Farm Energy Success Stories

New Farm Income • Rural Economic Development
Energy Independence • A Cleaner Environment
“American farmers and rural businesses are successfully using the Rural Energy for America Program to leverage billions of dollars in private investment for successful new renewable energy and energy efficiency projects. These new energy projects are good for rural economies, good for the environment and good for our national energy security.”

—Senator Tom Harkin (D-Iowa)

“Rural America possesses the resources and spirit to lead our nation away from dependence on foreign oil and non-renewable sources of energy. Building on the 2002 Farm Bill efforts, the 2008 Farm Bill is now expanding opportunities for farmers, ranchers and small businesses to conserve energy and produce clean renewable energy. Programs like the Rural Energy for America Program provide the resources to transform practical ideas to save or produce energy into a reality. This kind of common-sense program will help transform rural America into an energy resource for the entire nation.”

—Representative Collin Peterson (D-Minnesota)

“America needs a bold, new energy vision, and the Rural Energy for America Program can help. Our sustainable energy future must include the integration of energy efficiency and new technologies powered by clean renewable sources, such as wind, solar, biomass and biofuels. REAP funds a wide range of renewable energy projects that stimulate rural economies, help create jobs and address environmental concerns.”

—Representative Jeff Fortenberry (R-Nebraska)

“Rural America possesses the resources and spirit to lead our nation away from dependence on foreign oil and non-renewable sources of energy. Building on the 2002 Farm Bill efforts, the 2008 Farm Bill is now expanding opportunities for farmers, ranchers and small businesses to conserve energy and produce clean renewable energy. Programs like the Rural Energy for America Program provide the resources to transform practical ideas to save or produce energy into a reality. This kind of common-sense program will help transform rural America into an energy resource for the entire nation.”

—Senator Richard Lugar (R-Indiana)

“I strongly support the Rural Energy for America Program because it is one of the only federal programs that comprehensively transforms a clean energy development vision into action across agricultural America. From the time when we created this program in the 2002 Farm Bill to the nationally successful program today, we have cemented our commitment to transition rural and agricultural America toward a future that treats energy as a strategic resource which must be conserved, protected and produced. There is no turning back. America must break its foreign fuel dependency. The science of renewable energy rests in agriculture and unlocking the full potential of the carbohydrate molecule.”

—Representative Marcy Kaptur (D-Ohio)
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Rural Economic Development
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A Cleaner Environment

Environmental Law & Policy Center
Protecting the Midwest’s Environment and Natural Heritage
ELPC.org | FarmEnergy.org

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Front Cover: (Top) 15.99 kW PV array on barn at Camp Dewan, Burlington, Wisconsin - see FarmEnergy.org for additional information (photo courtesy of H&H Solar Energy Services); (L-R) Rancher with Solar Electric Fence, Courtesy of DOE/NREL, Credit - Warren Gretz; Green Circle Growers’ greenhouse with energy-saving solar curtain; Wind farm in Woodstock, Minnesota.

Back Cover: Wisconsin wind turbines.
The United States faces historic energy challenges to our economy, environment and national security. Rural energy development, especially on-farm energy production, responds to these challenges through clean, low-carbon renewable energy and energy efficiency opportunities, as this report documents.

The Farm Bill’s Rural Energy for America Program (REAP) is helping farmers and ranchers, other agriculture producers such as greenhouse growers, and rural small businesses throughout the country face and overcome these challenges.

**The Farm Bill - Key Clean Energy Driver**

The clean energy programs of the Farm Bill serve the nation in many ways: expanding clean energy production, slashing energy consumption and bills, promoting locally owned clean energy systems, diversifying farm income and cutting global warming pollution.

REAP and other Farm Bill clean energy programs accelerate the research, development and commercialization of many renewable energy and energy efficiency technologies. In the process, American agriculture and rural communities realize new income and economic development opportunities.

**Benefits of Expanding Farm Energy**

REAP and other farm energy programs boost local economies in several major ways. They create demand for new jobs for system development, installation, operation and maintenance. They help small businesses, which are engines of job creation. And they increase on-farm income and keep more of our energy dollars in our local communities.

Farm energy also increases our energy independence. A stable energy supply – largely immune to the supply shortages and pollution impacts of fossil fuels – is critical to our country’s security.

Clean energy also improves environmental quality by reducing or eliminating water, air and land pollution impacts from on-farm activities and fossil fuel power sources.

With a strong national commitment to policies such as Farm Bill clean energy programs, America can today provide clean energy for jobs, security and the environment for those who follow us.
The Rural Energy for America Program (REAP) is a cornerstone of the Farm Bill’s Energy Title. REAP is successfully helping farmers and other innovators in rural communities across the country to pioneer the next generation of American energy.

Many Projects, Strong Demand
Since its inception in 2003, REAP (first known as the “Section 9006” program) has helped thousands of farmers, ranchers and rural small businesses tap into the clean energy resources on their lands and cut energy waste in their operations.

REAP is extremely successful with over 3,000 project awards in all states. Even with more funding added in the 2008 Farm Bill, demand for REAP support continues to outpace resources.

REAP’s renewable energy technologies span the clean energy spectrum: wind and solar power, geothermal, manure digesters, small hydroelectric power, biomass for heat and power, and even geothermal heating.

