

## Utility contest shows how energy-efficiency improvements pay

On makeover shows, the lucky subjects receive thousands of dollars worth of merchandise, services and—most important—expert advice to transform their wardrobe or living room or car. Wouldn't it be great if the shows told those of us who don't have that kind of money or technical assistance which changes we could make at home to get the most bang for the buck.

### Contestants look at bills

Delta Montrose Energy Association took that extra step with its Home Energy Makeover Contest last fall, and everyone came out a winner. "Our goal was to show how a one-time investment in energy-efficiency improvements can save homeowners money every month for as long as they own the home," explained Ed Thomas, marketing director for the DMEA subsidiary Intermountain Energy.

The southwestern Colorado cooperative partnered with the Colorado

Energy Science Center and several local businesses to offer its members the chance to win \$25,000 in energy-related home improvements.

In addition to the grand prize, two runners-up received \$10,000 in energy-related improvements. Seven members won a free energy analysis of their homes to determine the best ways to cut their energy bills. Consumers got a Home Energy Makeover Guide to help them make their own improvements. DMEA and CESC got benchmarking data, a network of contractors and the framework for a new business line for Intermountain Energy.

### Selecting finalists

The contest kicked off in August 2005, and received 130 entries. Typical DMEA member homes—1,000 to 2,500 sq. ft., with no unusual types of major energy use—were eligible to participate.

Entrants had to give CESC permission to review their total energy bills, including electricity, gas and propane, for the last 12 months. CESC calculated the total BTUs and divided by the home's square feet to get the BTUs per sq. ft. use. From those calculations, a review team selected the 30 highest energy users.

The review team did a walk-through at about 20 homes. Thomas said, "We came up with 10 finalists to receive an extensive home energy efficiency performance analysis with a blower door test."



The grand prize winner in DMEA's Home Energy Makeover contest was a 2600-sq. ft. house built in 1945. (Photo by Delta Montrose Energy Association)

### Data determines prize

CESC plugged the data into TREAT, a software program developed by the National Renewable Energy Laboratory and New York State Energy Research and Development Authority. TREAT models the home's energy use based on the building shell and appliances and "tunes up" the model with the homeowner's 12 months of actual use and local weather data.

When local contractor costs are entered, the program produces a menu of cost-effective improvements grouped into price levels: good (up to \$2,500), better (up to \$10,000) and best (up to \$25,000). "It was critical to find a software program that worked with real data and treated the house as a system," said Thomas. "TREAT was good for that. It shows people which investments pay for themselves."

The grand prize winner was a 2,600-sq. ft. home built in 1945 and expanded in 1959 that used 16,100 kWh annually and 1,200 gallons of propane for heating. The most cost-ef-

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# California updates building standards to cut energy use

Changes to Title 24, the state-wide energy efficiency building standards that have saved Californians more than \$56 billion in electricity and natural gas costs since 1978, went into effect on Oct. 1 with a focus on reducing peak energy use in particular.

“Most of the year, California’s energy supply is more than adequate,” noted Jackalyne Pfannenstiel, California Energy Commission vice chair. “However, on those 10 or so extremely hot days, demand sky-rockets because of the increased air conditioning load. The new building standards will help us manage our peak loads.”

The CEC estimates that the standards will further reduce energy use in the state by 180 megawatts of electricity load and 8.8 million therms of natural gas each year.

The Energy Efficiency Building Standards regulate construction of residential and nonresidential buildings. The commission periodically updates the standards to reflect the state’s changing energy needs and to take advantage of new energy efficiency research and technology.

The latest revisions call for more

efficient lighting and make several changes to improve the performance of heating, ventilating and air conditioning systems for homes and businesses.

## Lighting measures pay off

The most extensive changes to the standards involved residential lighting requirements. “Lighting is low-hanging fruit,” explained Erik Page, director of engineering for the California Lighting Technology Center at the University of California at Davis. “Making the lighting changes required in the new standards can improve efficiency fourfold.”

The center developed the Residential Lighting Design Guide to help homebuilders understand and meet the new requirements. CEC, Pacific Gas and Electric Co., Sacramento Municipal Utility District, Sempra Energy Utilities, Southern California Edison and the EPA Energy Star program all contributed funding to the guide’s development. The guide is available as a free download, or contact Melissa Blevins to buy a hard copy.

For non-residential buildings, the interior standards include skylights with daylighting controls in “big box” buildings and lower lighting power limits to encourage use of new efficient lighting technology. “Unconditioned” buildings, such as parking garages and warehouses, must have efficient electric lighting and control regulations.

## High-use rooms targeted

In residential buildings, the new codes encourage high-efficacy lighting — meaning state-of-the-art fluorescent lighting in most permanent fixtures — and the use of dimmers and oc-



**An electrical technician installs a CKP62 high-output CFL downlighting system at a field test site in Sacramento, Calif. Title 24 updates encourage this kind of high-efficacy lighting in rooms with high loads and long use hours. (Photo by California Lighting Technology Center )**

cupancy sensors. Page added that some light emitting diode systems now qualify as high-efficacy and that all LED efficacies are improving rapidly.

