EnergyServices BULLETIN
February 2007
Western's monthly energy efficiency and renewable energy newsletter dedicated to customer activities and sharing information on energy services.

Marshall, Schwan lighting project puts custom in customer service

Improving a large industrial customer's energy efficiency is not a one-size-fits-all proposition. When The Schwan Food Company asked Marshall, Minn., Municipal Utilities for help upgrading its freezer lighting, it took tenacity and creativity to reach the right solution.

Usual options ruled out

During a compressed-air study MMU Energy Services Coordinator Mark Antony assisted with for the frozen-food company in 2004, Senior Project Manager David Bero asked about other potential energy saving measures. Bero said, "For every watt of light, the cooling system has to pull out 3.414 Btus. When lights are on 24/7/365 as our freezer lights are, that really adds up."

There is more than one option for companies looking to save on lighting in cold storage areas, but none of them suited Schwan's case. Light-emitting diode fixtures are now becoming popular for this application. However, at the time, LEDs were not widely available commercially.

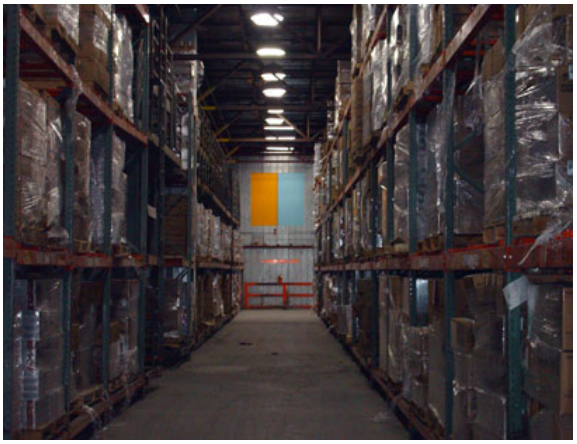
Occupancy sensors are a good energy-saving strategy for relatively small walk-in units, but Schwan's freezer resembles a warehouse rather than a room, complete with warehouse-style traffic. The ballast on a high intensity discharge lamp takes time to cool before it can restart.

"We tested the sensors in our dry warehouses," Bero added. "The way lights pop on right in front of the occupant is hard on the eyes, and it creates safety issues for forklift drivers."

Vendor joins search

Determined to find a solution that met Schwan's needs, Antony turned to the Internet to do a little research. "Mark was very, very helpful throughout the project," Bero commented. "He really stuck with it."

Antony finally came across 1st Source Lighting, a company in Auburn, Calif., that offered a product that seemed close to what Schwan was looking for. "They at least had fixtures that operated in freezer applications," Antony said.



Above, Schwan's freezer before the installation of high-efficiency T5 fixtures. Below, the new lights improve lighting quality as well as energy consumption. (Photos by The Schwan Food Company)

Unfortunately, the lowest recommended temperature for 1st Source's T5HO lamp was minus18 degrees, not low enough for Schwan's freezers. The lighting manufacturer did have ultra-induction fixtures that worked down to minus 40 degrees. Like occupancy sensors, though, UI fixtures are better suited to walk-in freezers than a warehouse-scale environment. Bero

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said, "Also, the fixtures didn't give us the return on investment we needed to make the project feasible."

The designers at 1st Source were not about to give up, however, so they applied the cold-resistant construction features used on UI fixtures to some four-lamp T5 fixtures. "We've been building freezer fixtures for some time, and we knew we could come up with a solution that worked for Schwan," said Sales Manager Greg Cooper. "We sent the plant a few of the modified T5 fixtures to test."

Determination rewarded

Bero tried out the lamps and recommended a few additional changes that resulted in a T5 lamp that worked flawlessly at temperatures down to 32 below zero. The new fixtures saved Schwan $113,000 on electricity last year. Lighting was about $66,000 of the savings, "And the rest came from reduced cooling demand, because the ballasts put out less heat than HID ballasts," said Bero.