REAP also funds many different energy efficiency upgrades, helping farmers and businesses cut energy costs, improve efficiencies and increase their revenue.

In 2008, Congress improved REAP in several major ways:

» **Energy Technical Assistance funding** – for organizations to carry out energy audits and renewable energy development assistance.

» **Feasibility Study funding** – to help assess the viability of new projects and improve program effectiveness.

» **Larger Loan Guarantees** – increases limit from $10 million to $25 million per project.

To help pay for these enhancements and meet the high demand for REAP resources, Congress increased mandatory funding to $255 million over four years (more than double the 2002 Farm Bill level). Congress also can add additional money through annual appropriations – for example, for fiscal year 2010, Congress pumped more than $39 million in additional discretionary funding into REAP, resulting in a total appropriation of nearly $100 million for the year.
Economic stability and homegrown renewable American energy go hand-in-hand. When Matthew Maxwell returned from Boston to his family’s rural Vermont farm he knew that the dairy industry had changed. “Milk prices were low at the time. I mean really low,” he said. “I knew that we needed to diversify our revenue and create some stability.”

Maxwell Farms’ Neighborhood Energy, LLC, joined the Central Vermont Public Service (CVPS) Cow Power program, becoming the fifth farm to use an anaerobic digester. With a $357,990 grant and a $326,770 loan guarantee from REAP, $250,000 from the Vermont Clean Energy Development Fund, $100,000 from CVPS, and $75,000 from the Vermont Agency of Agriculture, the $1.8 million project was on sound financial footing.

Maxwell projects a net income from the project of $224,900 each year, for a 6.4 year payback. The project has a variety of financial benefits, including electricity production and sales, animal bedding savings and sales, sale of excess solids, and tax credits. The generator has a 225 kW capacity, which can produce up to 1.75 million kWh of electricity each year, or enough to power almost 200 homes.

In addition to producing electricity, the farm’s anaerobic digester removes harmful bacteria from the cow manure, producing a high-value bedding that can be used on the farm. “With the bedding especially we’ve seen huge savings. Sawdust bedding used to be one of our biggest expenses,” noted Maxwell.

“This technology is the type of thing that allows a third generation kid like me to move back to the farm,” he said. “To us, the important thing is that the technology is getting better every day. The key is that we continue to pilot the process in the field so that we can improve efficiency and make the technology efficient for smaller farms.”

Farmers and rural small business owners have many reasons for undertaking renewable energy projects. For Doug Block at Hunter Haven Farms, it was simply a matter of improving on-farm efficiencies. “At the time, we never knew our energy costs would rise so much. We just wanted to make our operations more energy efficient.”

Hunter Haven Farms is on the cutting edge of digester technology. In 2005, Doug Block and his brother, Tom, installed an anaerobic digester on their 600-head dairy farm in Northwestern Illinois. The 130 kW generator, designed in nearby Chilton, Wisconsin by GHD, Inc., was an immediate success. Hunter Haven is now producing energy to sell back to the power grid, helping to grow American renewable energy solutions.

“We built our digester two years after another farm in Southern Illinois completed theirs,” noted Block. “They have twice as many cows, but we’re producing more energy. The technology is a lot like computers. The development is rapid, but it needs seed money in order to thrive.”

In addition to creating natural gas from cow manure, which greatly reduces the farm’s heating expenditures, the digester produces a comfortable solid byproduct that can be used as bedding for the dairy cows.

Block was quick to point out that most of Hunter Haven’s cost savings comes from producing animal bedding. “We see about 35%-40% of our savings through production and sale of heat and electricity, but over 60% of our savings comes from bedding.”

Block received $240,000 through REAP, accounting for 25% of the project’s $960,000 cost. Additional funding from the Illinois Department of Commerce & Economic Opportunity helped make the proposal a reality. Block, like so many other grant recipients, said that without REAP funding, “our project would have never been possible.”
In rural energy, manufacturers are constantly looking for innovative approaches. With that in mind, Easy Automation, an experienced manufacturer of feed and automated storage systems, is working to develop a modular ethanol plant that will allow farmers to produce ethanol, including cellulosic ethanol – all operated by a computer system similar to a feed mill or grain dryer.

To compete with the economies of scale realized by large ethanol plants, Easy Automation produces a modular system benefiting from cost savings of mass production. Easy Automation hopes its modular, skid-mounted system can produce ethanol economically at a smaller scale to overcome the transport costs of biomass. It asserts that the technology can also convert cellulose to ethanol.

Easy Automation started with a REAP grant to help convert the 100 kW natural gas genset at its Emmetsburg, Iowa manufacturing plant to an ethanol-powered system. "We wanted a way to make renewable energy using renewable energy," said Jayden Grupe, Operations Manager for the company. The generator serves nearly the entire electrical load for the plant.

Looking forward, Grupe believes that its modular system will be able to incorporate the latest in ethanol technology. "We believe our system will be able to readily produce cellulosic ethanol," he said.

Easy Automation is hopeful that its customers will also be able to use REAP funding to purchase its modular ethanol production facilities. The advantage of the company’s system is in its "plug and play" capability, said Grupe. The prefabricated system allows a self-contained, fully automatic ethanol production system to be delivered to a farm in trucks and assembled quickly. Combining units allows for scale-up. All that’s left is to turn the grain into fuel for the farm.

