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## Going green

September/October 2010 California Country magazine

Story by Christine Souza

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Farmers convert leftover products into renewable energy.

Imagine if you could take all the leftover potato peels and peach pits that end up in your kitchen and convert these scraps into energy to heat your home, power your television or wash your clothes.

This kind of waste-to-energy conversion is exactly what is taking place on a number of California farms and ranches, as innovative agriculturalists develop renewable energy sources like natural gas, electricity and diesel fuel from their leftovers.

Using everything from cow manure to onion juice to walnut shells, many of the state's forward-thinking farmers are turning what had once been considered waste into a renewable energy solution for use on the farm and beyond.

"When you look at innovation in California agriculture, it is usually initiated by good businessmen who are also willing to try new things," said Allen Dusault, a program director of San Francisco-based Sustainable Conservation. "We have to be looking at homegrown solutions, and the farm is the perfect place to find them."

"Governor Schwarzenegger has laid out a goal to have California generate a third of its power from renewable sources by 2020, and small renewable energy projects integrated with farm and ranch operations can help achieve that goal without the impacts caused by large-scale facilities," said Karen Norene Mills, a public utilities attorney for the California Farm Bureau Federation.

California dairy producers are among those leading the charge in developing renewable energy on the farm. They're doing this by installing methane digesters, a technology that allows them to capture the naturally occurring methane gas from their cows' manure before it escapes into the atmosphere and convert that gas into usable energy such as electricity.

David Albers, a third-generation dairy farmer and environmental attorney, is taking advantage of this "cow power." He is turning the manure produced by his 2,600-cow dairy in Fresno County into biomethane, a renewable natural gas that can be delivered directly to Pacific Gas & Electric Co. So far, he's producing enough natural gas to power about 1,200 homes annually.

Albers' direct-pipeline approach is different from what most other dairies in the state have done with methane

digesters, which is to produce electricity to run their individual operations. Through his Bakersfield-based company, BioEnergy Solutions, Albers said his goal is to link other neighboring dairies to his system to achieve economies of scale by bringing more gas together.

"Biomethane is a great opportunity from a number of perspectives," he said. "We have an administration and a Congress that is really focused on climate change issues and renewable energy. So it's an exciting topic and an exciting opportunity, and when you can be on the front end of something like that, it's intoxicating."

Dairy farmers aren't the only ones transforming waste to energy. Northwest of Sacramento in Winters, an organic walnut grower converts leftover walnut shells into renewable energy. Grower and processor Russ Lester of Dixon Ridge Farms uses a biogas-powered generator to create energy from walnut shells to fuel the farm's drying facility, generate electricity and heat buildings.



David Albers kneels on his methane digester, which consists of a covered storage pond where manure from his dairy is stored.



Dairy farmer and environmental attorney David Albers turns the manure produced by his 2,600-cow dairy in Fresno County into biomethane, a renewable natural gas.

"The good news is, the technology is going great. Ag by-products, like walnut shells, are a great renewable fuel source. It is something we have a lot of and many times pay to have removed," said Lester, a fourth-generation farmer. "I could do the math in terms of how much energy the walnut shells were capable of producing and I realized that we could do it, but it was just a matter of how."

In 2007, Lester worked with a manufacturer to install a small, biomass power system that converts walnut shells into heat and power and produces 50 kilowatts of electricity per hour—enough energy to power six homes. The generator burns the shells and creates a gas that is similar to propane, which is used to produce heat and electricity for shelling, drying, processing, freezing and packaging walnuts.

"One of the advantages of this technology is it produces a gas that can be used in a propane engine. When it is time to dry or harvest the walnuts, we can divert this gas and use it in our walnut dryers and offset the propane that we would typically use," Lester said.

Dixon Ridge Farms recycles 800,000 pounds of walnut shells for energy creation each year. Lester said his goal is to become energy self-sufficient by 2012, although he is well on his way after having reduced his total electricity use by more than 35 percent.

"I want to see it happen and believe it is possible much sooner than later," Lester said. "I've been dreaming about doing this for quite some time."

In Oxnard, fresh-cut onion processor Gills Onions uses innovative technology that each week converts 100 percent of the company's 1.6 million pounds of onion waste into ultra-clean heat, electrical energy and high-value cattle feed. The company reports that this process reduces greenhouse gas emissions by up to 30,000 tons per year.

