AGRICULTURAL ENERGY EFFICIENCY INFRASTRUCTURE: LEVERAGING THE 2002 FARM BILL AND STEPS FOR THE FUTURE

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About the American Council for an Energy-Efficient Economy (ACEEE)

ACEEE is a nonprofit organization dedicated to advancing energy efficiency as a means of promoting both economic prosperity and environmental protection. ACEEE fulfills its mission by:

- Conducting in-depth technical and policy assessments
- Advising policymakers and program managers
- Working collaboratively with businesses, public interest groups, and other organizations
- Organizing conferences and workshops
- Publishing books, conference proceedings, and reports
- Educating consumers and businesses

Projects are carried out by staff and selected energy efficiency experts from universities, national laboratories, and the private sector. Collaboration is key to ACEEE's success. We collaborate on projects and initiatives with dozens of organizations including federal and state agencies, utilities, research institutions, businesses, and public interest groups.

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Executive Summary

In recent years, energy efficiency programs targeting the agricultural sector have become more prevalent nationwide. New organizations specifically dedicated to improving efficiency on farms, ranches, and rural businesses have emerged, and existing programs are widening their focus to include agricultural energy efficiency issues. Whether by offering rebates for energy-efficient farm equipment, providing online or on-farm audits, or lending technical or financial support, these programs play a key role in aiding producers and rural businesses in reducing their costs, oftentimes allowing them to stay afloat in this time of sky-rocketing fuel prices. In turn, these successes lead to increased rural economic development, food security, reduced dependence on foreign energy sources, and improved environmental quality.

Although energy efficiency technical assistance programs have succeeded in helping the agricultural sector take significant strides to increase its efficiency, many areas of the country are lagging behind and there are still considerable opportunities for progress to be made. Although Section *9006*, the *Renewable Energy Systems and Energy Efficiency Improvements Program* of the *2002 Farm Bill*, has proven to be enormously successful in the states and regions that were able to acquire funding, its benefits have not been felt nationwide—many states still do not have any technical assistance programs or energy experts to assist potential beneficiaries, and thus many of those states have not been able to acquire grants.

This report examines the strengths and weaknesses of a sampling of the numerous energy efficiency programs in the agricultural sector, as well as looks at some emerging trends across the country. In addition, it explores the relationship, if any, between the emergence or expansion of these programs and Section *9006* of the *2002 Farm Bill*. Finally, it attempts to come to some conclusions about what legislation and policy tools would be most effective at solving the deliverability issues of the *9006* program and helping to facilitate the emergence and expansion of institutions serving the rural community nationwide. Since the *2002 Farm Bill* sunsets in 2007, the upcoming Farm Bill will be the appropriate legislative vehicle to house the recommended provisions discussed in this report.

Introduction

Title IX of the *2002 Farm Bill* was the most significant new piece of federal energy legislation passed in a decade. The hope was that it would reinvigorate the energy efficiency and renewable energy investments in the U.S. agricultural sector by advancing new technologies and helping rural communities cope with high and volatile energy prices and new energy challenges. In terms of energy efficiency, Title IX included two important programs. Section *9006*, the *Renewable Energy Systems and Energy Efficiency Improvements Program*, offered federal grants and loan guarantees to farmers, ranchers, and rural small businesses to assist them in purchasing renewable energy systems and energy efficiency improvements. Section *9005* detailed a program offering federal grants to institutions serving the agricultural sector—specifically to provide the capacity and capability to perform energy audits and provide other technical assistance to farms and rural businesses. However, the *9005* program was never funded. Some in Congress hoped that the presence of federal funding provided through *9006* would create enough incentive for new technical assistance and education programs to emerge in the states where none had previously existed. This report explores whether this response occurred, whether it was an adequate and equitable response across the states, and how it can be improved.

The *9006* program has been a huge success. Farmers and rural businesses in many states have made effective use of the funding, which has led to significant energy savings, new renewable energy sources, and rural economic development. However, there are still many regions that were unable to reap the benefits of the *9006* program. Although applicants in 44 states have received funding, majority of the grant funding has been heavily concentrated in just a few states. There was not a significant emergence of new technical assistance programs in states where they had not existed prior to the *2002 Farm Bill*, as had been hoped. A lack of resources to build this capacity prevented the benefits of *9006* from being realized nationwide. In order to realize the full potential of the *9006* program, federal incentives are required to build new capacity in states that are lacking institutions and programs. Funding of Section *9005* would have taken significant steps to address these deliverability issues and thus the lack of funding over the past five years was an unfortunate missed opportunity. The *2002 Farm Bill* sunsets in 2007 and it is essential that the next Farm Bill take these lessons into account by providing funding for *9005* programs to complement expanded *9006* funding.