With jobs on everyone’s mind in this tough economy, Maine Woods Pellet, LLC is creating jobs by producing homegrown renewable solid fuels. "We initially anticipated fourteen employees," said David Carr, Plant Manager of the company’s production facility in Athens, Maine. “But with the demand we saw for home pellet heating, we needed to expand our bagging operation. We now have thirty-two employees at our firm.”

Carr was quick to point out that job creation doesn’t stop at the facility. “There are more jobs in the woods because of our product, there are more people needed to transport the timber and wood chips, it all adds up,” he continued.

Maine Woods Pellet, a joint venture of Maine Biomass Fuels and Linkletter and Sons timber company, is part of the growing wood heating pellet industry in the rural Northeast. Businesses and homeowners facing rising fossil fuel costs are increasingly turning to biofuels to offset their energy expenditures.

With many homeowners using biofuels as a secondary heating source, the trend away from conventional heating oil is noticeable. “We were designed for bulk,” explained Carr, “But our demand has changed so that we’re now doing a lot of bagging. In the future we could very well see home delivery like people used to have with coal.”

The $10 million cost of the plant meant that numerous funding sources would have to be utilized to see the project to fruition. Still, the $400,000 the company received through REAP was very important. “It may have been a relatively small grant,” said Carr, “but it was very helpful.”

“This is one of the times you have to say that it’s money well spent,” added Carr.
When propane costs hit $2.00 per gallon in the summer of 2008, Cliff Fitchpatrick decided that he had enough of relying on fossil fuels to heat his four chicken houses. He wasn’t alone. In 2007-08, at least twelve other farmers in Southwest Missouri joined Fitchpatrick in making the switch from propane to biomass for heating their poultry houses.

Fitchpatrick learned about REAP funding through Bill Harvill, a local poultry grower, who installed his own biomass stove with a REAP grant. The support of the local USDA office in Springfield was essential, he said. “They were there any time you had a question on the grant. They really helped to walk you through the difficult parts of the application.”

Fitchpatrick received a REAP grant for $20,000, or about 25% of the total cost to buy and install an 800,000 BTU biomass stove that will heat all four of his chicken houses. Asked if he could have completed the project without REAP funding, Fitchpatrick commented, “Not on this scale. It allowed me to do all four poultry houses instead of just two.”

The new stove also is self-regulating, turning off on warmer days when less heat is needed. “That’s another easy way we save on energy costs,” he said.

“We used to be at the beck and call of the oil industry,” he said. “The biomass stoves also give us the flexibility to shift fuel sources from wood to corn. It helps to stabilize our energy costs.” While payback will depend on future propane costs, Fitchpatrick says he could never think about going back. “Fundamentally,” he noted, “it’s all about looking forward. We can’t get caught in the do-nothing trap when oil prices are low. We need to be looking at promoting long-term sustainability.”

Middleton Building Supply, Inc. (MBS) in New Hampshire faced growing energy costs that threatened the growth of its business as it tried to expand. In tough economic times and facing rising electricity costs, MBS decided to adapt to a tough economy by transitioning its plant to renewable energy, helping protect the jobs of the 61 manufacturing employees.

In 2005, the sawmill used 314,450 gallons of fuel and required 4,405,011 kWh of electricity. At a total cost of over $1.2 million, “energy as usual” stood out as a costly burden. With the help of a $461,000 REAP grant and additional assistance from local economic development organizations, MBS installed a high efficiency combined heat and power (CHP) wood-fired boiler to supply the lumber manufacturing facility. Utilizing 45 tons of mill chips, edgings and cuttings, the 600 HP boiler and 600 kW steam turbine system is designed to produce 5.1 million kWh annually.

The results prove out MBS’ decision, with the company seeing an annual net energy savings of over $1 million. Currently, the boilers meet about 40% of MBS’ electricity needs, and the company expects that figure to increase to about 60% in the near future. The company also hopes to sell excess generation to the electric utility.

Combined heat and power systems are the most efficient way to tap the energy of a fuel such as wood. “Waste” heat is tapped for other uses, serving two tasks with the same amount of fuel. CHP technology offers high efficiencies of 60% or more, which is helping MBS to realize a simple payback on their investment in less than four years.

Businesses like MBS illustrate the innovation and success that REAP promotes. MBS saved 61 jobs, created new jobs, and reduced imported fuel consumption by hundreds of thousands of gallons.
Elkton Locker & Grocery  
Elkton, South Dakota

When Steve and Diane Hammer looked into expanding their meat locker business to a full service grocery store, the town of Elkton had been without a grocery for several years. They had already developed acumen for the meat business, satisfying both customers and judges with “Big Daddy’s Meats.” Now, with the help of a $65,000 REAP grant, the Hammers were able to bring a grocery store back to their small town in an environmentally sustainable and cost-effective manner.

“We were looking for a way to cut costs,” said Steve. What they found was a clean, renewable geothermal heat pump system that would save them money. “Our facility is now heated and cooled entirely by geothermal energy,” he continued. Geothermal presents a great opportunity for rural small businesses across the region to tap into renewable energy, and REAP is a part of realizing that potential. “Could we have done this project without REAP? Probably not,” said Steve. The Hammers also received small loans and grants from the South Dakota Office of Economic Development.