Unlike HIDs, the new lights can be turned off on the weekends when the plant is closed. "They turn right back on at full output, and they have a much lower fire rate—they don't burn out as easily as HIDs do in freezer conditions," Bero pointed out. "So the savings are better than we initially calculated."

The project also gave 1st Source a new product. "We now have a standard T5 fixture rated to minus18 degrees that is sufficient for most businesses," said Cooper. "There is less demand for the VTF32 series Schwan uses, so we offer it as a custom fixture."

The Marshall plant replaced almost all its HID fixtures with the T5s, and Bero is encouraging other Schwan facilities around the country to install the technology. He estimates the payback on the Marshall plant retrofit to be between one and two years.

Schwan received MMU's commercial customer rebate of $0.20 per nameplate watt saved through the installation of the fixtures. The program specifies that the lighting must be in operation during peak hours and provide a net reduction in kW use from the previous system without affecting lumen output.

Commercial customer rebates

The lighting rebate is one of several energy efficiency incentives available to MMU commercial customers. MMU offers a variety of energy-efficient HVAC programs, including geothermal and air source heat pump rebates and Energy Star-qualified air conditioners. The utility has also created a custom rebate plan to assist customers in developing innovative, energy-efficiency measures not covered under other rebate programs.

Antony said lighting is MMU's most popular incentive, adding that the Schwan project has been a very successful retrofit. "There is another facility in Marshall—a turkey processing plant—that could also benefit from this particular lighting measure," he observed.

New challenges expected

Marshall's significant—and diverse—commercial load may well offer other opportunities for creative energy-efficiency strategies, however. Archer Daniels Midland Company has a corn wet-milling facility in town which accounts for half the utility's load. Other major employers include Southwest Minnesota State University, Avera Marshall Regional Medical Center, US Bank Corporation, Wal-Mart Supercenter, Hy-Vee Foods and Independent School District #413.

MMU recently worked with the school district on the construction of an energy efficient new high school. "Interest in energy efficiency among our large customers is perking up again as energy costs rise," said Antony.

Luckily for those businesses, their utility is a match for their unique challenges. As the Schwan retrofit proved, Marshall Municipal Utilities has improving energy efficiency down cold.

Energy Services Bulletin

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Mor-Gran-Sou partners with Boy Scouts to change lights and the world

Even though compact fluorescent lights have been commercially available much longer than personal computers, cell phones or iPods, a few Mandan, N.D., residents didn't know what to make of the spiral bulbs or the Boy Scouts on their doorsteps offering them for free.

"They must have thought there was some sort of catch," said Western Environmental Protection Specialist Chad Bourgoin, the environmental merit badge counselor for his son Shane's Boy Scout troop. "Here were the Boy Scouts teaming up with the utility to give them something that would help them save on their electric bills. I guess it sounded too good to be true."

Funding helps

But Troop 54's Change a Light, Change the World pledge drive was a real offer with real benefits for the people who accepted the CFLs, for the scouts and for Western customer Mor-Gran-Sou Electric Cooperative, which funded the project. To earn an environmental awareness merit badge, scouts went door to door, giving free CFLs to Mandan residents and explaining how the lights could save energy and the environment. Mor-Gran-Sou provided a $500 grant to purchase the energy-efficient lights.

Energy Star's annual Change a Light campaign encourages people to save energy with the simple step of replacing a conventional light with a CFL. Individuals take the online pledge to change one light at home or the office, or participate as a member of an organization, government agency or community. Pledges from the 2005 campaign alone had the potential to reduce more than 33 million pounds of greenhouse gas emissions and save more than 23 million kilowatthours of energy.

Mandan Boy Scout Troop 54 with the CFLs they gave away to town residents to earn their environmental merit badges. (Photo by Chad Bourgoin)

Door-to-door education

When Bourgoin submitted the grant proposal to Mor-Gran-Sou, the utility saw an opportunity to help its residents reduce their energy use and learn about the environment. Mor-Gran-Sou's charitable donation program funds projects in four categories: education and youth development, civic and community betterment; culture and arts and health and human services. "We look for projects that focus on social, economic and environmental betterment in the co-op's service territory," explained Member Services Manager Jackie Miller.

