

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

Holy Cross reduces emissions with vented methane power

A coal mine that generates electricity and carbon offsets may sound like the energy equivalent of a unicorn, but an innovative project in Gunnison County, Colo., promises to provide both to Holy Cross Energy.

Specifically, the electricity will come from burning methane vented from the Elk Creek Mine. By preventing the release of the powerful greenhouse gas (GHG) into the atmosphere, the project will qualify for approximately 80,000 carbon offsets annually, and is registered for verification with Climate Action Reserve (CAR). The offsets will be initially registered with NYSE Blue.

Vessels Coal Gas is building what will eventually be a 3-megawatt (MW) power plant to capture the waste gas. Holy Cross is purchasing the entire output of the project, starting with the first 1-MW generator coming online this fall. "Otherwise, the methane is just escaping into atmosphere from the active mine," observed Special Project Engineer Chris Hildred, "and it would continue to for years after the

mine closes. Turning it into electricity is a cleaner, safer alternative."

Groundbreaking project

According to the Environmental Protection Agency, coal mining activities worldwide emit about 986 billion cubic feet of methane into the atmosphere every year.

These emissions represent not only an environmental hazard—methane is more than 20 times more effective at trapping heat than carbon dioxide (CO₂)—but an economic opportunity, as well. Vessels Coal Gas specializes in capturing this wasted resource, converting it to pipeline gas, heating or electricity. The bulk of captured methane goes into natural gas pipelines after gas treatment. However, according to the EPA database the Elk Creek Mine project will be the first small scale (less than 50 MW) power plant, and the second overall in our nation to collect methane from a still-active mine and turn it directly into electricity.

The gas will be dried and filtered for more efficient combustion, and burned in a reciprocating engine to generate electricity, which will be transmitted over a nearby 44-kilovolt (kV) line. "The gas preparation is a little different at the front end," explained Tom Vessels, company president. "But otherwise, it's the same process as capturing methane from a landfill, wastewater treatment plant or confined animal operation."

The technology is good for any gas waste stream with a methane content of 20 percent or more, Vessels added.

"There are facilities of this type all over Germany, and they some are in operation in Australia and China. The United States has a significant potential power resource, if there was greater acceptance of the technology."

Lining up the partners

Holy Cross's challenge, as the power purchaser, was to arrange transmission from the mine. "The electricity had to be wheeled over medium-voltage distribution lines to a TriState [Generation and Transmission Association] substation, then across Western and Xcel Energy transmission lines," said Hildred. "We weren't sure in what order we needed to talk to people. DMEA [Delta Montrose Energy Association], the owner of the line that supplies power to the mine, had never dealt with anything like this before."

All of the parties proved cooperative, so Holy Cross was able to sort out the distribution without encountering too many barriers. The utility signed the power purchase agreement and DMEA built a substation with a short extension to the 44-kV line.

Of course, no project happens without funding, and the developer was fortunate in finding an "angel" with an interest in alternative energy. Randy Udall, a sustainable energy advocate and former executive director of the Community Office for Resource Efficiency, happened to be at Vessels's first meeting with Holy Cross Energy. "Afterward, Randy asked me

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Western, Wheatland REA team up for science class demonstration

Wheatland Rural Electric Association (REA) took advantage of Western's Equipment Loan Program to help science classes at Wheatland, Chugwater and Glendo high schools.

Educational displays are among the most requested items in the Equipment Loan Program. Utilities set them up at customer meetings, classrooms and community events to open up conversations with their ratepayers, explained Equipment Loan Manager Gary Hoffmann. "For example, the lighting display shows consumers how much energy they can save simply by replacing a conventional light with a compact fluorescent light," he said.

The fuel cell demonstration is good for illustrating complex ideas about energy production and storage," continued Hoffmann. "Utilities are more likely to borrow that display to take to a school."

Tools to help community

That's what Wheatland REA Member Services Manager Al Teel had in mind when he asked to borrow the program's weather station and soil monitoring equipment last spring.

"It's a good way to help out the science teachers in our territory," Teel observed.

Wheatland REA is a frequent borrower, and Teel said he is always on the lookout for equipment that can help members. "I'll call Gary and ask him what's new, what haven't I tried yet. He was very enthusiastic about the weather stations," recalled Teel.

There is a lot to get excited about. Some educational displays collect only one type of data, like anemometers with wind speed. The weather station measures wind speed, solar index, ultra-violet levels, precipitation and soil temperature and moisture content. "Instead of just evaluating renewables potential, the weather station gives a complete profile of the area's weather," said Hoffmann.

For residents in a largely agricultural economy, that information is relevant to their daily lives, Teel observed. "It's more than a science project—students will be collecting data that has real value to the three communities," he said.