“We’ve seen considerable energy and cost savings,” he noted. “With the way the President would like to ‘go green’ I think that this program should play a larger role; we should get more of these projects funded.”

Shirley Hovda knows the financial strain that can come from heating businesses through the long winters of the upper Midwest. Her Quality Decorating company, which specializes in custom wood finishing and coatings, is located in Roseau, a northern Minnesota town famous for its local high school hockey team.

In February 2007, Hovda faced a “body check” of her own, courtesy of a $1,200 natural gas bill. The high heating costs convinced her that a change was needed. After researching a number of options, Hovda settled on a geothermal system to heat her newly constructed 6,000 square foot facility. With help from a $7,920 grant through REAP, she was able to purchase and install the system in January of 2008.

Geothermal heat pumps are a good fit for many businesses because they work efficiently in both the winter and the summer, heating or cooling, and replacing two separate systems. Hovda was attracted to geothermal for its efficiency and for the fact that it can operate year-round.

The system at Quality Decorating consists of a well that is dug into the ground which pumps groundwater through pipes in the building. The heat pump technology provides heating and cooling, as needed, through both in-floor and forced air mechanisms. Hovda has been very pleased with the unit’s reliability. But the true satisfaction, she says, will come from seeing energy bills that are 40% lower than in the past.
Dr. Maggie Peterson of Family Chiropractic & Massage in Enderlin, North Dakota knows that rural development is an opportunity that is best approached from the bottom up. The historic house she uses as an office for her practice seemed to be the ideal candidate for an energy efficiency project, and the adjacent garage was the perfect place to build a small organic foods store for local farmers to sell their produce.

Using a $12,801 grant from REAP and a $10,000 promissory note from the Enderlin Economic Development Committee, Dr. Maggie (as she is known) installed energy efficiency upgrades and a geothermal heating and cooling system that will cut her costs significantly. The REAP grant ended up accounting for about 25% of her $52,000 construction costs. She said she expects payback on her investment in five years.

“The geothermal system just made sense,” she said. “It was the same cost as installing a conventional system, and the operating costs are much lower.” The upgrades and expansion allowed Dr. Maggie to hire two new employees, and provide a market for four local farmers to sell their produce six days a week.

“Everyone’s looking for the big companies that will bring 1,000 new jobs to a community,” commented Dr. Maggie. “But if we only focus on the big fish, we will miss all of the small fish that are really driving our rural communities.”

Asked if she could have done the project without the support of REAP, Dr. Maggie said, “I don’t think so. Banks were willing to lend the money because I had the backing of the REAP grant, and they trusted that the USDA knew that my project was a good one.”

Sam Hoffman started brewing beer in 1998, taking advantage of locally grown barley, hops and the clean mountain waters that flow through the small town of Red Lodge just north of Yellowstone National Park. Today, Red Lodge Ales may now be one of the “greenest” breweries in the country.

When Sam needed to expand his operation, he wanted to incorporate more green energy into his new facility and adopted several innovative approaches in solar energy with the help of a $26,390 REAP grant.

The new Red Lodge Ale facility sports an array of solar hot water panels that will provide space heat through floor heating in the winter, while providing hot water in the summer. Hoffman also constructed a biodiesel production unit, using waste grease collected from his customers. Delivery trucks now drop off beer and pick up grease, which is then used to fuel the Red Lodge delivery fleet.

Other innovations adopted by Hoffman include a “Freeaire” refrigerator system for his large coolers that exchanges chilly Montana air from outside during the winter months, drastically cutting his electric load and extending equipment life. He’s also added wood stoves for sustainable heat and ambience in public areas.

Unfortunately, the Red Lodge Ales are only available in Montana, Wyoming and the greater Yellowstone region. But maybe, with Hoffman’s ingenuity and drive, we’ll be able to enjoy this “green” beer around the country very soon.
Some might look at an abandoned coal mine as wasteland. Illinois’ Rural Electric Convenience Cooperative saw a prime location for wind power. Using a $375,000 REAP grant and additional assistance from the Illinois Department of Commerce and Economic Opportunity, the RECC constructed its first wind turbine atop the 60-foot heap of coal tailings left over from the mine’s active days. Dubbed the “Gob Nob” by locals, the 900 kW turbine began generating power for the RECC’s 300 members in the Farmersville area on March 4, 2009.

The RECC is the second rural electric cooperative in Illinois to construct a wind turbine, following the lead set by the Illinois Rural Electric Cooperative of Winchester two years earlier. Close behind the RECC is the Adams Electric Cooperative of Camp Point, which received a REAP grant in 2007.

Rural electric cooperatives are tax exempt entities so they cannot use the federal Production Tax Credit. REAP makes up some of the difference in lost incentives. While the “Gob Nob” is the first turbine that the co-op has commissioned, it may not be the last. “The door is open,” said Dana Smith, Director of Member & Public Relations for the RECC. “There is the possibility of up to three turbines at the same site.”