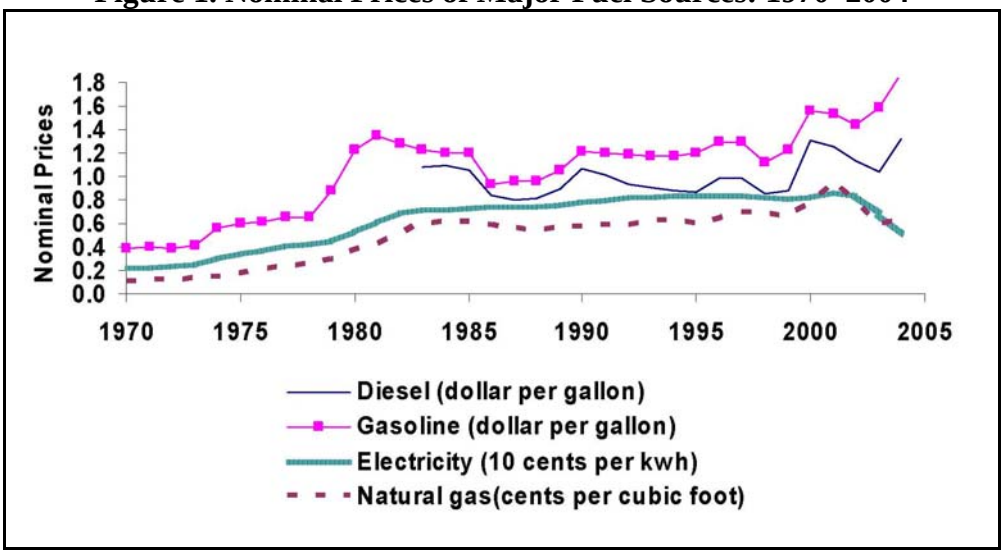
This report also provides some background on the challenges facing the agricultural sector and explores a few of the emerging trends across the country. The primary goal, however, is to review a sample of the energy efficiency technical assistance programs serving rural communities, attempting to identify their common strengths and weaknesses, and also to determine the relationship, if any, between the emergence or expansion of these programs and Section *9006*. Finally, the report outlines the policy recommendations we feel would be most effective and appropriate to help the Energy Title reach its full potential, thus helping the U.S. agricultural sector continue to flourish.

Background

Challenges and Opportunities in Agriculture

High and volatile energy prices are putting considerable pressure on many sectors of the U.S. economy, but agricultural producers have been suffering disproportionately. As illustrated in Figure 1, electricity, diesel, and natural gas prices have skyrocketed in recent years, posing serious challenges to the agricultural sector, which accounts for about three percent of total electricity use nationwide.[1] Farms are extremely energy intensive—energy expenses constitute a significant portion of the farm budget, accounting for up to 10 percent of total costs.[2] Since operating margins, especially for small farms, are typically well under 10 percent, energy costs can have an impact on the survival of many farms (Brown, Elliott, and Nadel 2005). High input costs and the inability to raise prices have left many in the agricultural sector with limited options.

Figure 1. Nominal Prices of Major Fuel Sources: 1970–2004



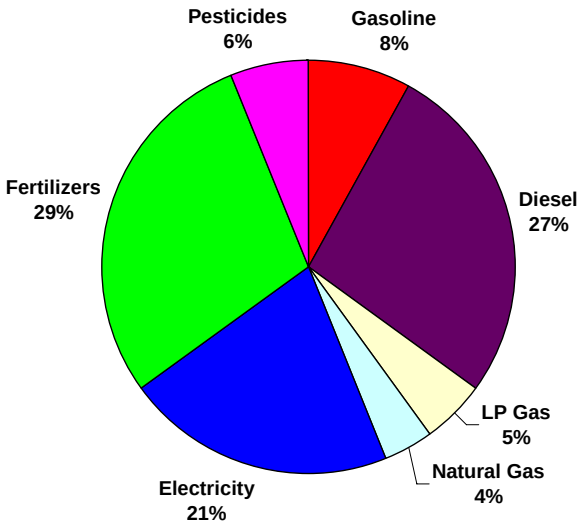
Source: Miranowski (2005)

