madison, S.D., and for many residents, so is the periodic—and barely noticeable—interruption of their water heaters, air conditioners and electric furnaces during those peak demand times.

The small municipal utility, a Western hydropower customer, has managed its load since 1984 to minimize expensive supplemental power purchases. Although the automated control system was upgraded in 2001, the program targeting residential consumers is a classic example of a demand response program, and a success. “And it is one of the few voluntary demand response programs around,” added Load Management Operator Tess Nelson.

Rewarding customers

Almost half of the utility's 3,800 electric customers participate in the



The city of Madison built this 10-MW powerplant as part of an agreement with Basin Electric Power Cooperative. The facility provides stand-by generation for the municipality and emergency power to Basin. (Photo by Madison Electric Utility)

program, and it was presented as a case study at one of Western's demand-side management webcasts in 2007. A key factor in the program's popularity is that Madison Electric Department shares the savings with participants. Customers who allow the utility to control one of the targeted appliances receive the following incentives:

- Water heaters—\$0.00500/kilowatt-hour (kWh) on monthly use between 50 kWh and 800 kWh with a maximum of \$3.75 per customer.
- Air conditioners—\$0.0125/kWh on monthly use from July through September between 300 kWh and 1200 kWh with a maximum of \$11.25 per dwelling unit on 220-volt air conditioner.

- Electric heat—\$0.02813/kWh on monthly use from December through February between 1,000 kWh and 1,400 kWh, with a maximum of \$11.25 per dwelling unit (4-kW electric heating system required).
- Off-peak use rates—\$0.0329/kWh for use that can be interrupted at the convenience of the city without advance notice to the customer.

A “dual fuel” incentive is also available to customers with an auxiliary heat source other than electric. This part of the program has seen the greatest increase in enrollment in the last year, likely due to rising natural gas costs. Most customers choose electric resistance heating systems, though air-source heat pumps are becoming

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Demand response

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more popular. “We don’t control those because they are too efficient, and the back-up furnace will be working on the coldest days anyway,” explained Nelson, who has one of the units at her own home.

Reasons to participate

Program enrollment remains steady with only bill stuffers, newsletter ads and word of mouth to promote it. The large number of rental units in the city is part of the reason, said Nelson. “Landlords who pay the utilities appreciate it, and the apartments that receive heating assistance are required to participate.”

The program has recently experienced an influx of new participants, noted Nelson. “People are looking to save money any way they can, and demand response is a painless way to control your energy costs,” she said.

Of course, no program is right for every customer, so Madison

Electric makes it easy for residents to pull out if they find load control to be too disruptive to their lifestyle. There is no contract between the utility and the customer, so the customer only has to call to discontinue participation. “It doesn’t happen much,” Nelson acknowledged. “People are very open to the idea of load control, especially when it saves them money and helps to keep electricity rates from going up.”

New system, local vendor

Any program needs to be updated occasionally if it is to continue to succeed, especially after 25 years in operation. Madison Electric gave its demand response program a technological facelift in 2001.

The auto-control system is based on set points, and operates around the clock to shed without manual intervention. “It’s all standard, off-the-shelf, load-management technology, intertwined with SCADA (supervisory control and data acquisition),” Nelson said.

On the consumer end, the equipment consists of radio control load switches and remote transmitter controllers from Converge Technologies Inc. With the help of contractors, the utility installed the switches over the course of about two years. A local company, Internet Energy Systems, handled the remote system, software and antenna design. Service wasn’t much of an issue, recalled Nelson, since IES does work all over the country. “But it’s comforting to know the vendor is right around the

corner if something does go wrong,” she admitted.

The city leaders were no doubt happy to keep a portion of the major purchase within the community, however. The \$275,000 price tag on the new system was a big investment for a small town, but a wise one. In 2007 alone, load management saved the city of Madison more than \$105,000. Even with about half of that money paying for customer incentives, the system has more than paid for itself.