“We need to see what kind of funding is available,” noted Smith. “For our project to succeed, we needed that assistance.” In the meantime, wind atop the Gob Nob will be blowing, waiting for the turbines that will power the region in a clean, renewable, and reliable way.
When the Southern Iowa Electric Cooperative (SIEC) began planning its new headquarters, its leaders wanted a building that would reflect the concerns of their customers and demonstrate how clean energy can save money. With the help of a $165,340 REAP grant from the USDA and an additional loan guarantee, they were able to install a geothermal heat pump to heat and cool their 12,000 square foot office and 22,000 square foot warehouse.

“We needed to figure out how we could encourage our customers to save energy in their homes, and we concluded the best way was to lead by example,” said Mark Aeilts, CEO of the SIEC.

The 90-ton geothermal system in SIEC’s new facility cost over $350,000, but REAP funding helped make the project a success. “It certainly broadened the scope of what we were able to do,” said Aeilts. “Without USDA grant assistance we would not have been able to include [heating] the warehouse, and it would likely still be running on fossil fuels.”

The SIEC uses its building as an example for customers. The SIEC is promoting a “Take Control and Save” program, providing energy audits and rebates to customers for clean energy improvements. For geothermal alone, SIEC provides members a rebate of $750 per ton for new systems in their homes and businesses.

The program is catching on. Aeilts said, “our rebate helps to dramatically cut the payback time for these investments. What might have taken six or seven years to pay off is now taking only four.”

Geothermal systems reduce electric loads in the summer and lower gas bills in the winter.

Aeilts said that the project has many benefits. “It’s certainly a cost-savings, it uses a reliable resource, and we’re able to be good stewards of the blessings God has given us here.”

When the Minnesota legislature began considering a statewide renewable electricity standard, Rick Burud, General Manager of Nobles Cooperative Electric, knew that he had to move quickly if Nobles was to stay ahead of the renewable energy curve. Given their location in breezy southwestern Minnesota, wind power was the obvious choice.

Because Nobles is a non-profit, it is ineligible for the Production Tax Credit that provides incentives for corporations with taxable income. That’s where REAP helped. Nobles received $500,000 from REAP, over 15% of the total $3.2 million cost. “This construction allowed us to get into the wind business; to produce our own power to serve our members. That was important,” said Burud.

Burud also manages the neighboring Federated REA, and helped it to secure REAP funding for its turbine. “We have pretty strong winds in this part of Minnesota,” he noted. “Annually, we’re looking at a 33-34% capacity factor for our turbine, but some months it has been over 40%.”

Most importantly, REAP funding helped make the project economical for Nobles. “It’s a tool that we needed in our tool box,” said Burud.
When most people think of maple syrup, Vermont immediately comes to mind. But for Everett Sechler and his wife, Chris, Southwestern Pennsylvania will do just fine. In 1983, the couple began tapping their own trees in Somerset County and have been growing their small business each year since, always making an effort to stay on the cutting edge of technological innovation.

In 2007, they applied for a REAP grant to install a new reverse osmosis machine to help separate the sugar from the water in maple sap. Usually done entirely through energy-intensive evaporation, reverse osmosis allows 75-80% of water to be removed from the sap before boiling off the remainder. The fuel savings are substantial.

“I used to use about 4.25 gallons of fuel oil to make one gallon of maple syrup. With reverse osmosis that ratio drops to 1.2 gallons of fuel per gallon of syrup,” said Everett. Even with low energy prices brought on by the economic downturn, Everett says he is still saving time and money. “The amount of time it takes to produce our syrup has been almost cut in half,” he said, happily.

Everett is a pioneer of sorts in Pennsylvania, as he was the first maple syrup producer in the commonwealth to receive REAP funding for a reverse osmosis project. The $6,050 he received covered exactly 25% of the project’s $24,200 cost, and other producers in the area have taken notice.

Asked what he thought of REAP grant funding, Everett said, “This is something practical. It allows maple syrup producers to save resources and it helps the sugar maker to make choices that help the environment and our economy.”

One of the most important resources in a greenhouse is heat. With 80 acres of greenhouse in its Northwestern Ohio operation and high natural gas prices, Green Circle Growers realized that costs could quickly spiral out of control. It decided to be proactive.

In 2008, Green Circle applied for a $227,500 REAP grant to purchase and install an energy curtain on 12 acres of its greenhouses, with an estimated energy savings of 43% in the covered area. The curtain, new technology from Europe, allows light for the plants to pass through while holding heat that would otherwise escape during the cold Midwestern nights.

Norman Baxter, Green Circle’s Chief Financial Officer, emphasized the project’s quick payback. “With the help of the grant, we’re looking at only 3-4 years before the energy savings will have made the energy curtain pay for itself.”

Asked if Green Circle would have proceeded with its energy savings project without REAP funding, Baxter replied, “It’s questionable. The grant made it a definite ‘go’ for us.”

Green Circle has had such success with REAP on this project that it will be applying for another grant when it installs five new wood-burning boilers to replace its conventional natural gas boilers later this year.
Stromer Farms
Juniata, Nebraska

Nebraska is a leading farm state that is using irrigation to help increase crop yields. Over 240 Nebraska farmers have cut their irrigation energy costs, and often water use, with help from the REAP.

Darrell Stromer is one of those farmers. He grows corn and soybeans on his 1,000 acre family farm near Juniata, in the Little Blue watershed in south central Nebraska. Until recently, he used a gravity irrigation system. This old system used diesel fueled pumps and had high operational costs.