Contractors and building owners who want to save energy in any state should consider replacing incandescent lamps in those rooms with energy-efficient fixtures such as the one the center developed for kitchens. Page also strongly recommends replacing conventional porch lights with fixtures using CFLs and/or occupancy sensors.

## Other improvements

The new standards did not overlook efficiency gains to be found in building shells and other systems and equipment.

Efficient window and roofing technology will help to reduce electricity demand on hot summer days when air conditioning loads can cause the state’s power needs to nearly double. Tighter windows with improved glazings will be required when remodeling or altering existing residential buildings.

*See BUILDING STANDARDS, page 3*

## Energy Services Bulletin

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## Building standards

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Contractors must install “cool roofs” – highly reflective, insulated roofing – when building new non-residential buildings or replacing existing roofing. A cool roof can reduce those temperatures by as much as 50 degrees, which translates to a 20-percent reduction in air conditioning costs.

Whenever new heating, ventilating and air conditioning equipment is installed, the standards require ductwork to be inspected and sealed to correct the inevitable large leaks in existing ducts.

### Utilities provide support

The tighter regulations have the

support of building industry representatives, the Natural Resources Defense Council and utilities.

Roseville Electric offered New Construction Design Incentives to encourage owners and builders to include energy-conserving measures during the project's design phase. Funding was available to customers on a first-come, first-served basis for any combination of lighting, envelope or mechanical system improvements and for whole-building measures.

Before the new code went into effect, SMUD offered incentives for lighting upgrades and cool roofs for commercial buildings, said Lighting Specialist Connie Buchan, but discontinued the programs when the measures became requirements.

Buchan, with Melissa Blevins at

the CLTC, spearheaded the CLTC lighting guide and presented some workshops with CEC trainers. “SMUD held an ‘All-Title 24 Summer,’” she said. “We had 20 classes covering nothing but Title 24 changes on building envelope, mechanical systems and lighting requirements.”

As the Golden State continues to raise the bar on energy efficiency in buildings, the industry outside California is starting to follow. Developers are finding that sustainability is a marketing point, especially if it translates into lower energy bills for owners. Also, many municipalities are considering or including efficiency standards in local building codes. Title 24 may provide the blueprint. ⚡

Want to know more?

Visit [www.wapa.gov/es/pubs/esb/2006/feb/feb062.htm](http://www.wapa.gov/es/pubs/esb/2006/feb/feb062.htm)

## Utility contest

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fective investment of \$2,500 would be adding cellulose insulation to the attic and crawlspace, sealing air leaks, installing low-flow faucet aerators and showerheads and replacing 10 incandescent bulbs with CFLs.

The next level includes all those measures, plus upgrading the boiler and water heater and installing Energy Star windows. The best package—the one the winners received—replaced the propane furnace with a geothermal heat pump.

### Launching business

Co-sponsoring businesses do-

nated systems and equipment for the contest.

If a system was identified as cost-effective and there was no donor, DMEA bought it and installed it anyway. “If a measure can save the homeowner money, it’s worth the investment to us to have a working example,” noted Thomas.

That market-based approach hints at the direction DMEA may take with the benchmarking data, vendor network and analysis tools the contest brought together. “The Home Energy Makeover could be the launching pad for a new business,” Thomas said. We need to see if people are interested in a comprehensive service to help

them improve their home’s energy performance.”

At a November workshop DMEA held on how to launch a home energy efficiency program, about half the participants said they would be willing to pay for such a service.

Consumers can visit the Home Energy Makeover Guide to learn more about energy-saving improvements that pay. The guide is available through a licensing agreement DMEA has with Apogee through TriState Generation and Transmission Association. “It’s quick and free and anonymous, but it gets the idea across.” That is, with a few small improvements, you too can transform your energy bill. ⚡

Want to know more?

Visit [www.wapa.gov/es/pubs/esb/2006/feb/feb061.htm](http://www.wapa.gov/es/pubs/esb/2006/feb/feb061.htm)

# Wyrulec loan program grows local business

Keeping local economies vital is one of the greatest challenges facing small-town and rural utilities in Western's territories, and it is one that Wyrulec Company in Lingle, Wyo., has tackled with creativity and vision.

The electric co-op has been stimulating economic development in eastern Wyoming since 1997 with a revolving loan fund started with a \$400,000 grant from the USDA Rural Development Electric Program.

The conditions of the grant required Wyrulec to put up 20 percent matching funds and make the first loan to a non-profit entity. "The revolving loan fund was established once the first loan was repaid," said Wyrulec General Manager James Hudelson. "As long as that money stays in the fund, it stays in the community."