Lessons learned

The strong vendor relationship that has worked so well for Madison Electric is limited to the automated control system. Unlike many utility incentive programs, Madison’s demand response program does not promote or rebate specific consumer appliances or systems. “At this time, the overhead would just be too high for us to absorb,” said Nelson. “We are doing some studies to see if it might be a possibility in the future.”

And there is no hurry to fix a program that is already working well for the city and its residents. With a quarter of a century of load management experience, the city of Madison has learned its lessons: Share the rewards with your customers, develop strong trade allies and, above all, keep it simple. ⚡

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) 962-7508.

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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Silicon Valley Power ready for California's green energy goals

The day after Governor Schwarzenegger signed an executive order increasing California's Renewable Energy Standard to 33 percent by 2020, the Santa Clara City Council approved a similar increase in its own renewable energy goals.

What might have looked like a copycat move actually showed the municipality and its utility, Silicon Valley Power (SVP), to be ahead of the curve—as usual. “Renewable energy standards for a utility aren't something you can change overnight,” SVP Customer Services Manager Larry Owens pointed out. “The city sets its own goals, and our utility has been discussing this change for some time.”

At first glance, meeting the higher goal may not seem like much of a challenge for SVP. Geothermal, wind, solar and small hydro resources already comprise 28.5 percent of the utility's portfolio. But demand keeps growing and the output from some of SVP's older geothermal fields is expected to decline.

Also, the new state mandate may have the effect of driving up renewable energy prices as investor-owned utilities scramble to comply. “Increasingly, SVP has had to compete for the generation from renewable projects,” acknowledged Owens.

Green power veteran

But Santa Clara is nothing if not a forward-thinking city. SVP plans to add as much as 50 MW of renewable energy over the next 12 years, some on its own land. “In the '70s and '80s, the city invested in



SVP Customer Services Manager Larry Owens shows off some of the wind turbines that supply renewable energy for the utility's Santa Clara Green Power program. (Photo by Silicon Valley Power)

land parcels in the wind-rich areas of Benecia and Loyalton, Calif., so we will be able to develop projects there,” Owens said. “Loyalton may turn out to be a better location for solar in the long run,” he added.

Solar has been an important part of Santa Clara's portfolio since launching the nation's first solar utility with its solar hot-water leasing program 35 years ago. Today, residents can add as little as \$5 to their monthly bills to support photovoltaic projects through the Neighborhood Solar program. The money customers contribute is matched by SVP and funds the installation of solar power systems on non-profit facilities in the city.

Business and residential customers have been able to purchase wind and solar power through the Santa Clara Green Power offering since 2004. For an average of about \$7.50 per month (1.5 cents per kWh), subscribers can cover 100 percent of their electricity needs with Green-e certified energy credits.

In 2007, Santa Clara joined the EPA Green Power Partnership by

purchasing over 1 million kilowatt-hours of green power for its own facilities. The city council then set an ambitious goal to get 10 percent of utility customers to join them in choosing green power. Enrollment reached 8.5 percent by Jan. 1, 2008, and new sign-ups come in every week, despite the current economic climate. The community effort earned the city the title of second largest Green Power Community in the country.

Waste-to-energy

Wind and solar power aren't the only resources SVP will be tapping to keep up with customers' demand for clean power. “For municipalities that want to do something about the climate crisis, waste-stream conversion is a great opportunity,” said Owens.

Waste-to-energy facilities add diversity to utility portfolios with base-load power, while reducing the municipal waste stream and the accompanying emissions. SVP is working with Northern California Power Agency, a joint power agency

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Silicon Valley Power

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and with neighboring cities to develop waste-to-energy and other renewable projects.

One potential project on the horizon is a water pollution control plant partly owned by the city of Santa Clara. The plant could maximize methane recovery to power a generator, and also divert the CO2 emissions into producing algae for biodiesel. "It has the necessary land and water supply to make growing algae feasible," Owens explained.

"First fuel"

Energy efficiency is a critical part of SVP's portfolio, as it is for most utilities in the state that leads the nation for using the "first fuel" to grow its economy. The utility's extensive program offers incentives for installing

efficient lighting and exit signs, heating and cooling systems, motors, chillers and washing machines. Rebates that promote energy-efficient new construction and customer-tailored efficiency improvements round out the package. "Our energy-efficiency program saved about 26,000 MWh in 2007, and the 2008 figures look about the same," Owens said.