Darrell was concerned about the system’s high energy costs and water use, and knew from his business as a “dirt contractor” – soils and earth moving – that more efficient technologies were available. He did his homework and hoped to install a new subsurface drip irrigation system, which REAP made possible.

Subsurface drip irrigation is more efficient because it delivers water directly to the root zones of the plant. “Driplines” beneath the soil surface dispense water to the roots. Careful engineering by Eco-Drip Irrigation ensured that the water pressure would be correct throughout the system.

Mr. Stromer’s utility, the Nebraska Public Power District (NPPD), helped him jump-start the project with an energy audit. The audit revealed that an irrigation system would cut water use by over 60%. NPPD also helped facilitate the REAP grant application process. The grant pays for about 25% of the project’s costs.

Mr. Stromer says the new system will reduce his fuel costs by nearly 50%, and avoid the use of 1,300 gallons of diesel fuel annually. The irrigation system also will reduce operation and maintenance costs. The new irrigation system should also be better for his crops because it will deliver nutrients directly to the plants. As Stromer said, “This funding helped me go ahead and meet my goals of saving water and energy.”

Dove & Boar Farm
Hampton, Connecticut

Dove & Boar Farm is a start-up farm in Hampton, Connecticut, raising sheep and chickens, and growing fruits and vegetables. Farm owner Tim Huchthausen, already a member of the Northeast Organic Farming Association, has always been environmentally conscious and wanted to reduce his farm’s environmental footprint while saving money.

By taking advantage of a $29,400 REAP grant and additional funding from the Connecticut Clean Energy Fund, Dove & Boar was able to install a 15.6 kW solar array on the rooftop of the main barn. The 78 panel array is one of the first to be installed on a working farm in Connecticut and is expected to supply about 85 percent of the farm’s energy needs, making the farm almost completely self-reliant for electrical power. The installation is financed over 10 years.

The solar power array is part of the farm’s five-year plan that includes a heated greenhouse, certified kitchen, and walk-in cooler, which will allow them to grow and sell fresh fruits, vegetables, eggs, and prepared specialty foods year round in a sustainable manner.

“Applying for the grant was fairly flawless and easy,” Huchthausen said, “because Solarwrights [now Atlantis Renewables], the supplier of the array, was most helpful in every aspect of the grant process.”
Pinehold Gardens, a community-supported farm in Oak Creek, Wisconsin, has become a solar pioneer in southeastern Wisconsin. With the help of grants from REAP, Sandy Raduenz and David Kozlowski, the farm’s owners, recently added their second photovoltaic solar system to their 21-acre fruit and vegetable farm. When they were considering their first project, a 2.5 kW dual-axis tracker installed in May of 2005, Raduenz joked that they would “probably” be alive to see their expected 19-year payback. However, through multiple funding sources, including a $4,940 grant from the REAP program, an overachieving system, and rising energy costs, they are recovering their investment faster than expected. The solar tracker, which was supposed to generate 4,100 kWh/year has bested expectations, averaging 4,400 kWh/year over its first three years of operation.

This performance bolstered the pair’s confidence in solar technology as an answer to electricity costs. They decided to add a second system, which would allow them to meet 100% of the farm’s electrical needs including irrigation, refrigeration, and heating their chicken house. The newer system, added in October 2008, is 2.7 kW and is expected to produce 3,438 kWh per year. Again, they were able to make the investment with the help of an $8,310 REAP grant.

Kozlowski said the benefits go beyond reducing the farm’s operating costs and increasing profitability. “The system,” he said, “functions as a sort of marketing tool for us too.” Customers are already drawn to Pinehold Gardens because of the sustainable way in which they grow food, but with the solar panels on-site, “people see it as a double bonus.” Raduenz said that her customers like the panels and that the farm has gotten more attention because of them. “We’ve been on the Midwest Renewable Energy Association’s solar tour for three or four years . . . it’s a really great thing to do.”

Whispering Pines Fish Farm
Holland, New York

On a frigid January day in 2007 with wind chills dipping well below zero, Stephen Welk installed a solar photovoltaic system on his fish farm in Holland, New York. Welk, who has been involved with aquaculture for more than 20 years, raises nine different species of fish including perch, trout, and bass. These fish are then sold as sport fish for stocking rivers and lakes in the area. After taking a course in solar technology, he became interested in a new catch: installing a functioning solar electric system on his own farm.

With a grant of $23,125 from REAP, he was able to install a 10 kW system on his property. In evaluating the feasibility of his project, Welk stressed the importance of securing funding from multiple sources. Aside from the REAP grant, he received support from a New York state energy program and tax credits at both the state and federal levels. “Without any one of those, I would not have done it,” Welk noted of his project, the total cost of which was about $93,000.

Thus far, he has been very happy with the performance of his system, which has supplied about one-third of the farm’s energy. Welk says he is confident in the technology and he knows that it works, even if it would have been pricey in the absence of support from programs like REAP. His system has been very dependable, producing 11,000 kWh over a twelve-month period. On its best day of production, Welk’s system produced 67 kWh. Now, Welk loves “just sitting back and watching the meter spin” as he avidly tracks the system’s daily clean energy production.
Massachusetts does not leap to mind as a top wind energy producing state, but Sylvan Nursery and many of its neighbors in Westport are finding small wind a prudent investment. In 2007, Sylvan received a $33,144 grant through REAP to install two 10 kW wind turbines at its facility. The grant covered 25% of the project’s cost, and with additional funding from the Massachusetts Technology Collaborative, payback on the investment will be achieved quickly.