Wyrulec has made 12 subsequent loans to support feasibility studies, business expansions and new businesses. The loans have not created direct load growth for the utility, but they have probably helped to keep people in Wyrulec's service territory who might otherwise leave to find work.

## New technology

One of those start-up ventures, Heartland BioComposites, LLC, might still be just Heath Van Eaton's dream without Wyrulec's help. Van Eaton developed a composite building material made of wheat straw and recycled plastic that supports weight. Competing products on the market are not structural.

"Heath had a great idea and a strong business plan, but it's very hard for a college student to get funding to

launch a company on a new technology," said Brad Sutherland, executive director of the Goshen County Economic Development Corporation. Sutherland sits on the loan committee.

Wyrulec was Van Eaton's first choice for funding, rather than a last resort. The utility awarded Heartland a \$20,000 loan initially, and then increased it to the maximum of \$150,000. "They saw the potential in the project and the benefits to the different communities," said Van Eaton.

The funding went into research and product development. "We learned a lot about our composite with the money they loaned us," said Van Eaton. "Their loan boosted our company, the credibility of our technology."

## Community benefits

After Heartland BioComposites received the Wyrulec loan, Van Eaton was able to raise \$2.5 million. The company held a groundbreaking ceremony for plant construction in December, and hopes to be in production by summer 2006.

The Economic Development Corp. will own the 33,750-square-foot facility Heartland will lease. The plant will employ 15 to 20 people initially, growing by an additional 50 to 60 employees over the next five years. Eastern Wyoming wheat farmers will benefit by selling Heartland the wheat straw needed to manufacture the material. In an agricultural community, supporting a business that adds value to local crops makes good economic sense.

Another advantage of locating in Torrington is the nearby supply of the product's other ingredient. "The Rocky



**Heartland BioComposites produces a building material from wheat straw and recycled plastic. (Photo by Heath Van Eaton)**

Mountain region is one of the only areas that has a surplus of recycled plastic," Sutherland pointed out.

## Elements for success

Wyrulec's loan committee and board carefully scrutinize those logistics and the business plan when evaluating loan applications.

"Applicants have to have a product and a marketing strategy," stated Sutherland. "We see a lot of plans that have one but not both. Heath had the product, the marketing and the talent, and he was realistic. Too often, people don't want to give up any ownership."

Companies should be choosing the community for the right reasons, Sutherland added, "Otherwise, it could leave town for the first better offer that comes along."

The business should be based on the present economy, he recommended, and have a good potential future. Old industries, especially ones that rely on the Farm Bill, don't fit that description.

Backing a new idea can be risky, but Wyrulec Company is willing to put its faith—and funding—behind its community. When an innovative enterprise like Heartland BioComposites comes along, that faith may reward both the utility and the community. ⚡

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# Efficient lighting takes off at California airports

**T**ruckee-Tahoe Airport and Naval Air Station North Island. Both implemented energy-efficient lighting projects in 2003 with different goals and different technologies, but with the same end result: more efficient operations.

NAS North Island in San Diego, replaced existing incandescent taxiway, heliport and obstruction lights with LED lights. “The goal of the project was energy and maintenance savings,” said Base Energy Manager Mike Magee.

For Truckee-Tahoe, a small civil airport on the northern California-Nevada border, the goal was to install its first taxiway lighting. “We only had reflective markers on the taxiway at the time,” recalled General Manager Dave Gotschall.

## Lower cost, easy to install

The cost of installing the lights, including running electricity out to the area, was estimated at \$1.2 million. Gotschall hoped to fund the project with an Airport Capital Improvement Program grant from the Federal Aviation Administration. Because of the size of the expenditure, however, the FAA wanted to break it into a two-year project.

A trip to the Association of California Airports conference changed that grim forecast. Gotschall visited the Carmanah Technologies booth at the conference and discovered an efficient and inexpensive solution. He learned that 560 solar taxiway lights could be installed for \$135,000, the airport’s matching portion for the FAA grant. “The cost of civil engineering

and extending power line really drove up the price tag,” said the general manager.

Solar lights could save the airport an additional \$15,000 annually in maintenance costs. The one drawback was that the lights carried only a five-year guarantee. The equipment’s relatively short lifespan seemed like an acceptable tradeoff to the airport board, however. Gotschall got approval to install the solar lights, and Truckee-Reno Airport became the first civil airport in the country to install solar taxiway lights. In the two years since the installation, “The lights have worked great,” he declared.

## Utility contract

Solar-powered lights have been used by the military to set up airstrips in Iraq, Magee noted, but they were not appropriate for NAS North Island. “We already had the electrical infrastructure in place,” he explained.

The base’s resource efficiency manager worked with Naval Facilities Engineering Command Southwest to develop the retrofit project. Project financing and execution for the upgrade came from a utility energy services contract the Navy had with San Diego Gas and Electric Company.