Forecasting energy savings can be difficult with so many data centers located in SVP's service territory. "Some of our biggest savings come from data centers implementing cooling measures, but those projects don't occur regularly," he noted. "That results in 'lumpy' savings figures."

According to a 2006 report from DOE's Office of Energy Efficiency and Renewable Energy (EERE), data centers represent about 1.5 percent of total U.S. electricity consumption—enough

electricity to power 5.8 million average households. Business as usual could double that use by 2011, but luckily, the industry is recognizing the need for energy efficiency. Sun Microsystems' Silicon Valley facility participated in a Berkeley Laboratory study in 2006 on potential energy savings from powering servers with direct current. Owens said that area data center operators are forming a user group on best energy practices and achieving remarkable success.

An active participant in DOE's Industrial Technology Program (ITP), SVP will be ready to help those business customers remain economically—and environmentally—healthy. When it comes to providing reliable service that protects the environment, too, the city of Santa Clara doesn't have to follow the leader. It is the leader. ⚡

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2009/jan/jan092.htm

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Transmission issues focus of Wind Interconnection Workshop

Like a traveling road show, the Demand-side Management (DSM) Technology workshop on commercial lighting moved from town to town this summer. Some utility engineers feel like they are running in place to keep up with the latest wind interconnection developments and issues, while others don't know where to start their education about the world's fastest growing form of generation.

The fourth Wind Interconnection Workshop, Jan. 21-23, at Western's Electric Power Training Center (EPTC) is a good place to begin. The event is designed to answer questions transmission and distribution engineers have about interconnecting wind turbines and other distributed generation systems to the grid.

The National Rural Electric Cooperative Association (NRECA) teamed up with Western, American Public Power Association (APPA), Utility Wind Integration Group (UWIG), DOE's Wind and Hydropower Technologies Program and the National Wind Coordinating Collaborative in 2006 to present the first workshop. The event introduced Internet-based tools for assessing the impact distributed wind projects have on the local distribution system. UWIG developed the software program with funding from APPA, NRECA and several other organizations.

"The Wind Interconnection Workshop was a good way to make sure that people had the training to get the most out of the tools," said Randy Manion, Western's Renewable Energy program manager. "For Western, it was also

an opportunity to show people the facilities at our EPTC."

New material

The two-day agenda is packed with the latest information on tools, project development and economics presented by industry experts. On the first day, attendees will get an overview of wind energy, followed by lab exercises using the UWIG assessment tools.

The second day will offer more lab exercises covering specific scenarios, and conclude with a tour of EPTC's hands-on miniature power system and Wind Farm Simulator.

As in past years, an optional tour of the National Wind Technology Center is scheduled for the Friday following the workshop. Speakers from the National Renewable Energy Laboratory in Golden, Colo., will give presentations about the center's research activities and lead the tour.

The format and subject matter of the workshop have changed little over the last four years. The focus is primarily on community wind projects at the distribution level, said Manion, "But we will also be looking at utility scale wind projects and wind issues at the national level," he said.

There's new information on the same subjects every year, said



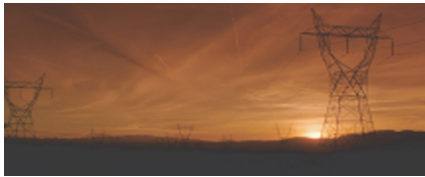
Western co-sponsors the Wind Interconnection Workshop to help customers keep up with the challenges of adding wind generation to their portfolios.

Robert Putnam of CH2M Hill. Putnam, NRECA's wind energy technical support contractor, has coordinated the agenda for each of the meetings. "Tools continue to evolve, research takes different directions, the market and policies change," he explained.