“There’s small nature of the turbines makes them less intrusive,” says Jim McBratney, President and General Manager of Sylvan. “But they still generate up to about 70% of the electricity used by the buildings they supply.”

Sylvan Nursery is a great example of how renewable energy technology can realize cost savings, even in an unconventional place. “It was first a cost savings investment for us,” said McBratney. “Secondarily it was an environmental decision, but fundamentally we just hated being beat with a stick because of high energy costs.”

There are other benefits as well, he noted. “The community appreciation is really there. The novelty of the project certainly hasn’t worn off.” The Sylvan project sparked others when word spread quickly. Within a ten-mile radius of Sylvan, eight similar turbines have been erected.

While McBratney calculates Sylvan’s payback for the project at eight years, he says that’s a conservative estimate. “To legislators thinking about funding this type of project, I say ‘Go for it.’ This is the right thing to do. It spurs on the industry and allows new, better technology to reach the market.”

With the help of REAP, a group of rural Iowa entrepreneurs joined together to develop a locally-owned wind farm that produces clean power, energy independence and economic development.

Crosswind Energy Project was one of Iowa’s first locally-owned wind farms. The project consists of 10 farmer-owners pooling their investments for a 10-turbine wind farm totaling 21 MW of clean generation capacity.

REAP was key to project financing because local farmer-owners cannot directly use the federal Production Tax Credit. In forming a partnership with Edison Mission Energy (EME), the entrepreneurs used REAP as a source of equity investment, while EME uses the tax credit. During the 10-year life of the tax credit, EME owns most of the project. Soon thereafter, the local investors will assume ownership. Corn Belt Power in Humboldt, Iowa purchases all of the power from the local company, just as it would from an outside developer. The addition of Crosswind Energy to its power supply mix brought the renewable content of its members’ electricity to nearly 15%.

Wind farms bring new investment and jobs to rural economies but local ownership, such as the Crosswind Energy Project, retains even more wealth in the community. What’s more, the community roots bring a shared sense of purpose with the local community, building wind farm support.

Community ownership also grows energy independence. Crosswind Energy generates enough power to meet the annual electricity needs of Palo Alto County.

Crosswind Energy demonstrates how REAP can yield multiple benefits for clean energy, rural economic development and energy independence.
Glen White found that his 35-acre farm in Northern Indiana could be a prime location for renewable energy growth. REAP provided the seed that allowed his family’s business to grow during a recession. Mr. White is now in the solar and wind power business in addition to livestock and construction.

Mr. White first tried solar water heating on his farmstead, using evacuated tube collectors, with success. He decided solar was ready for the market and has been selling and installing solar energy systems for several years.

By the way his flag snapped in the breeze White knew he also had a wind energy resource he could tap. He made a winter project out of researching wind power resources around the world. Ultimately, Glen decided to purchase a Bergey 10 kW wind turbine. A local metal fabricator built the tower and is now ready to make more.

The wind turbine has performed as well as the solar, producing enough power to meet the electricity needs of his Indiana farmstead. And the construction and energy businesses have created more employment for him and his workers to fill out the year.

Investing in a new venture in early 2009 was risky given the dire economic conditions. REAP incentives made his wind turbine feasible. White has since plowed his clean energy savings back into growing a clean energy enterprise.

“We can see steady growth in this field but we need to educate people on the possibilities,” said Glen.

Kent Madison has always tried to stay on the cutting-edge of farm technology. His third generation family farm in the foothills of the Blue Mountains in Eastern Oregon grows wheat, corn, alfalfa, potatoes, and canola, and he makes biodiesel fuel from canola.

Given his previous success with innovative projects, Madison recently decided to add wind power to its harvest with the help of a REAP grant.

He joined forces with a wind developer and one of his neighbors to build the project more efficiently. They shared the costs of construction equipment, negotiated a better contract with John Deere Renewable Energy, and in the end expanded their installed capacity to 64 MW of clean wind power.

Madison’s portion of the project eventually included three Vestas V82 1.65 MW turbines. The project was organized with a “flip” financing structure, where Madison started with a 1% of ownership and 51% of operational control. After their corporate partner realizes a return on investment, in 10-12 years, local ownership and revenues flip to 95% for the remainder of the project life.

Madison points out that REAP “allows us to own a bigger share of the turbines more quickly.” The project also demonstrates the close connection between locally owned farm energy and rural economic development.
2008 Farm Bill Clean Energy Programs

REAP is one of an array of innovative farm energy programs in the 2008 Farm Bill. Taken together, these programs provide a great opportunity to produce more clean energy from farms, ranches, other agriculture operations and rural small- and medium-sized businesses.