The project cost \$327,800, and saves the base an estimated 222,850 kWh annually. The initial simple payback was calculated to be 3.8 years, but Magee said that subsequent airfield LED projects have been more like six to eight years, even counting maintenance savings.



**Carmanah Model 601 taxiway edge lights awaiting installation at Truckee-Tahoe International Airport. (Photo by Phred Stoner, Truckee-Tahoe International Airport, courtesy of Carmanah Technologies)**

## Measures attract attention

Even with the longer-than-expected payback time, lighting is still one of the most cost-efficient strategies for saving energy that any business can make, according to Scott Terrell, planning director for Truckee-Donner Public Utility District.

The utility worked with Truckee-Tahoe on upgrading lighting in airport buildings, but can’t take credit for the solar taxiway lights, Terrell said. “Maybe we helped to get them thinking about energy-efficient lighting, though.”

The base received the Secretary of the Navy Energy Award in 2004 for a variety of measures including the LED retrofit. Truckee-Tahoe earned a Flex Your Power award for installing the solar lights, and PBS did a documentary on the system.

Gotschall said he would consider installing more PV at Truckee-Tahoe if he could find equipment that worked in the region’s harsh winter conditions. “The technology and economics are getting better all the time,” Gotschall said. “If it pencils out, why not give it a try?” ⚡

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# Nebraska's first digester produces energy, controls hog odor

A simple plan to expand his hog operation near Dodge, Neb., turned Danny Kluthe into the owner of the state's first methane-powered electrical generator.

"It was the best way to control the odor," Kluthe stated. "Electricity is just the byproduct."

Kluthe's company, named for the church across the road from the farm and for his lean hogs, began feeding 59 kW to Cuming County Public Power District's system in September. Nebraska Public Power District built the interconnection to CCPPD's distribution system and buys the electricity from OLean Energy, which it sells to its member CCPPD—Kluthe's utility.

## Odor control

NPPD's power purchase closed the partnership circle that began more than three years ago with a methane recovery workshop hosted by the power wholesaler and the Nebraska Department of Environmental Quality. Kluthe attended in hopes of finding a way to double the size of his 4,000-head farm without offending his neighbors. Capturing the gas and turning it into power seemed to offer an answer.

In a state with low-cost power like Nebraska, the margin for selling electricity is small. The irony is that the states with the most potential for methane generation—agricultural states—tend to have inexpensive coal- or nuclear-based power.

There has to be a business reason for building a generator.

The reason for Kluthe was increasing his farm's profitability. A methane

digester would allow him to do that and still be a good neighbor. That settled, the real work of being a pioneer began.

## Challenges

A combination of Kluthe's own investment and grants funded the project. CCPPD helped Kluthe conduct a feasibility study and submit grant applications. The Nebraska Environmental Trust gave the project a \$200,000 grant and the USDA Natural Resources Conservation Service helped share the cost of lagoon piping.

Kluthe also received an \$80,000 grant from the USDA Farm Bill Clean Energy program in 2003. Construction must be completed and design performance tested before he can collect the grant.

Raising money wasn't the only challenge facing Nebraska's first digester project. Kluthe learned that Nebraska is a public power state. "Any generation added to the power supply has to go through a power review board," he explained.

After the board tabled his first request for a review, the Nebraska Attorney General offered the opinion that a review wasn't necessary. Since the digester could be considered a PURPA Qualifying Facility, NPPD could be required to purchase the digester's excess generation at its avoided cost. *Note: The Energy Policy Act of 2005 required FERC to modify these rules.*

There were also negotiations with the state Department of Environmental Quality. Kluthe had to convince the department that the digester



osie and Danny Kluthe (center) were joined by Nebraska state senators Arnie Stuthman (left) and Matt Connealy to cut the ribbon on the Kluthes' digester gas-powered generator, the first in the state. (Photo by Cuming County Public Power District)

would take care of the odor from the additional livestock.

## Pointing the way

If he had any of his own doubts about the system's effectiveness in that area, they were put to rest when Kluthe visited Colorado Pork, LLC, in Lamar, Colo. "They had 5,000 sows and no offensive odor," he declared.

Colorado Amendment 14, which regulates odor emissions, has helped to drive the development of methane recovery projects in the state, but Nebraska doesn't have a lagoon law yet.

Other livestock producers may be following Kluthe's lead soon. In Omaha Public Power District's territory, a 20,000-head cattle feedlot is building a digester. Thompson said NPPD has heard proposals for a system to take the manure from several feedlots and another to dispose of paunch manure from cattle slaughter.