An additional challenge to agricultural producers is that diesel fuel and indirect energy in the form of fertilizers, pesticides, and feed are significantly more important to most farms and ranches than electricity. Figure 2 shows the breakdown of energy use in the U.S. agricultural sector in 2004, illustrating that the bulk of energy use in agriculture is indirect. The implication is that electric opportunities in terms of reducing energy use and on-farm costs are of somewhat limited interest to farmers, and instead producers tend to focus on practices that save fertilizer, water, feed, and chemicals because of resultant fuel savings. However, improvement of these practices is not being adequately addressed right now and there is thus a growing need to target these issues.

[1] It is worth noting that there is significant uncertainty concerning this estimate. Reasons for why this uncertainty exists are explored in Brown, Elliott, and Nadel (2005).

[2] This estimate was taken from Brown, Elliott, and Nadel (2005). Since there have been significant additional increases in energy prices since the release of that report, this may underestimate current energy expenses on farms.

Figure 2. Direct and Indirect Energy Inputs to Agriculture in 2004
(Total Energy Input = 1.7 Quads)



Source: Miranowski (2005)

Changing energy realities in the economy as a whole have also created new opportunities for farms to thrive. The recent boom in biofuels—primarily corn-based ethanol at this point in time—has created enormous economic growth potential for U.S. agriculture. As pointed out in a March 2007 *Wall Street Journal* article, corn farmers are planning on planting more corn than they have in decades, hoping to take advantage of corn prices, which are likely to reach unprecedented highs in the coming years. Early estimates are that farmers will plant 87 million acres of corn, up from 78 million last year (Etter 2007). This opportunity, however, comes with additional challenges including land use issues and pricing dilemmas. Farmers want to be able to take advantage of high corn prices by planting more than usual, but will need to avoid flooding the market because that could depress prices. In addition, many farmers have also invested in ethanol production, which creates an even more complicated puzzle since they want to maximize profits in both businesses. Finally, high corn prices are leaving other sectors of the economy struggling—for example, livestock owners who can't afford to feed their animals (Strassel 2007).

We as a society are asking our farms to become fuel and electricity producers, find ways to reduce fossil fuel inputs in our food system, and drastically change their methods of production and distribution. U.S. agriculture is adapting to these changes and as many farmers and producers are rediscovering, energy efficiency is an extremely valuable resource that they can turn to for help during this challenging time. This report explores the organizations and programs that serve the agricultural sector and rural community by advancing energy-efficient practices to help U.S. agriculture cope with energy challenges.

Past and Current ACEEE Work

This report reflects a continuation of ACEEE's work in recent years providing information on energy efficiency opportunities in the agricultural sector and identifying successful program strategies. A previous report, *Energy Efficiency Programs in Agriculture: Design, Success, and Lessons Learned*, was released in January 2005 and identified and detailed energy efficiency programs targeting the agricultural sector nationwide, examining their design, implementation, and respective strengths and/or weaknesses. This work was undertaken in response to requests for assistance from the Senate Agriculture Committee in their crafting of the Energy Title (Title IX) of the *2002 Farm Bill*. Since the passage of this bill, we have continued to be involved in the agricultural community, participating in meetings and providing support and input to organizations and individuals working to advance energy efficiency programs and practices in the agricultural sector.

As part of this dialogue about the role of energy efficiency in agriculture, ACEEE organized the first *Forum on Energy Efficiency in Agriculture* in November 2005.[3] The Forum focused on advancing programs and policies that can help the agricultural community realize the benefits of more efficient use of energy in agricultural operations. It also explored issues related to increasing the sustainability of the agriculture sector, with an emphasis on improving energy efficiency.

The 2005 Forum brought together a diverse group of participants who provided useful insights into how energy efficiency programs were impacting the rural agricultural community. Many of these insights are reflected in this report. A subsequent conference planned for 2008 will build on these discussions while incorporating new ideas and developments.