By extracting the juice out of onion waste and letting it ferment in a renewable energy system called an anaerobic digester, Gills Onions creates enough biogas to power two 300-kilowatt fuel cells—the equivalent of powering 300 homes. Brothers Steven and David Gill, who own Gills Onions, installed the system in 2009.

"What we discovered was, when creating this new technology to address the issue of getting rid of the waste, we were literally taking our plant to zero waste," said Steven Gill, adding that it saves the onion processing facility some \$700,000 in annual electricity costs. The biggest challenges to the project, he said, were getting the permits and approval from the bank for financing.

"I was going to the bank trying to explain what the process was and what I was going to do and they just responded that it was going to cost a lot of money," he said. "They ended up taking a leap of faith and when we added it up, it was a good business decision.

"Despite the startup issues we've had, I'm real happy with the program."

As farmers have discovered the rewards for going green, they've learned that there can be obstacles beyond the cost of installing a renewable energy system. Sometimes, for example, policies from government agencies or power companies can conflict and complicate the conversion to renewable energy.

"We're working to encourage both the government and the private sector to make sure their policies encourage green power, to make it a more realistic option for farmers and ranchers throughout the state," Farm Bureau attorney Mills said.

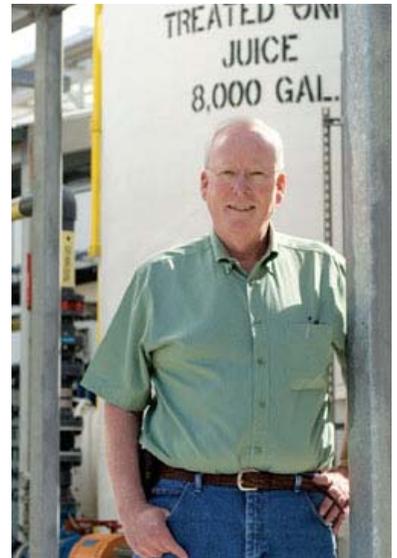
## How it works

The Advanced Energy Recovery System at Gills converts onion waste into ultra-clean energy.

View [diagram](#). (PDF, 744 KB).



Walnut farmer and processor Russ Lester converts 800,000 pounds of walnut shells each year into renewable energy. After his generator processes the shells, Lester's biomass-powered generator system produces a gas similar to propane that fuels the farm's drying system, generates electricity and heats buildings.



Steven Gill, owner/partner of Gills Onions in Oxnard, unveiled the company's system for converting leftover onion juice into energy in 2009.



Employees at the Gills Onions processing facility inspect the onions, which are shipped throughout North America.



Waste from the processing goes through a procedure where onion

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## Energy creation innovations garner recognition for farmers

By taking a chance on groundbreaking technology to improve the environment, several California farmers are now starting to see their efforts pay both financially and personally. These producers have been able to reduce their energy costs by converting waste into energy, and they are receiving state and nationwide recognition for thinking outside the box.

### David Albers, BioEnergy Solutions, Bakersfield

- In 2009, David Albers' BioEnergy Solutions was awarded California's highest environmental honor known as a Geela, the Governor's Environmental and Economic Leadership Award. The Geela is awarded for a person or company's voluntary contributions in protecting and enhancing the environment, building public-private partnerships and strengthening the state's economy. [www.calepa.ca.gov](http://www.calepa.ca.gov)

### Russ Lester, Dixon Ridge Farms, Winters

- Russ Lester's company was awarded a Growing Green Award in 2010 by the Natural Resources Defense Council that honors farmers, business leaders and promoters of sustainable food. [www.nrdc.org](http://www.nrdc.org)
- Dixon Ridge Farms received Geela awards in both 2008 and 2009 under the climate change category for environmentally sound energy production.

### Gills Onions, Oxnard

- Gills Onions (and HDR Engineering Inc.) received the American Council of Engineering Companies' Grand Conceptor Award in 2010 for engineering excellence in developing the company's Advanced Energy Recovery System fueled by onions. The engineering industry recognized 163 national finalists and 24 top award winners. [www.acec.org](http://www.acec.org)
- Gills Onions received a Geela in 2009.



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