If those projects move forward, they will be looking to OLean Energy as a model. Ready or not, Kluthe is now Nebraska's leading livestock/energy producer, and OLean's success doesn't have a smell at all. ⚡

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Visit [www.wapa.gov/es/pubs/esb/2006/feb/feb065.htm](http://www.wapa.gov/es/pubs/esb/2006/feb/feb065.htm)

# Granite Falls, Minn., offers customers first conservation incentive

Whether a utility engages in demand side conservation to control its load growth or does it because of a regulation or contract requirement, energy efficiency offers benefits for both the consumer and the power industry, as Granite Falls, Minn., Municipal Utilities discovered.

“If you’re conserving energy, you’re not purchasing it and that’s a good deal for the utility,” explained Granite Falls Electricity Supervisor Don Reznechek.

Granite Falls buys about half its power wholesale from the Central Minnesota Municipal Power Agency. Western has supplied around 30 percent of the city’s annual power load since the 1980s, and the rest comes from Granite Falls’s own 1.2-MW hydroelectric dam on the Minnesota River.

That dam is one of the reasons the town only launched its first conservation program this year. Reznechek said, “Those generators have really helped to keep the cost of electricity down for us.”

## Federal requirement

However, Western’s Energy Planning and Management Program requires customers to develop a plan for efficient energy use. One option is for a utility to spend 1.5 percent of its revenues on demand-side conservation programs. So Reznechek consulted with the city engineer and reached the conclusion that lighting is one of the most cost-effective and easy-to-implement efficiency programs.

The utility provided customers with coupons worth \$10 that could be redeemed for a compact fluores-

cent lamp. “Actually, with sales tax, the cost of two CFL bulbs is about \$11,” said Reznechek, “so they could get a second one for a few cents.”

Distributing the coupons as bill stuffers kept the logistics simple. Ladner’s True Value Hardware and the Sawmill Builder’s Supply in Granite Falls carried the efficient light bulbs and accepted the coupons.

Advertisements explaining the program ran in the local newspaper and on the radio. Customers redeemed \$2,300 worth of coupons — an excellent response for a utility with about 1,500 meters.

## Other measures

For the utility’s next efficiency program, Reznechek is investigating some type of incentive for energy efficient appliances. Cooling may be an application where Granite Falls could reduce its consumption, too.

The utility’s load is increasing steadily at about 1 percent per year, after a period of intense building in the 1990s. “That was driven by flood and tornado recovery,” explained Finance Manager Darcy Mulvihill. “Otherwise, the population is pretty stable.”

The price of electricity in Granite Falls was stable, too, thanks to the town’s hydroelectric facility. Even with a recent necessary cost adjustment, rates are still a very good deal. “When



**The city-owned, 1.2-MW hydroelectric dam on the Minnesota River helps Granite Falls Municipal Utilities to provide low-cost electricity to residents. (Photo by Granite Falls Municipal Utilities)**

we made the adjustment, we did a comparison of our rates with Xcel’s rates for Montevideo [Minn.], and ours still came out lower,” said Mulvihill.

Most Granite Falls customers heat their homes with natural gas, however, leading some to look into alternatives to control their energy costs. “I’ve gotten calls from people wanting to know about dual heating rates,” noted Reznechek.

The rates are good, he said, but not low enough to inspire many customers to switch to electric systems, or to inspire an incentive program for electric heating technologies.

Still, there are many technologies that can improve a utility’s service and bottom line. Reznechek has recently been looking into using biodiesel in the city’s 6-MW diesel backup generator. After all, a public power provider’s first concern is supplying reliable, low-cost electricity to its customers. If conservation supports that goal, Granite Falls supports conservation, and its first successful energy-efficiency program won’t be its last. ⚡

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Visit [www.wapa.gov/es/pubs/esb/2006/feb/feb066.htm](http://www.wapa.gov/es/pubs/esb/2006/feb/feb066.htm)**

# Utility's biodiesel fleet promotes New Mexico clean energy goal

**A** New Mexico utility recently committed to a major renewable energy purchase that doesn't involve electricity generation at all.

PNM, the state's largest power provider, purchased more than 100,000 gallons of B20 biodiesel blend from Blue Sun Biodiesel in 2005, and expects to use about 240,000 gallons annually starting this year. The cleaner burning, alternative fuel is powering the company's Albuquerque and Santa Fe diesel-powered fleets, including medium duty trucks, backhoes, compressors and welder units.

## Demand creates availability

Increasing the local market for the cleaner-burning diesel alternative was one of several motivations for the switch, PNM Spokesperson Jeff Buell added. "We hope that other large diesel fleets will consider using this fuel, and that will lead to a better equation for distributors," he said.

So far, biodiesel is only available around the major metro areas of the large and sparsely populated state. That is why only 240 vehicles, or about 57 percent of PNM's fleet, use it. "A lot of our service areas are remotely located and have only four or five cars," Buell said. "You need a certain population density to get the economy of scale."

That is changing in the northern part of the state. Amigo Mart, the New Mexico distributor for Colorado-based Blue Sun, already has two retail biodiesel pumps in Santa Fe and two more in Taos. More pumps are planned for Albuquerque later this year.