Loads of useful data

The Wheatland High weather station went into the school's science "ecology area," an unused area students turned into an outdoor lab with fish ponds and gardens. From there, the equipment wirelessly transmitted data throughout the summer to the science classrooms at the south end of the building. Students will download the information when they return in the fall. "A tornado went through the area the day after we installed the weather station," said Teel. "It will be interesting to see what it recorded."

The schools have big plans for the data their students will be col-



Cody Teel, on the roof of Chugwater High School, signals that he has successfully installed weather monitoring equipment borrowed from Western's Equipment Loan Program. Science students will use the data from the weather station to study the effects of weather on energy use and agriculture. (Photo by Wheatland REA)

lecting. One teacher wants to start a workbook that will become a weather history for future classes to use as a reference. The solar and wind data might one day help the schools apply for grants for renewable energy systems, Teel suggested.

The students will also be working on interfacing the weather stations with the district administrative building's public website. Eventually, anyone in the area who might need weather history—the highway department, farmers, teachers and students at other schools—will be able to access real-time data on local weather.

The value of the weather stations as a teaching tool has caught on with teachers at other schools in the Platte County School District. "Glendo School is the latest to set up a weather

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Energy Services Bulletin

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Demonstration

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station,” said Teel. “The town is about the same distance north from Wheatland as Chugwater is south, so now we have weather data for a contiguous portion of our territory.”

Co-op, Western benefit too

There are lots of community-minded reasons for power providers to borrow educational displays from Western, but there are benefits for the utilities as well.

Wheatland REA will be able to use the real-time data to schedule

maintenance crews during weather events. Teel admitted that students, teachers and administrators involved in the weather station project are more likely to be open to less “exciting,” but far more vital electric safety demonstrations.

In the long term, teaching future consumers about how weather affects agriculture and energy use prepares them to make sound decisions about both. “It’s always good for a co-op to work with well-informed members,” he added.

Just as utilities borrow Western’s equipment to build relationships with their communities, we use the loan program to bond with our

customers. Hoffmann, who traveled up to Wyoming to assist with installing the weather stations, said, “Meeting with our customers and their members gives us the chance to learn more about their needs and their experiences with the equipment they borrow. That feedback helps us build our tool library and identify training needs.”

He added praise for the students, teachers and Wheatland REA employees who did so much preparation for the project. “The bottom line is Western is just a small part of a really awesome team.” ⚡

For links to more resources, visit <http://ww2.wapa.gov/sites/western/es/pubs/esb/Pages/esb2.aspx>

Holy Cross

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if we were seeking partners and gave me the number of the sustainability director for Aspen Skiing Company,” Vessels recalled.

The innovative project appealed to the ski resort owner with its long history of supporting environmental causes, and the company put up the bulk of the funding to build the Elk Creek facility. “Aspen Skiing Company and Holy Cross Energy deserve accolades for seeing beyond the end their noses,” declared Vessels.

Comprehensive stewardship

The Elk Creek methane capture project is just one more of Holy Cross Energy’s forward-thinking strategies to manage its environmental footprint. The utility has an internal goal of limiting its carbon emissions growth to half its sales growth rate, and the plan does not ignore other GHGs.

Holy Cross Energy also has its own ambitious goal of getting 20 percent of its sales from renewable energy by 2015, and has already surpassed Colorado’s renewable energy requirement of 10 percent by 2020. The state does not count coalmine methane capture as renewable energy, but the project’s carbon credits are a proactive hedge against potential legislation that may eventually require all utilities to limit their emissions.

Holy Cross consumers actively participate in—and benefit from—their utility’s sustainability efforts. The co-op’s Wind Power Pioneers and Local Renewable Energy Pool programs have nearly 2,400 subscribers who purchase more than 1,562,000 kilowatt-hours of renewable energy each month. The WE CARE (With Efficiency, Conservation And Renewable Energy) program, launched in 2004, has resulted in 2,786 kW of net-metered and

community-owned renewable energy generation capacity.

Holy Cross Member Services Manager Stephen Casey estimates that the WE CARE renewables program alone has prevented 3,886 tons of CO₂ emissions (Assuming 1,500 kWh annually per kW of capacity, and 1.86 lb/kWh carbon intensity factor).

Calculating the emissions avoided through WE CARE’s conservation and efficiency measures is more difficult, but the programs’ popularity is not in question. Since its inception, WE CARE has distributed more than \$4.53 million to its member-consumers in incentives and rebates. “Co-ops are about working with the community to find long-term solutions to problems like greenhouse gas emissions,” said Casey. “Thus far, our sustainability efforts have resonated favorably with many business and residential member-consumers of Holy Cross Energy.” ⚡

For links to more resources, visit <http://ww2.wapa.gov/sites/western/es/pubs/esb/Pages/esb1.aspx>

A walk through resource planning

Editor's note: The first of a three-part series on the hows and whys of integrated resource planning looks at the process itself.