With funding in hand, the troop approached local retailers. "We managed to get Lowe's and Home Depot to sell us the lights at near cost," said Bourgoin.

The Boy Scouts spent a Saturday afternoon going door to door in Mandan, giving away CFLs to any residents who were interested in reducing their energy consumption. The troop reported the total number of lights distributed to Energy Star.

In three hours, 14 young men distributed more than 400 CFLS to households, along with energy-efficiency information Bourgoin downloaded from the Energy Star Web site. "That's enough to prevent 90 tons of greenhouse gas emissions," he observed.

Low rates

Mor-Gran-Sou especially liked the idea of working with the youth to spread the word about CFL technology and how small steps can add up. "Chad and the Scouts were very well-informed and enthusiastic about getting the energy-efficiency message out to our members," Miller said.

Miller provided a map of Mor-Gran-Sou's territory and acted as the troop's guide on the day they distributed their lights. The utility serves 5,000 members and about 7,800 meters, making the grassroots approach to customer education a natural. "I think our members really appreciated learning about a new way to save energy one-on-one," said Miller.

Members who took CFLs will be pleased to know that altogether, the lights could save 113,928 kilowatthours. Over the lights' lifetime, that equates to a little more than $11,000 at Mor-Gran-Sou's current rates. A Mandan hardware store owner told a local newspaper covering the pledge

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Western's IR cameras help utilities, customers maintain efficiency

Whoever coined the saying, "an ounce of prevention is worth a pound of cure," must have been thinking about an infrared camera inspection. Well, maybe not, but that's how NMPP Energy and Fort Morgan Light and Power see the audits they perform with cameras borrowed from Western's Equipment Loan Program.

NMPP Member Services Representative Bob Meade recently coordinated a preventative inspection of Leprino Foods' Fort Morgan, Colo., plant with the city utility and Western. "It took about six hours and the help of four maintenance workers to complete the audit," he recalled. "That's a small investment of time and labor compared to the loss an equipment shutdown could cause the plant."

"The biggest plus is that we can find problems and fix them on our schedule," said Leprino Plant Engineering Manager Paul Oliveira who has been working with the city and NMPP to perform inspections for about five years. "There is no down time involved because the equipment has to be running during the audit," he added.

Prepared for inspection

Linda Swails, who recently joined Western's Rocky Mountain Region as a public utilities specialist, accompanied Meade, Western Equipment Loan Manager Gary Hoffmann and Fort Morgan Electric Superintendent Larry Black. "The maintenance staff knew what they wanted to accomplish and they had the route through the plant planned," she said.

That is because the Leprino plant has a rotation schedule for inspections, said Oliveira. "We've divided the facility in half and audit each half in alternating years," he explained. "We also revisit problems found in the previous inspection to make sure they have been corrected."

Having in-house workers open and close electrical bays for inspectors makes the audit run smoothly, he added. "And it's important to have a detail of the areas being inspected so that when you get the report, you can go right to the hot spots."

Oliveira praised NMPP Energy for its efficient approach. "They show up when they are scheduled, they get the job done and we get the report in a timely manner," he said.

Instant benefits

The most recent inspection turned up only a few potential problems, said Meade. "Of the 3,000 pieces of equipment we scanned, 35 needed some sort of attention. That's 1 percent," he observed.

That illustrates two important reasons for IR inspections: first, in a big facility, there is always something that isn't performing as efficiently as it could be; second, and perhaps more important, regular inspections keep such instances to a minimum. Facility managers are able to correct problems while they are manageable and relatively inexpensive to address. Also, they may discover small adjustments that save energy and wear on equipment, thereby reducing operating costs.

On the other hand, an inspection could uncover a major malfunction about to happen, as one did at Leprino Foods a few years ago. "One large transformers was on the verge of going out," recalled Meade. "With permission from the city, we shut it down and repaired it. That saved thousands of dollars in lost production time.