## Easy transition

The delivery infrastructure—the actual pumps—are not the obstacle for biodiesel in the same way that it is for hydrogen, for example. Biodiesel can run through a standard diesel pump, "As long as the system is cleaned first and properly maintained," said Blue Sun President Jeff Probst. "When you don't have that maintenance, you have big problems, and mechanics will usually blame the new fuel."

The practical benefits of using biodiesel were another critical factor in PNM's decision to switch. The alternative fuel offers better mileage and higher lubricity, which can reduce wear and tear on engines. The cost is about nine to 15 cents more than diesel per gallon, "But we expect fuel efficiency and longer engine life to mitigate some of the cost," said Buell.

## State energy plan

PNM shares its concerns about the cost of conventional fuel, both environmental and economic, with the state government.

New Mexico Governor Bill Richardson has an ambitious program to develop the state's renewable energy resources. In August, he issued an executive order requiring state agencies to obtain 15 percent of their fuel from renewable fuels, such as biomass, by the year 2010. The executive order also set up a structure for the state's



**A PNM service truck fills up with Blue Sun biodiesel. The utility hopes that other large fleet owners will follow its example and start using the cleaner-burning fuel. (Photo by PNM)**

vehicle acquisitions so that they comply with the existing law.

Utility representatives served on the governor's task force on biofuels, and on other committees looking at renewable energy and climate change. By joining the state to put its buying power behind biofuels, PNM is leading the way to cleaner air and a stronger economy. "We're interested in the economic development angle, too," said Buell. "Some oilseed crops could potentially grow in New Mexico."

For example, Blue Sun has had a lot of success with mustard seed in Oklahoma, an arid, lower-altitude region similar to eastern New Mexico. "Developing different products for different geographies is a central part of Blue Sun's business," said Probst, adding that product development takes time and support.

With enthusiastic supporters like PNM and the state of New Mexico, the time for a biodiesel boom in the Land of Enchantment may be right around the corner. ⚡

**Want to know more?  
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# Arizona sun powers sustainable farming experiment

**W**olfberry Farm, an experimental agro-ecology facility, is combining the best of modern technology and ancient farming practices to revive agriculture in north central Arizona.

Prescott College acquired the 30-acre site in the Chino Valley in 1996, and it has served as a laboratory for ecologically and environmentally sustainable farming methods ever since. “We’re here to test theories, not to read about them,” explained Dr. Tim Crews, project coordinator.

Students conduct experiments in irrigation methods, native plants, drought tolerance, crop rotation, soil regeneration, organic farming and more. Crews readily admits that some experiments are more successful than others. The failures help the students understand the frustrations farmers go through and why they rely on tried and true practices. The successes are helping Wolfberry Farm challenge conventional farming practices, like the use of electricity.

## Renewable energy success

Wolfberry Farm’s irrigation system, greenhouse fan, straw bale farmhouse and open air classroom run on solar power. “The grid runs by the site so we had access, but we wanted to see if we could run a growing system within the farm’s footprint,” said Crews.

That meant finding an environmentally-friendly power source to run the irrigation system, one of the biggest energy loads on a conventional farm. Water pumping became Wolfberry Farm’s first photovoltaic operation.

The system consists of two 2,500-gallon tanks supplying the water to the fields and the house, and pumps

that run directly off of 32 40-watt panels. The farm recently switched from a gravity fed drip system to pressure pumping. “The tanks weren’t high enough, so we were overwatering some of the lower fields to get all of them,” said Crews.

The new system pumps directly into a closed-pipe network at 10 psi. “Presumably, it will use about the same amount of power, but it will use less water to irrigate the fields more evenly.”

The 500-sq. ft., three-room farmhouse runs off 10 40-watt panels connected to an array of four 60-watt batteries. Super-insulated straw bale construction keeps the house cool in the summer and warm in the winter. “There’s a back-up propane heating system on the house that we haven’t used,” Crews noted.

Although the resident must keep a close eye on electricity use, the house and the equipment in it were designed or selected for energy efficiency. For example, the farm chose a high-efficiency conventional refrigerator because, Crews said, “We wanted equipment that was readily available and easy to fix.”

Instead, the refrigerator turned out to be the house’s biggest energy user, especially in the summer. “It could be that we just got a bad unit. We switched out for a new model last spring and it ran much more efficiently even through the summer.”



**The irrigation system at Wolfberry Farm in Arizona’s Chino Valley runs off the power generated by 32 40-watt solar panels. (Photo by Tim Crews)**

The classroom array is the most recent addition to the farm. Two 40-watt panels allow teachers and students to use microphones, give PowerPoint presentations and hook up laptop computers.