The primary goals of our most recent work have been threefold: to build on the 2005 ACEEE report mentioned above by providing updated information on energy efficiency programs targeting the agricultural sector; to determine what, if any, effect the *2002 Farm Bill*, specifically Section *9006*, has had on those programs; and finally, to use this information to make recommendations for the upcoming Farm Bill. The issue of agricultural energy efficiency is even more compelling now than in 2005 since prices have only increased, intensifying the challenges facing the agricultural sector.

The 9006 Program of the 2002 Farm Bill

Section *9006*, the *Renewable Energy Systems and Energy Efficiency Improvements Program*, is the cornerstone of the energy provisions of the *2002 Farm Bill*. The program was designed to provide farmers, ranchers, and rural small businesses with financial assistance in purchasing renewable energy systems and energy efficiency improvements. It authorized the U.S. Department of Agriculture (USDA) to award $23 million in grants and loan guarantees each year (ELPC 2006). The grants are provided on a competitive basis and allocate up to

[3] See the ACEEE Web site at http://aceee.org/conf/af05/af05agenda.htm to download presentations from the Forum.

$250,000 for energy efficiency improvements or $500,000 for renewable energy systems; loan guarantees can go up to $10 million (ELPC 2006). The primary goal of Section *9006* was to create and expand the market for energy efficiency and renewable energy technologies in rural America (Walters, Savage, and Brown 2006).

The *9006* program has achieved broad success. In the first four years, USDA awarded more than $87 million in grants and $34 million in loan guarantees to projects in 44 states (Savage 2007). The program also gained popularity over the years resulting in more than 600 applications submitted in 2006 (ELPC 2006). During the first year, the quantity and quality of applications submitted were generally lower than expected, but as the USDA outreach effort to expand applicant resources increased, there was a dramatic increase in both the number and quality of the applications received in subsequent years. According to a 2006 National Renewable Energy Laboratory (NREL) report, applicant commitment to projects is reflected in the fact that 95% of awarded projects are still considered "active," implying that the project has either been completed or is still under development (Walters, Savage, and Brown 2006). Energy efficiency projects have the highest completion rates overall (Walters, Savage, and Brown 2006) and efficiency projects accounted for 51% of the cumulative grant awards by technology from 2003–2006 (Kubert and Kharbanda 2007).

The *9006* program has had an immediate and direct impact on renewable energy production and energy savings in rural America. According to the study mentioned above, the combined energy production and savings from the active projects from 2003 to 2005 accounts for more than 17 trillion Btu of energy per year ,which is equivalent to roughly 3 million barrels of oil or enough energy to power 124,000 homes or fuel 181,000 cars for an entire year. This also equates to significant emission benefits resulting in the avoidance of more than 1 million metric tons of carbon equivalent per year. There has also been significant rural economic impact from the projects awarded.

The *9006* program has been extremely successful in terms of putting federal funding directly into the hands of U.S. farmers, ranchers, and rural businesses. However, this funding has not been distributed evenly nationwide. Many states were very successful in receiving significant grants dollars (both number and size of awards), including Minnesota, Iowa, Wisconsin, Nebraska, and others, while other states did not receive any (these include Connecticut, Kentucky, Nevada, New Mexico, Arkansas, and Rhode Island) (Savage 2007). It seems that the states that had an existing infrastructure of technical assistance programs serving the agricultural sector were those that were the most successful at acquiring *9006* funding. This trend will be explored more deeply in the following sections of this report.

Program Review Method

The program review of a sample of energy efficiency programs serving the agricultural sector was carried out in the winter and spring of 2007. The term "program" was defined as an entity that encourages energy efficiency in the agricultural sector. Using ACEEE's 2005 program review as a starting point, we worked towards updating the information on the programs already outlined in that report, as well as attempting to identify newly established programs. This was accomplished through Internet and literature research as well as phone

interviews. An attempt was made to find a manager or other representative to discuss each program, the energy-saving results and potential, and the lessons learned. Where we were unable to contact a person directly, we used the Internet to fill in the missing information.

We identified the specific types of program information that we believed would be the most useful in determining the success level of a particular program as well as its relationship, if any, to Section *9006* of the *2002 Farm Bill*. Our questions were directed at information relating to the following: general program vitals including geographic area served, eligibility (farms/rural businesses), number of farms participating, and years in operation; funding (source as well as both cumulative and annual amounts); program services/offerings and implementation practices; program results including energy and cost savings (annual and cumulative) as well as case studies and consumer response; and Farm Bill information including whether the *9006* program had any affect on the program in terms of its funding, services provided, or change in numbers of program participants. If information was gathered during a phone conversation, there was also discussion about the general strengths and weaknesses of the program in the hopes of identifying what makes each program uniquely beneficial as well as what could be improved. Finally, we discussed any general observations the individual had about the achievements or failures of the Section *9006* program.