Inspections give a sense of instant gratification that builds a strong relationship between a business and its power provider. "Our utilities can provide this service to their large key accounts free of charge, and the customer sees the benefit right away," said Meade. "That's why NMPP Energy promotes it so heavily at our customer meetings."

Supporting local economy

Fort Morgan, a strong advocate for IR inspections, tries to do inspections for all of its large key accounts every two years and offers inspections to smaller customers as well. "Keeping the large accounts running keeps our meters running," said Black.

For a utility with only 5,000 meters, Fort Morgan has a lot of experience with servicing large industrial accounts. In addition to Leprino Foods, a sugar factory, a meat processing plant and a dairy provide manufacturing jobs for 22 percent of the city's workers, well above the state and national averages.

Black agrees with Meade that IR audits have helped to open lines of communication with those accounts. "Whenever our big customers need help or have a concern that might affect electrical service, they will contact us," he said.

"We use Western's cameras to scan our own substations and feeder lines once a year," Black added. "It's a great way to prevent problems."

Equipment loan options

NMPP borrows Western's IR cameras to conduct between 30 and

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IR cameras

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50 inspections each year. Even though camera prices are going down and equipment is becoming easier to use, Meade still prefers to use the Equipment Loan Program. "NMPP is a joint action agency with a small budget and staff," he explained.

For the Leprino audit, Meade chose the FLIR ThermaCam 695. "It takes color pictures that are easy to interpret," he said. "I've been using this model for about four years."

Hoffmann said, "We have 16 color cameras available for loan. All of them record images that can be used to illustrate reports or saved for comparison with future audits."

The Equipment Loan Program also offers other pieces of diagnostic equipment. A blower door can be used with an IR camera to make leaks in a building envelope show up more clearly on infrared images. Utilities can borrow a power quality analyzer to balance their power systems for maximum efficiency, or help customers identify power spikes that can cause outages and damage equipment.

Best of all, Western customers don't have to break their budgets to provide technical assistance to their own customers. They can borrow equipment as needed—in the case of the infrared camera, some utilities need it twice a year while others only borrow it every two years. The program also gives customers the chance to "test drive" a technology they are considering buying. Request an ounce of prevention, education or research online, or contact Hoffmann at 720-962-7420.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2007/feb/feb073.htm

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/2007/feb/feb07coe.htm

Mor-Gran-Sou

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drive that low electricity rates in the area may be one of the reasons CFLs are not more widely used.

Miller pointed out, however, that Mor-Gran-Sou recently completed construction on two new substations, and power demand keeps growing. "Meeting that demand comes at a cost. Even small conservation measures like CFLs can help utilities to manage growth and continue to provide affordable, reliable energy," she said.

More outreach

The pledge drive was Mor-Gran-Sou's first involvement in the seven-year-old Change a Light campaign. Based on its success, the utility would definitely consider trying another project, said Miller. "Something for a wider audience, involving innovative technology, maybe," she suggested.

Chad Bourgoin and Mandan Boy Scout Troop 54 were also pleased with the outcome. "I felt tired ... but I felt good because we're trying to change what might happen to earth in the future," Shane Bourgoin reported.

His father noted that the troop is only the second in the United States to conduct a Change a Light pledge drive. Bourgoin expects more people and organizations will get involved in the future, though, since the campaign is a great way to raise energy awareness. "And even one effort on a Saturday afternoon can make a big difference," he said.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2007/feb/feb072.htm

Technology Spotlight:

Energy efficiency in computer data centers

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

Computer data centers use a lot of electricity in a small space. Up to 75 percent of the energy consumed feeds servers and other information technology equipment. The next largest use is for air conditioning. A comprehensive energy conservation program will seek to both reduce the load of IT equipment and improve cooling efficiency—without compromising reliability. The following resources outline potential energy conservation measures and provide additional information.