## Finding use for excess power

Like the pumping system, the greenhouse fan runs directly off one 40-watt panel. The fan draws on its power supply about eight months of the year, while the irrigation system’s energy needs usually peak around June, the hottest, driest part of the growing season. That has Crews and his students thinking about ways to use the excess power the irrigation array generates.

Up to now, selling power to Arizona Public Service, Prescott College’s utility, has not been an option. “They didn’t have a net-metering plan when Wolfberry Farm started up,” said Crews.

The state adopted a renewable portfolio standard in 2001, and Crews thinks things may change. “Representatives from Wolfberry attended

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*See ARIZONA SUN, page 12*

# Western governors map out region's renewable energy future

Imagine a Great Divide with abundant renewable energy resources on one side; a clean, diversified and secure energy supply on the other and a mountain range of issues in between. Navigating through those peaks is the task the Western Governors' Association set for itself when it launched its Clean and Diversified Energy Initiative two years ago.

WGA, a nonprofit organization of governors from 18 states and three U.S.-flag Pacific islands, develops policies and programs to address regional issues. Its key areas of focus include natural resources, the environment, human services, economic development, international relations and state governance. Spanning several of those categories, renewable energy development is a natural concern for the group.

The governors adopted a resolution in June 2004 to explore opportunities to capitalize on the West's immense energy resources. The goals of the Clean and Diversified Energy Initiative include developing 30,000 MW of clean energy in the West by 2015, and increasing the efficiency of energy use by 20 percent by 2020. The project also is examining the region's generation and transmission needs over the next 25 years.

## Experts study goals

The Clean and Diversified Energy Advisory Committee was formed at WGA's 2004 winter meeting to develop recommendations to meet the initiative's goals. The CDEAC

steering committee created individual task forces to study energy efficiency, transmission, solar, wind, geothermal, biomass, clean coal technologies and advanced natural gas technologies.

Members of the task forces brought different backgrounds and experience to the project. "It gave the task forces a variety of perspectives," said Robert Fullerton, power marketing advisor to Western's administrator.

Fullerton was invited to sit on the wind task force, where he provided a voice for Western customers. "It was important to assure that funding for renewable project studies would not be the responsibility of our long-term firm power customers unless they choose to participate," he said.

Each task force assessed the current state of its assigned technology, estimated costs for increasing capacity and identified risks and obstacles to development. "Task force members brought a lot of knowledge about their respective organizations to the table," recalled Fullerton. "We also researched specific states' programs, legislation and Federal information."

In fall 2005, WGA posted drafts of the task force reports on its Web site and accepted public comment for 30 days. The wind report was one of the first to be posted. "We received some comments that we incorporated in the final draft," Fullerton said. "The public response was relatively modest, with no recurrent themes or concerns."

Each task force offered a set of recommendations, which the wind group prioritized by timeliness as well as impact on initiative goals. "We identified policy priorities as well as actions that could be done quickly— what items might be completed in one year, three years and so on," Fullerton explained.

## Final report

Task force reports completed to date include advanced coal, biomass, energy efficiency, geothermal and solar. Reports on natural gas, wind and transmission are expected to be completed in the coming weeks. White papers also were produced on the topics of combined heat and power and hydropower.

CDEAC is compiling them into a comprehensive set of recommendations. The conclusions the task forces reached indicate that the initiative goal is attainable through a mix of efficiency, renewables and clean fossil fuel technology.

The optimal mix will have to be determined by the governors after CDEAC submits the final report at the WGA annual meeting in June, said attorney and economist Tom Carr. Carr is with the Western Interstate Energy Board, the energy arm of the Western Governors' Association. "Computer modeling can develop scenarios for different combinations of technologies and resources," he explained.

Whatever the WGA's final strategy is, Fullerton believes that the

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Want to know more?  
Visit [www.wapa.gov/es/pubs/esb/2006/feb/feb069.htm](http://www.wapa.gov/es/pubs/esb/2006/feb/feb069.htm)

# Heating calculator helps utility promote electric heat systems

In the continuing battle to control energy use and costs, Western's online Energy Services tools are a weapon that utilities and consumers can turn to any time to improve energy efficiency.

Just ask Marketing Representative Dave Holte of West River Electric Association in Rapid City, S.D., branch office. "I was just using it an hour ago," Holte responded when recently asked about the Heating Fuel Calculator. "A customer came in and wanted to know how an electric furnace would stack up against his forced air gas unit. I plugged in the current rates and was able to give him an estimate."

The Heating Cost Calculator is part of a suite of tools Washington State University's Extension Energy Program created for Western's Energy Services. The tools include heating and cooling fuel calculators, the Energy Solutions database, the Utility Options case study library and an Energy Events Calendar.

## Comparing factors

The heating calculator compares yearly operating costs for two different heating systems based on the heaters' efficiency, the distribution system and cost of fuel in the user's area, assuming an equal amount of space in both cases.