Utilities can't stop change—changes in the weather, fuel prices, the economy, technology and our understanding of the environment—but careful planning helps to protect ratepayers against market volatility. That is why the Energy Planning Act requires Western customers to do integrated resource planning (IRP).

Easier said than done

Determining the best strategies for meeting the consumer's need for affordable, reliable power is no easy task. Although cost and reliability are still high priorities for most ratepayers, those are far from the only considerations a plan needs to address. Utilities must now account for environmental concerns, national security, integrating alternative resources, economic development and emerging technologies, too. Any one of those factors—or a combination of them—can derail even the most comprehensive and meticulously conceived energy plan.

Recognizing that some of our customers—especially small power providers—can be overwhelmed by juggling so many moving parts, Energy Services has created several tools to help utilities get a grip on their IRPs. Energy Services Director Ron Horstman suggests planners start by studying the IRP checklist. “It provides customers with a roadmap for conducting the planning process,” he explained.

Step by step

The process begins with the utility estimating its load for the next five

years and comparing all energy-efficiency and energy supply resources available to meet the demand. A timetable for rolling out programs and acquiring or building the needed resources must be a part of the plan. Because every fuel has its downside, the utility must detail its efforts to minimize the adverse environmental impacts of the chosen resources.

The public comment portion of the process gives consumers the chance to offer their input on the plan added Horstman. “This is where utilities discover the value of keeping open the lines of communications with their members,” he said. “The success of a program or support for any new resource or acceptance of a rate hike ultimately depends on the consumer's understanding of the need.”

Finally, the utility must have a strategy to measure the plan's success. Setting goals and seeing how close you come is the most straightforward measurement of success, and hitting your mark is easier if you do your homework on the front end. Look for more on that subject in the October issue of Energy Services Bulletin.

Even more help

Energy Services exists to serve—our mission is to help customers conduct their IRPs, and to guide them through the submission process with online tools and personal assistance.

Checklists are available on our website, not only for the IRP, but also for the alternative plans: Energy Efficiency and Renewable Energy report, Minimum Investment Report and the Small Customer Plan.

For those who still have questions, planning and review assistance is only a request form away. Several Western customers in Kansas went a

step further, teaming up to sponsor in-person trainings presented by their regional Energy Services representative.

Submitting the IRP in the right format can be almost as daunting as the planning process itself. Our online compliance training program helps customers better understand IRP requirements, and makes for a more consistent review of plans. The “train the trainer” syllabus explains what the law requires each plan and annual report to include. It also covers how Western reviews plans, evaluates compliance and monitors IRP implementation.

Building on compliance training, Western developed an online data collection tool. This standardized, pre-approved format makes it easier for customers to submit the annual reports and alternative plans, and to reference past reports.

Beyond the five-year plan

As utilities draft their annual IRP updates, the real value of subjecting resources to a variety of tests makes itself known. Fuel prices, demographics, technology, public opinion and policy keep changing. Having a broad set of assumptions and estimates from last year and the year before to compare against the current situation helps utilities identify emerging trends and respond quickly and flexibly.

Those industry changes don't stick to the calendar year, either, adds Horstman. “You can change your IRP as often as circumstances dictate,” he said. “Planning is both an ongoing and long term process,” he said. “Allowing yourself a 10- or even 20-year planning window gives you direction, even when the changes are coming thick and fast.” 

For links to more resources,
visit <http://ww2.wapa.gov/sites/western/es/pubs/esb/Pages/esb3.aspx>



Question:

What are the benefits of heat pump water heating versus standard electric water heating for a small restaurant?

Answer:

There are several options you ought to explore regarding heat pump water heaters (HPWH) in a restaurant setting. The following approaches range from simple to complex:

Replace electric hot water with HPWH – A new HPWH could use up to 50 percent less energy than your old electric water heater, depending on the model chosen and the unit it would replace. Heat pump systems are available in a range of sizes and optional features, priced accordingly. Larger hot water storage is better in a business setting since heat pumps do not recover as quickly as electric elements. One advantage of heat pump technology is that it creates cold air as a byproduct of heating water. Recirculating the cool air through the kitchen could reduce cooling needs while increasing employees' comfort.

Add a heat recovery system to the existing air conditioning – Consider installing a heat reclaim unit on the air-conditioning system to supplement the hot water system. Waste heat from the air conditioner preheats water used in the electric water heater. This solution captures more efficiency from your air conditioner, and is best suited to a climate with a longer cooling season.