Eyes on wind future

The 2009 agenda includes sessions on "Transmission Planning in the West," small wind applications (less than 100 kW), and economic development opportunities. "The audience has shown particular

See WIND INTERCONNECTION WORKSHOP page 8



TOPICS from the POWER LINE

Consider district heating for new housing development

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:

Can you give examples of district heating systems providing heat to new housing developments? A developer of large luxury homes is incorporating conservation and renewable technologies, and wants to investigate district heat using ground-coupled heat pumps or biomass-fueled boilers.

Answer:

District heating systems are a good way to provide heat to large numbers of customers—especially where otherwise-wasted energy can be used and houses are close together. In areas of lower density, the cost of installing and maintaining the piping, especially if it is installed underground, can be prohibitive. Because of the many variables involved (such as the cost of energy, the installed cost of the piping, revenues from homeowners, maintenance costs, etc.), every system proposed should be evaluated on its economic parameters.

Combined heat, power

Biofuels are one possible source of energy for the district heating system. To be cost-effective, these systems require a low-cost source of fuel such as wood, agricultural waste, garbage

or nearly anything else that will burn. In some parts of the West, large stands of beetle-killed trees could potentially provide fuel for a hot water boiler or a steam boiler as part of a Combined Heat and Power (CHP) system. The feasibility of using this wood depends on several factors: cost of the wood (including transportation costs), volume of wood available, heating and electrical loads, construction and operating cost of the CHP facility and the value of the electricity produced.

A search of the Energy Solutions Database yields several resources on the topic of “biofuels.” The DOE Office of Energy Efficiency and Renewable Energy (EERE) has a comprehensive Web site devoted to biomass.

A CHP system may be a possibility for the development. These systems use a turbine or diesel engine to generate electricity for local use and for sale to the local electrical utility. Most of the waste heat from the process is captured and can be used by the district heating system to heat homes and domestic hot water. CHP district heating systems have been installed in several colleges around the country described in several case studies.

Geothermal hot water

If there is a source of geothermal hot water available, it can be easily used in a district heating system. The first commercially successful geo-

thermal district heating system in the United States was installed in Boise, Idaho, in 1897. The system provides 4,000 GPM of geothermal water at 179°F to businesses and residences in the city of Boise.

Since then, many district heating systems have been installed in other locations. The Oregon Institute of Technology (OIT) provides a brief overview of several existing direct-use district geothermal heat systems in the Western U. S. The OIT Web site also contains a list of consultants experienced in all phases of implementing geothermal heating systems, as well as case studies, software, geothermal resource data bases, publication newsletters and lots more.

Heat pumps

You also mentioned an interest in using ground-source heat pumps (GHPs) as a source of heat for a district heating system. GHPs are most effective at low operating temperatures—if they are used to raise the temperature above 120° F, the efficiency falls off rapidly. Using a central chiller to heat water to 120° F to distribute to the houses is probably not a cost-effective option—piping and pumping costs increase rapidly for systems using lower water temperatures. Individual ground-source heat pumps serving each house would likely be a much more cost-effective option. ⚡

Want to know more?
Visit www.wapa.gov/es/pubs/2009/jan/jan094.htm

Web site of the month:

Tax Incentive Assistance Project

www.energytaxincentives.org

Customer service and key account managers who have spent the year urging customers to make energy efficiency improvements can earn extra points at tax time by pointing businesses and homeowners to the Tax Incentive Assistance Project (TIAP).

A coalition of public interest nonprofit groups, government agencies and other energy-efficiency organizations sponsor TIAP to help consumers access Federal income tax incentives for energy-efficient products and technologies. The project works with the Treasury and Energy Departments and other agencies on rules to implement the tax incentives. Its network of professional and trade associations and firms provides products and services eligible for the tax incentives.

The Web site provides information to consumers, businesses and energy-efficiency firms. States and utilities looking to use Federal tax incentives to complement local programs can find information, presentations and technical assistance.

The home page features updates on legislation, filing guidelines and studies, as well as downloadable tax forms. The left-hand navigation bar lists different types of energy consumers, guiding users quickly to information that suits their specific needs.