This report does not attempt to provide comprehensive information on every program researched (as the previous ACEEE report attempted in 2005). Instead, the main purpose was to determine the effects of Section *9006* on the establishment of new programs or expansion of existing programs, and to highlight some of the more prominent, successful programs in order to identify some common characteristics and trends. Therefore, we focused on exploring the relationship of *9006* to the programs researched and analyzing regional and market trends using the information collected.

Survey Results

There are many well-established successful technical assistance energy efficiency programs all over the U.S. Some have worked specifically with the agricultural sector for years, while others are just beginning to expand their program focus to include farms, ranches, and rural businesses.

The following information is arranged by organization. Since several are involved in the implementation of numerous programs and some of the program details are the same across all programs, it made sense to lay out the data in this way. Most of the information is taken directly from conversations with the contacts listed in the program tables or from their written responses to our questions. The information regarding implementation issues related to the *9006* program represent the opinions of the individuals with whom we communicated at each respective organization. When we couldn't find information, we left the row blank.

NorthWestern Energy

Electric conservation incentives continue to be available on a case-by-case basis, but the overall program has ended.

From 2002 to 2004, NorthWestern Energy's *Efficiency Plus Irrigation Pilot Project* offered free on-farm irrigation system audits, rebates and incentives for energy-savings improvements, educational workshops, free publications, and other free technical assistance by phone or e-mail. This project was administered by the National Center for Appropriate Technology (NCAT).[4]

Strengths: Cash incentives for customer-proposed projects yielded the greatest energy savings per dollar spent, but energy audits served smaller irrigation customers, created opportunities for education and management improvement, and helped customers solve problems that could only have been identified during a site visit and audit.

Weaknesses and possible improvements: Although popular with customers, energy audits were expensive ($700–800 per audit) and many customers did not follow through with recommended energy-saving improvements. Participation in the rebate program was low, and the rebate program was discontinued after one year. Project publicity was late getting started in 2002 and 2004, delayed until early summer in each of these years, and customer participation dropped as a result.

Possible improvements include: (1) starting the project publicity early, during the winter months; (2) coordinating more closely with the National Resources Conservation Service (NRCS), which offers financial incentives to irrigators through its Environmental Quality Incentives Program (EQIP) and other programs; and (3) facilitating more frequent communication between utility staff and agricultural customers to ensure that expectations are realistic.

Customer response: The audit program and funding for customer proposals were both successful and well-received by customers.

9006: No relationship to NorthWestern Energy's program.

In the opinion of NCAT, *9006* did not affect general awareness of energy efficiency and renewable energy opportunities. High energy costs increased the level of awareness, but participation in *9006* was very low. The complicated application process discouraged some. For those motivated to make improvements, more easily accessible funding sources (including NorthWestern Energy's project and the NRCS EQIP program) were available.

[4] See http://www.ncat.org/index.php.

Program Title	**Efficiency Plus Irrigation Pilot Project (no longer active)**
Contact	Mike Morris
Geographical Area Served	Montana
Eligible/Targeted Participants	Irrigation customers of NorthWestern Energy in Montana
Number of Participants	616 audits; few projects materialized
Years of Operation	2002–2004
Funding Sources	NorthWestern Energy (2002–2004) using Universal System Benefit Charge funds
Total Funding	$1,000,555, with about three-quarters of this amount delivered directly to customers as incentives and services
Energy Savings	Annual savings achieved were 2,385,074 kWh; demand savings were 6,465 kW-months
Cost Savings	Annual savings achieved were $165,337
Other Success Metrics	Savings verification studies were conducted for at least 25% of projects completed; water savings were also calculated; case studies and program literature available on request.
Did the presence of the *9006* program affect the program in any way (funding/program offerings/etc.)?	Not measurable.
What interaction, if any, has the program had with *9006*?	Answered some customers' questions about the *9006* program and helped one customer submit an application.