Total mandatory funding for the Energy Title averages $280 million a year, compared to $160 million annually in the 2002 Farm Bill. However, comparing the 2002 and 2008 Farm Bills is not “apples to apples” – program funds are now allocated differently and more favorably for cleaner energy. For example, mandatory funding for REAP more than doubled from $115 million to $255 million. The 2008 Farm Bill also includes $400 million in cellulosic ethanol tax credits. You can learn more about these programs at FarmEnergy.org.

Biomass Crop Assistance Program (BCAP)

This program incentivizes farmers and others to grow and harvest sustainable biomass energy crops like switchgrass and other prairie grasses or fast growing trees. BCAP helps to solve the “chicken or egg” dilemma that is delaying the commercialization of advanced biofuels – no markets for energy crop producers and no energy projects because no supply of energy crops. By providing grants for establishing, growing, harvesting, collecting, storing and transporting energy crops, BCAP can encourage farmers to grow low-carbon, sustainable energy crops at a profit.

Biorefinery Assistance

Inconsistent federal funding has delayed commercialization of advanced biofuels like cellulosic ethanol. The Biorefinery Assistance program provides grants and loan guarantees for emerging technologies. Demonstration scale plants are eligible for grants up to 30% of costs, and commercial scale plants are eligible for loan guarantees for up to $250 million per plant.

Repowering Assistance

This program helps ethanol plants reduce their carbon footprint and pollution by burning energy crops and other renewable biomass instead of coal or natural gas in plant boilers. In addition to cutting pollution, the program helps to create new markets for energy crops.

2008 Farm Bill Energy Title

Mandatory Funding

- REAP 23%
- Biorefinery Assistance 20%
- Biomass R&D 11%
- Biomass Crop Assistance 6%
- Repowering Assistance 3%
- Bioenergy/Advanced Biofuels 27%
- Biobased Markets & Biodiesel Fuel Education 1%

Other Programs with Mandatory Funding

- Biomass Research and Development
  Accelerates new biomass energy technologies through cost-share funding for research by companies, universities and government.

- Bioenergy Program for Advanced Biofuels
  Pays biofuels producers to produce advanced biofuels, defined as most biofuels except corn starch-based ethanol.

- Biobased Markets Program
  Expands the federal preference for biobased product labeling guidelines.

- Biodiesel Fuel Education Program
  Continues this existing program.

- Biofuels Infrastructure Study
  USDA to assess the infrastructure requirements for biofuels production and transport.

Other Programs with Only Discretionary Funding (subject to appropriations)

- Rural Energy Self-Sufficiency Initiative
  Helps rural communities improve energy independence through building improvements and renewable energy production.

- Forest Biomass for Energy
  Research and development to encourage use of “low-value” forest biomass for energy.

*Congress did not limit BCAP funding. While this chart uses the federal budget estimate of $70 million over 4 years, actual BCAP spending will be much larger.
2008 Farm Bill Clean Energy Programs

» **Community Wood Energy**  
   Helps state and local governments install wood energy systems in community facilities.

» **Renewable Fertilizer Study**  
   USDA to assess the viability of producing nitrogen fertilizer from renewable resources (such as wind power) in rural areas.

**Tax Credit Incentives**

A new cellulosic biofuels production tax credit for up to $1.01 per gallon is available through 2012. This credit will be available for cellulosic biofuels produced from agricultural waste, wood chips, perennial energy crops and other non-food feedstocks. Congress helped to pay for that credit and other tax credits in the Farm Bill by reducing the volumetric ethanol excise tax credit (“blender’s credit”) from 51 cents to 45 cents per gallon, subject to some limitations.

**Other Provisions**

Several other provisions in the 2008 Farm Bill either directly or indirectly encourage more farm-based energy production and energy efficiency. For example, Title II of the bill significantly increases the size of the Conservation Stewardship Program (formerly the Conservation Security Program), which among other things encourages farmers to use energy-saving best practices. A new Sun Grant program in the Research Title encourages biobased energy technology development (although this program did not receive any mandatory funding), and other Research Title programs also focus on clean energy development.

Learn more about these and other clean energy programs in the Farm Bill at [FarmEnergy.org](http://FarmEnergy.org)
The Environmental Law & Policy Center is the Midwest’s leading public interest environmental legal advocacy and eco-business innovation organization. We develop and lead successful strategic advocacy campaigns to protect our natural resources and improve environmental quality. We are public interest environmental entrepreneurs who engage in creative business dealmaking with diverse interests to put into practice our belief that environmental progress and economic development can be achieved together. ELPC’s multidisciplinary staff of talented and experienced public interest attorneys, environmental business specialists, public policy advocates, and communications specialists brings a strong and effective combination of skills to solve environmental problems.

ELPC’s vision embraces both smart, persuasive advocacy and sustainable development principles to win the most important environmental cases and create positive solutions to protect the environment. ELPC’s teamwork approach uses legal, economic and public policy analysis, and communications advocacy tools to produce successes. ELPC’s strategic advocacy and business dealmaking involves proposing solutions when we oppose threats to the Midwest environment. We say “yes” to better solutions; we don’t just say “no.”

ELPC was founded in 1993 after a year-long strategic planning process sponsored by seven major foundations. We have achieved a strong track record of successes on national and regional clean energy development and pollution reduction, transportation and land use reform, and natural resources protection issues. ELPC’s creative public advocacy effectively links environmental progress and economic development and improves the quality of life in our Midwestern communities.