The Tax Incentive Assistance Project is a useful guide to navigating through the incentives available to businesses and consumers who have made energy-efficiency improvements throughout the year. (Artwork by TIAP)

Easy to use

TIAP's simple organization makes it as user-friendly as a Web site on the dry and complex subject of tax codes can be. The Consumer Incentives menu lists home shell, home heating and cooling equipment, passenger vehicles, on-site renewables and fuel cells and micro-turbines. Each item links to a page that answers questions specific to the measure, such as the amount of the incentive, eligible products, minimum efficiency qualifications and more. At the end of each page is a list of links to more resources.

The Business section covers incentives for commercial buildings, commercial vehicles, combined heat and power, fuel cells and micro-turbines and on-site renewables. The investment tax credit for combined heat and power systems is a new addition this year for systems placed into service between Oct. 3, 2008 and Jan. 1, 2017.

Users hoping to get incentives for installing geothermal heat pumps (GHPs) will need to look under on-site renewables for both business and consumer installa-

tions. While the debate goes on as to whether GHPs are an energy-efficiency or a renewable technology, it seems that TIAP comes down on the side of renewables.

The only incentives TIAP addresses for builders and manufacturers at this time are for new homes and appliances. As with the other sections, there are links to more resources pertaining to each application.

For power providers

Utility representatives will find many valuable resources under General Information. Organizations including the American Council for an Energy-efficient Economy (ACEEE), Alliance to Save Energy (ASE), Edison Electrical Institute and Residential Energy Services Network contribute reports and presentations for program implementers, state energy offices and utilities. This section also provides a hand reference for relevant IRS regulations and a rundown of recent and pending legislation.

The frequently asked questions in the general information section give quick answers for a variety

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Wind Interconnection workshop *from page 5*

interest in managing resource variability and in the local economic development opportunities wind offers,” said Putnam. “These sessions are tailored to answering those questions.”

John Bleem, a division manager with Platte River Power Authority, agreed that transmission planning is becoming more of an issue. A long-time member of UWIG, Bleem attended the first workshop in 2006. “Things have changed since Platte River started acquiring and building wind generation 12 years ago,” he said. “With more megawatts coming on to meet the growing demand, it’s getting harder to integrate and balance the intermittent resource.”

The experience participants have with wind integration range

from Platte River’s established and growing wind portfolio to utilities that may have only a few kW on their systems. Trent Loutensock of Highline Electric Cooperative also attended the 2006 workshop, but from a different perspective than Bleem. “We wanted to get acclimated to the wind environment and culture,” said Loutensock.

“Highline was just starting to see interest and activity in our community, and we needed to talk to people who knew the industry.”

So far, Highline has only one small distributed wind turbine in its service territory, but the workshop introduced Loutensock to resources that will help the rural utility handle whatever the future holds.

Register now

Whether or not their systems currently carry wind generation, utility engineers believe that

wind turbines will be part of the future. In 2006, 13 people showed up to the first workshop. The next year, 22 came and last year, the event sold out. Putnam expects another sell-out crowd this year. Enrollment is limited to 30, so he urges anyone who is interested to reserve a spot early on.

Early registration is especially important for non-U.S. citizens who want to attend the NWTC tour on Jan. 25. The center is a Federal facility and will need visa or passport information several weeks in advance to provide security clearance.

The non-refundable fee for the Wind Interconnection Workshop is \$300. Participants can register online at <http://windworkshop.govtools.us/> and find lodgings in the vicinity of the EPTC. ⚡

Want to know more?

Visit www.wapa.gov/es/pubs/esb/2009/jan/jan093.htm

Web site of the month *from page 8*

of questions about specific products, filing procedures and installation scenarios. The most useful information on this page may be an explanation of the difference between rebates, deductions and credits.

As all good informational Web sites do, TIAP provides contact information. General questions go to ACEEE, while ASE manages media inquiries.

The Tax Incentive Assistance Project has the power to turn utility customer service representatives into heroes. Visit it today and brush up your knowledge on energy-efficiency

tax incentives, because nothing takes the sting out of tax time like a little money back. Especially if it is a rebate for on something that saves you money all year around. ⚡

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