Low/no-cost measures

- Increase the cooling setpoint temperature to 75 degrees Fahrenheit.
- Provide the lowest possible level of humidity consistent with manufacturer recommendations. Increase humidity control deadbands to 10 percent or more. Raise water temperature to 50 to 55 degrees F for chilled water systems. A coil bypass for direct expansion systems can reduce dehumidification.
- When using engine heaters to keep generators ready for rapid starts, reduce the engine heater setpoint to 70 degrees F (120 degrees F is typical).
- Clean air filters regularly.
- Keep the outdoor condenser surfaces of air-cooled DX units clean.
- Fully commission and periodically re-commission the HVAC system, including adjusting dampers, belts, fans, pumps, drives, thermostat and relative humidity settings and controls. Adjust head pressure regulation devices of air- and water-cooled DX units.

Selecting and sizing

- Avoid oversizing IT equipment. Operate your uninterruptible power supply, batteries and power distribution systems in their most effective load range.
- Select energy efficient power supplies and processors.
- Select servers that use low-power chips with multi-core processors. Select processors to match the required workload, rather than buying the fastest-performing chip for every use.
- Select equipment and/or software with power management strategies to throttle down the processor during low-load periods.
- Replace AC power supplies with efficient DC power supplies to shift thermal load outside the server.
- Use higher back-pressure, ducted server fans with automated dampers at the server blade rears and at fan entrances.

Air management

The following measures minimize mixing conditioned cooling air supplied to IT equipment with hot air released from equipment:

- Use "High Delta-T Cooling" to blow conditioned air directly on equipment, rather than mixing conditioned air with room air to cool the room.
- Locate racks and cable mazes so they do not block airflow.
- Place equipment so that devices that emit a lot of heat have greater airflow or zoned air conditioning around them.
- Use "hot aisle/cold aisle layout," orienting racks so that cold inlet sides face each other and hot discharge sides also face each other.
- Use high overhead plenums or ductwork to efficiently collect and return hot air to the air handler.
- Seal cable or other openings in under-floor distribution systems
- Block unused spaces in and between equipment racks to direct air flow only to racks that are in use.
- Enclose computer equipment in water-cooled cabinets to efficiently cool the cabinet mini-environment and capture return air at less expense than cooling the entire room.

Cooling and heat recovery

- Install air-side or water-side economizers to take advantage of cool outdoor air for air conditioning.
- Select efficient water-cooled chillers in a central chilled water plant.

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Energy Shorts

Western's new Administrator

Western's new Administrator Tim Meeks is looking forward to attending more customer meetings and touching base with power customers as he takes on this new role, he said in an interview with Western's Closed Circuit newsletter.

Meeks recently shared his goals and expectations with Western customers and employees. Transmission, wind integration and tribal partnerships are the three key areas he wants Western to focus on, he said.

"I think of transmission as being the ultimate key to our future," he explained. "I think we have an obligation to get out there and work with public, private and even non-utility entities to help alleviate transmission congestion points and 'conditional congestion areas' within our service territory."

"Conditional congestion areas" are locations where existing congestions is expected to worsen significantly if large amounts of new generation are developed without associated transmission capacity. Western's 17,000-plus miles of transmission lines put the agency in the position to be a major player in solving congestion.

On wind integration, Meeks stated, "Wind energy is here. It's the world's fastest-growing energy technology. We need to do what we can physically to make it easier for wind generators to connect to the system.

"Thirdly, I anticipate expanding our partnership with Native American tribes to foster economic development on reservations. We're going to continue to reach out to the tribes.

"I would like Western to be a strong strategic player in the electric utility industry," Meeks concluded. "When people think about transmission and transmission services in the West, I want them to think of Western as the organization to talk to."

Marketing consumer energy programs

Idaho Power recently combined its renewable energy efforts with its energy efficiency and load management team, leading the investor-owned utility to wonder, how do you make all those distinct but related programs understandable for consumers?

That question cuts across the industry as rising energy costs, increasing demand and environmental concerns drive power providers to promote wise energy use and alternative resources. "We've been using 'DSM Team' for the EE+LM group, but that isn't an ideal name when it comes to the public's understanding," Efficiency Team Leader Celeste Becia observed.