Replace the electric water heater and air-conditioning – HPWH could provide both water heating and space cooling – and very efficiently at that. The unit would only heat water in the

winter, but again, this might be a cost-effective choice in a milder climate.

Add a heat recovery system to the dishwasher drain – Unlike air conditioners, dishwashers produce heat all year around. Use heat reclaimed from this appliance to preheat water to the hot water tank.

To help you decide

Obviously, each system comes with a price. Do your homework to determine which option is right for you. The following resources may help you in making your decision.

- **Measure Guideline: Heat Pump Water Heaters in New and Existing Homes;** C. Shapiro, S. Puttagunta, and D. Owens; 2012
- **Laboratory Performance Evaluation of Residential Integrated Heat Pump Water Heaters;** B. Sparn, K. Hudon, and D. Christensen; 2011
- **Residential Heat Pump Water Heater Evaluation: Lab Testing & Energy Use Estimates;** Ecotope, Inc., for the Bonneville Power Administration; 2011
- **Heat Pump Water Heaters Energy Savers;** U.S. DOE Office of Energy Efficiency and Renewable Energy
- **Residential Heat Pump Water Heaters;** Washington State University Extension Energy Program, 2008
- **Heat Pump Water Heaters;** National Association of Home Builders ToolBase
- **Water Heating;** American Council for an Energy-Efficient Economy
- **Water Heater, Heat Pump;** Energy Star
- **ENERGY STAR Qualified Heat Pump Water Heaters;** This table lists brands, models, sizes, energy factors and other information. ⚡



Heat pump water heaters come in different sizes with a range of features (Photo by SZ Wholesaler)

For links to more resources, visit <http://ww2.wapa.gov/sites/western/es/pubs/esb/Pages/esb4.aspx>

Website of the month:

Tribal Energy Program gets new look

<http://apps1.eere.energy.gov/tribalenergy/>

U.S. DEPARTMENT OF
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Tribal Energy Program

The Tribal Energy Program, under the Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE), recently launched its newly redesigned website.

The program provides financial and technical assistance to tribes seeking to evaluate and develop their renewable energy resources, and reduce their energy consumption through efficiency and weatherization. It also offers education and training opportunities designed to foster clean energy technology adoption, promote green jobs and growth and strengthen native communities.

The site translates the program's three-pronged approach to fulfilling its mission into an efficient, user-friendly experience. Incorporating direct input from users, the improved architecture helps visitors navigate quickly to the valuable resources tribes have relied on for years to make sound energy decisions.

Quick links

Obtaining funding is one of the greatest challenges any energy project faces, and tribal projects are no different in that respect. Funding opportunities is the first among popular links on the new home page, and the first link in the "Quick Links" box that appears on the left side of sub pages.

With the help of the Tribal Energy Program, the Rosebud Sioux built this 750 kW NEG Micon turbine. (Photo by National Renewable Energy Laboratory)

This page briefly describes the program's funding process, with a link to DOE's general overview.

Current funding opportunities can be found here, along with a list of past opportunities visitors can use as a reference when researching grants. Since tribal projects may qualify for funding from other agencies, the page provides a link to related funding opportunities, too.

Money matters, but it helps if you know what to do with it, so next up in "Quick Links" is upcoming trainings. A gray box gives information about the most recent training opportunities and provides a link to a full calendar. Users can also learn about student internships and access materials from past workshops and webinars.

The final two "Quick links" connect users to additional information. Interested parties can subscribe to email updates to receive news alerts about funding and educational op-

portunities and energy development. Those who have more questions about the Tribal Energy Program can send them to the Help Desk.

Learn all about it

Whether users are building their knowledge of tribal energy development from the ground up or just looking for specific information, this website can help. In the former category, the comprehensive Guide to Tribal Energy Development is an excellent introduction to the many facets of energy development.

Users who want to know more about the dozens of projects the Tribal Energy Program has funded over the years can get the details here. Project information is organized by tribe, state, award type and technology.

Federally recognized Indian tribes or communities with a project already in mind can qualify for up to 40 hours of technical assistance. This may include information on renewable technologies and resources, energy-efficiency techniques, design review and strategic energy planning to name only a few of the services available. The program evaluates the request and forwards it to the appropriate DOE laboratory.

Keep in touch

Websites are organic things, evolving as the owners learn more about their users' needs. The Tribal Energy Program encourages visitors to share their opinions and suggestions, so this resource can continue to grow and improve and help tribes make the most of their energy resources. ⚡



With the help of the Tribal Energy Program, the Rosebud Sioux built this 750 kW NEG Micon turbine. (Photo by National Renewable Energy Laboratory)

For links to more resources,
visit <http://ww2.wapa.gov/sites/western/es/pubs/esb/Pages/esb5.aspx>