Northwest Energy Efficiency Alliance[5]

The Northwest Energy Efficiency Alliance runs the two following programs: the *AgriMet Weather Station Network* and the *AM400 Soil Moisture Data Logger*.

The *AgriMet Weather Station Network* is implemented by the Northwest Energy Efficiency Alliance, through the U.S. Bureau of Reclamation. It provides Web-based information. Irrigators are able to access real-time weather data, including vapotranspiration rates, from over 90 remote sites.

Strengths: Availability of local weather data.

Weaknesses and possible improvements: Growers must learn to use the Web site. Additional marketing of services and training would be helpful.

Customer response: There are approximately 5,000 Web site visits per month.

9006: This program has no interaction with *9006*.

Program Title	**AgriMet Weather Station Network**[6]
Contact	Andy Ekman
Geographical Area Served	Idaho, Montana, Oregon, and Washington
Eligible/Targeted Participants	All kinds of farms, ranches, and rural businesses
Number of Participants	
Years of Operation	23 years (9 with NEEA); 12/31/07 is the renewal date
Funding Sources	USBR (61%), NEEA (25%), and local site sponsors (14%)
Total Funding	Annual funding for last 5 years was $315,000.
Energy Savings	Not calculated
Cost Savings	Not calculated
Other Success Metrics	Web site usage
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	None

[5] See http://www.nwalliance.org/ .
[6] See http://www.usbr.gov/pn/agrimet/ .

The *AM400 Soil Moisture Data Logger* is implemented by the Northwest Energy Efficiency Alliance. It provides marketing support for the AM400 soil moisture data logger.

Strengths: It is a simple-to-use, inexpensive tool that gives growers real-time and historic information on soil moisture levels.

Weaknesses and possible improvements: Some growers want more sophisticated tools. An expanded distributor network would be helpful.

Customer response: There has been significant positive customer response. Documentation can be acquired by contacting the M.K. Hansen Co.

9006: This program has no interaction with *9006*.

Program Title	**AM400 Soil Moisture Data Logger**[7]
Contact	Andy Ekman
Geographical Area Served	Idaho, Montana, Oregon, and Washington
Eligible/Targeted Participants	Small farms
Number of Participants	Unknown, but about 2 million irrigated acres
Years of Operation	2 years; renewal date is November, 2004
Funding Sources	NEEA
Total Funding	$45,000 per year for 2 years; $89,000 cumulative
Energy Savings	3,400,000 kWh (2002); 2,456,000 kWh (2003); 2,175,000 kWh (2004); 2,205,000 kWh (2005); 1,900,000 kWh (2006); Cumulative: 12,136,000 kWh
Cost Savings	
Other Success Metrics	
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	None

[7] See http://www.mkhansen.com .

Wisconsin Focus on Energy Program[8]

The *Wisconsin Focus on Energy Program* offers prescriptive grants through equipment dealers, custom grants with onsite audits with Focus energy advisors, and verification of equipment installation. It is marketed through multiple channels and promoted by multiple stakeholders. GDS Associates is a subcontractor to the Focus on Energy program. Since the program began, approximately 1,500 dairy farms have participated out of the approximately ten to eleven thousand that are currently eligible to receive program services.

Strengths: Works well with all agricultural stakeholder groups including university, extension agents, associations, contractors, utilities, cooperatives, etc.

Weaknesses and possible improvements: Free rider[9] estimates do not accurately reflect the free rider percentage. The methods used to estimate free ridership are the same as used for other customer sectors and have not been adapted to reflect the way that the agricultural market works or the way that the program has been designed.

In addition, the annual planning process makes it difficult to establish and implement long-term strategies and projects. Longer-term planning would help address this. Also, it could be a true statewide program if all the non-participating electric cooperatives joined the program—in fact, this may be starting to happen this year.

9006: The reporting and application requirements have dampened interest in submitting applications, but Focus on Energy has helped with grant preparation to some extent.

The level of awareness of energy efficiency and renewable energy opportunities has increased because of *9006*. Focus on Energy has helped promote awareness of *9006* with the Department of Agriculture and the local USDA offices.

[8] See www.focusonenergy.com.

[9] A free rider is a customer who would voluntarily take a certain action to reduce energy consumption and demand, even without the incentive of the energy efficiency program.