To get a comparison, the user first selects his current heater and distribution system. The menu offers a choice of 27 different units fueled by electricity, natural gas, geothermal heat, propane, oil or wood pellets. There are six choices for distribution systems, which are categorized by the level of duct insulation and

sealing. The user then selects a new heater and distribution system, and the calculator compares the efficiency of the two systems, BTUs per fuel unit, dollars per million BTUs and heating cost per year.

The site notes that factors such as home insulation, climate and building size affect heating costs. Overall, however, Holte has found the calculator to be very accurate. "After the heating season is over, I'll compare actual fuel bills on the electrical side," he said. "They are usually pretty close to the calculations."

The air conditioning cost calculator works in a similar way. A map of the United States divided into climate zones gives users the estimated annual cooling hours in their location. It also indicates where evaporative "swamp" coolers provide an effective alternative to air conditioning. Users can compare 17 types of electric air conditioners and six distribution systems, and compare air conditioners to swamp coolers.

## Persuading customers

The marketing representative learned of the Fuel Calculator from Energy Services Representative Ron Horstman when the online tools were first launched, and he has been using it almost daily since. "Customers who are familiar with the Energy Services tools use them frequently and often com-



The Energy Services tools pages have a new graphic look that identifies the tools as a joint product of Western and Washington State University.

ment on their value," said Horstman.

"Western continually searches for innovative new tools that will help the customer, like the Online Key Accounts Toolbox we're adding in 2006. If customers have an energy services idea or need, we want to hear about it," he added.

The calculator has been especially useful this heating season, Holte noted, with energy prices going up. "It gives consumers a reference they can use when shopping for new systems," he said. "The calculator has definitely helped to persuade some residential homebuilders and contractors to go electric."

West River's electric heating incentives undoubtedly increase the motivation. The utility offers rebates on air-to-air and geothermal heat pumps, and radiant wall and floor systems, and has special heating rate of 3.7 cents per kWh from Oct. 1 to April 30. "Electric heating is still quite a bargain," said Holte.

The heating and air conditioning calculators have been so useful to

*See HEATING CALCULATOR, page 12*

## Heating calculator

from page 11

West River and its consumers that the utility recently placed a link to the tools on its own Web site. Holte also suggested an addition to make the heating calculator even more useful. "I'd like to see an electric boiler/radiant floor system added to the menu," he said. "Rapid City is experiencing a residential housing boom and a lot of builders are installing those systems."

### Suggestions

"The Energy Services Clearinghouse receives lots of user com-

ments from utilities, mortgage lenders and contractors to name only a few," said WSU's Energy Program Coordinator David Shepherd-Gaw. "We've acted on user suggestions before, like adding the ground source heat pump, and we are looking into implementing West River's idea."

If you have used the Energy Services tools lately, you may have noticed another change—a new graphic look. The redesigned pages combine elements of Energy Services with the Extension Energy Program to identify the tools as a product of Western's partnership with WSU. A notice alerting users that they are leaving Energy Ser-

vices, a Federal Web site, has been added to comply with government regulations.

"The new, improved look is just another step in the evolution that has provided Western's customers and their end-users with energy-saving opportunities since 1994," Shepherd-Gaw observed.

Managing energy costs can be hard work, but high-quality, up-to-date information makes it easier. Western will continue to enhance its Energy Services Web site to make sure the energy-saving tools and resources our customers need are right on their desktops. ⚡

Want to know more?

Visit [www.wapa.gov/es/pubs/esb/2006/feb/feb069.htm](http://www.wapa.gov/es/pubs/esb/2006/feb/feb069.htm)

## Energy future

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CDEAC report promises to be a comprehensive resource for both the power industry and policy makers. "It will provide a current, accurate picture of the West's renewable resources potential and offer a variety of policy directions that could be pursued to meet the renewable energy goals adopted by the WGA," he said.

With a clear starting point, a map of the terrain and a clear destination, that Great Divide the Western Governors' Association set out to cross is starting to look like a bridge to a clean energy future. ⚡

## Calendar of events

Visit Western's regularly updated Energy Event Calendar for a complete list of seminars, workshops and conferences. <http://www.wapa.gov/es/pubs/esb/2006/feb/feb06coe.htm>

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the ribbon-cutting of APS's big solar array," he said, adding that the utility has shown some interest in another eco-farm the college is planning.

Solar-powered farm implements may be another option for the Wolfberry group. "At first, we looked into using solar power to produce hydrogen fuel," said Crews, "but the technology still has too far to go."

Then our research turned up a group that has been developing a

tractor that runs on a direct-charge solar battery. So now we are working on a prototype solar tractor."

The prototype might be plowing fields next spring or it could end up as another lesson learned. Either way, Wolfberry students will continue to ask the question that has dogged Arizona's long agricultural history: Can farming in the region be more ecologically and environmentally sustainable? History should prepare for some surprising new answers. ⚡

Want to know more?

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