"Demand-side management is a term coined back in the '70s that the industry understands but consumers don't," noted Elliot Boardman, executive director of Utility Communicators International. "There's no question that utilities need to clarify terminology, so we can better explain these programs to consumers."

Becia wants to know how others in her field are meeting the challenge. "We would like to hear from utilities that have come up with effective umbrella names to cover their energy efficiency, load management and renewable energy initiatives," said the new UCI member.

Western would like to know, too. Have you discovered any strategies that have been especially helpful in communicating those concepts to the public? Share your experience with Western by contacting the Energy Services Bulletin editor.

DOE's 'Easy Ways to Save Energy'

The Office of Energy Efficiency and Renewable Energy has launched Simple Monthly Awareness Reminders & Tips as part of its "Easy Ways to Save Energy" initiative.

The year-long campaign broadcasts monthly e-mail messages to all DOE employees about simple actions everyone can take to save energy, save money and improve the environment. The message directs recipients to the "Easy Ways" Web site where visitors will find the animated tip of the month. The first tip in January was advice that everyone is familiar with and that even a child can do—turn off that light!

The Web site also provides links to energy-saving information for consumers, kids, educators, businesses and government agencies:

DOE created the initiative in 2005 in response to rising energy costs caused by tight oil and gas markets, and the damage done by Hurricanes Katrina and Rita. The campaign is intended to build on the outreach activities of Energy Awareness Month, observed in October.

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Technology Spotlight

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- Use water-side economy cooling for chilled water.
- Upsize duct/plenum and piping infrastructure used to supply cooling.
- Use medium-temperature chilled water in cooling loops (50 to 55 degrees).
- Use aggressive chilled and condenser water temperature resets to maximize chiller plant efficiency (Chiller Plant Optimization).
- Use a variable-flow evaporator design and staging controls to operate chillers near their design temperature differential.
- Monitor chiller-plant efficiency to maintain high efficiency.
- For air-cooled DX units, use evaporative pre-cooling.
- Oversize cooling coils so the surface temperature is higher, reducing humidification energy.
- Recover waste heat for building space heating, domestic water heating, absorption or adsorption chillers or on-site electricity generation.

Motors and drives

- Use energy-efficient motors in rack blowers and air-conditioning compressors and fans.
- Install variable-speed motor drives on chillers, pumps for chilled and condenser water and cooling tower fans.

Design, ops, maintenance

- Involve all IT, facilities and management personnel in the design process to achieve solutions that save energy and meet reliability, performance, cost control and other requirements. Use life-cycle costing as a decision-making tool.
- Introduce energy optimization at the earliest possible phase of the design process to minimize construction and operating costs.
- Institute an energy management and monitoring program.
- Ensure that facility operations staff receives site-specific training on identifying and properly operating energy-efficiency features.

For further references, contact the Power Line at 800-769-3756.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2007/feb/feb074.htm

Energy shorts

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Video Web site for renewables projects

Bringing the do-it-yourself ethic of interactive Web sites such as YouTube to the growing renewable energy industry, the recently-launched Green Energy TV provides video clips of green energy projects globally.

Through the company's Web site, anyone can submit videos of renewable energy projects, under construction or completed. Green Energy TV is also carrying presentations from webcasts sponsored by the Public Renewables Partnership. Available with streaming audio, the presentations include "Markets for Renewable Energy Credits;" "Project 25x25;" "The Central Solar Option" and "Wind Power Case Studies." Western is a member of the PRP, an initiative dedicated to helping public organizations, cooperatives and Tribal utility authorities integrate renewable energy into their power portfolios and business strategies.

The videos air on the Internet, giving users from all over the world the opportunity to learn about the project. Green Energy TV also hopes to feature companies, inventors, installers, colleges and universities that have an existing or breakthrough technology that is waiting to be discovered and marketed to the world.

"This type of coverage allows consumers to become educated about the energy choices available and empower them to make the educated switch to clean energy," Green Energy TV Founder Craig Zamary said.

"Green Energy TV will be an excellent resource for utilities and the renewable energy industry, too," added Western Renewable Resource Program Manager Randy Manion.

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