Program Title	Wisconsin Focus on Energy Program
Contact	Rich Hackner
Geographical Area Served	Wisconsin
Eligible/Targeted Participants	All farms (dairy, livestock, crop) and other agricultural-related businesses (crop storage, grain processing, etc.)
Number of Participants	Approximately 1,500 dairy farms since the program began
Years of Operation	2001 to present
Funding Sources	Electric and gas utility ratepayers
Total Funding	Approximately $10 million
Energy Savings	Annual savings since program began: 14.8 MW; 74 million kWh; 1.4 million Therms
Cost Savings	Annual savings since program began: $1.85 million (from MW savings); $7.4 million (from kWh savings); $1.4 million (from therms savings)
Other Success Metrics	Case studies and program evaluation reports on Web site
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	Submitted and received *9006* funding for a few energy projects, but unlikely to continue to do so.

Alliant Energy[10]

Alliant Energy provides rebates and audits in Iowa and Minnesota as well as loans in Wisconsin.

Possible improvements: Some customers would like to have more grants available or low-interest loans for renewable projects.

Customer response: Very favorable response from customers through testimonials and satisfaction results.

9006: Application process was very lengthy and at an inconvenient time of year. Shorter and more succinct applications would help. Also, the grant availability periods should not begin when farmers are heading into the field. Open application should be during the off-season. In addition, the turn-around time seemed too long.

The *9006* Program did help increase awareness of renewable opportunities.

Program Title	**Alliant Energy**
Contact	Bill Johnson
Geographical Area Served	Wisconsin, Iowa, and Minnesota
Eligible/Targeted Participants	Primarily dairy and hog operations, but other livestock and grain operations are eligible as well
Number of Participants	486 farms in 2006
Years of Operation	20+ years
Funding Sources	Conservation escrow, ratepayer contribution
Total Funding	
Energy Savings	About 8,000,000 to 10,000,000 kWh annually
Cost Savings	
Other Success Metrics	There are some testimonials on the Web site
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	Assisted customers in accessing USDA funding—grant application assistance in IA and MN; also energy audits; funding did not change due to USDA funds
What interaction, if any, has the program had with *9006*?	Helped 12–14 customers with applications; most or all received funding; also helped with implementation of grants

[10] See http://www.alliantenergy.com/docs/groups/public/documents/pub/default.hcsp.

New York State Energy Research and Development Authority (NYSERDA)[11]

NYSERDA runs the following four programs: *Enhanced Commercial/Industrial Performance Program, FlexTech, Energy Smart Loan Program,* and the *Peak Load Reduction Program*. NYSERDA reported that *9006* had no effect on any of these programs.

Enhanced Commercial/Industrial Performance Program

The *Enhanced Commercial/Industrial Performance Program* provides performance-based financial incentives for electric-efficiency measures, including lighting, motors, variable speed drives, and refrigeration. Customers work with an energy service company (ESCO) or other contractor of their choice.

Strengths: The multi-tier approach of this program allows for all to participate.

Weaknesses: This program is open to all sectors, and thus does not focus specifically on agriculture.

Program Title	**Enhanced Commercial/Industrial Performance Program**
Contact	Todd Baldyga
Geographical Area Served	New York
Eligible/Targeted Participants	All types eligible (this program is open to all commercial / industrial entities, not just farms)
Number of Participants	1,100 farms
Years of Operation	7 years (up until recently, this program was two: "Commercial/Industrial Performance Program" and "Smart Equipment Choices")
Funding Sources	System benefits charge on electric utility bills
Total Funding	Annual funding is $30 million for all sectors; cumulative is $220 million for all sectors
Energy Savings	1,017,421,556 kWh total for all sectors
Cost Savings	
Other Success Metrics	Case studies available on the NYSERDA Web site[12]
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

[11] See www.nyserda.org.
[12] See www.nyserda.org/programs/commercial_industrial/cippcasestudies.asp.

FlexTech

The *FlexTech* program provides cost sharing of energy audits or feasibility studies. Farms and other agricultural facilities are provided detailed, onsite engineering studies. The types of studies inlcude technical and and cost-benefit analyses of electrical energy-saving capital improvements, electric-load management, and operational improvements that will save money. Further techncial assistance can be used to help prepare groups of farms to cooperatively negotiate commodity energy prices. NYSERDA will cost share these programs using consultants already under contract with NYSERDA or a consultant chosen by the farmer.

Strengths: The program has long-term success in helping entities identify cost-efficient, energy-saving measures.

Weaknesses: This program is open to all sectors, and thus does not focus specifically on agriculture.

Program Title	**FlexTech**
Contact	Jessica Zweig
Geographical Area Served	New York
Eligible/Targeted Participants	All types eligible (this program is open to all commercial / industrial entities, not just farms)
Number of Participants	Over 100 farms
Years of Operation	15 years
Funding Sources	System benefits charge on electric utility bills/state energy plan
Total Funding	
Energy Savings	For every dollar spent on a study, $5 in energy savings and $17 in implementation/construction costs is realized (for all sectors).
Cost Savings	
Other Success Metrics	Program evaluations available for all sectors on NYSERDA Web site.
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

Energy Smart Loan Program

The *Energy Smart Loan Program*, working with participating lenders, offers interest rate reductions of 4.0% on loans up to $1,000,000 for energy efficiency improvements or installations of renewable energy systems. The borrowers work through their lenders.

Strengths: The program reduces interest rates on loans for energy efficiency improvements, including lighting, heating and cooling, plate precoolers and scroll compressors, and renewable technologies such as wind turbines, photovoltaic systems, and methane digesters.

Weaknesses: Processing time, although usually less than a few weeks, is sometimes not quick enough for lenders and borrowers. Also, this program is open to all sectors, and thus does not focus specifically on agriculture.

Program Title	**Energy Smart Loan Program**
Contact	Marcia Ruth
Geographical Area Served	New York
Eligible/Targeted Participants	All types eligible (this program is open to all commercial/ industrial entities, not just farms)
Number of Participants	About 30 farms
Years of Operation	7 years
Funding Sources	System benefits charge on electric utility bills
Total Funding	
Energy Savings	
Cost Savings	
Other Success Metrics	Program evaluations available for all sectors on the NYSERDA Web site[13]
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

[13] See www.nyserda.org/energy_information/evaluation.asp.

Peak Load Reduction

The *Peak Load Reduction* program provides cost-shared incentives to commercial and industrial customers to identify and install measures to reduce electric demand during the summer period, and/or to ready their facilities to participate in the New York Independent System Operator's (NYISO) Emergency Demand Response Program (EDRP) or other transmission owner demand response programs.

*Weaknesses***:** This program is open to all sectors, and thus does not focus specifically on agriculture. Furthermore, the program is not a particularly good fit for agriculture in general.

Program Title	**Peak Load Reduction**
Contact	Chris Smith
Geographical Area Served	New York
Eligible/Targeted Participants	All types eligible (this program is open to all commercial/industrial entities, not just farms)
Number of Participants	3 farms
Years of Operation	6 years
Funding Sources	System benefits charge on electric utility bills/state energy plan
Total Funding	
Energy Savings	
Cost Savings	
Other Success Metrics	Program evaluations available for all sectors on the NYSERDA Web site.
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

Cornell University Manure Management Program[14]

The *Cornell University Manure Management Program* provides information through meetings, workshops, conferences, case studies and fact sheets. It also assists with technology transfer. NYSERDA is interested in continuing the program.

Possible improvements: It's dependent on personnel to write fact sheets and organize materials. More support, money, and staff would be helpful.

Customer response: There has been positive customer response at workshops and conferences.

Program Title	**Cornell University Manure Management Program**
Contact	Norman Scott
Geographical Area Served	Northeast
Eligible/Targeted Participants	All farms, large and small
Number of Participants	About 10 in NY and a few more in PA
Years of Operation	3 years
Funding Sources	NYSERDA and USDA
Total Funding	About $150,000 per year; about $700,000 cumulative
Energy Savings	
Cost Savings	
Other Success Metrics	Assessments of environmental benefits; case studies on Web site
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	Some discussion of the Farm Bill at conferences and meetings

[14] See http://www.manuremanagement.cornell.edu/.

Vermont Energy Investment Corporation[15]

Efficiency Vermont provides targeted audits either on the phone or on site, and subsequently, contract management assistance. This means working with installers to get quotes for equipment (such as variable frequency drives on vacuum pumps, lighting for barns, plate coolers, etc.), and running assessments to figure out cost effectiveness and providing incentives to farmer—ranging from 40–60% of the project total installed costs. *Efficiency Vermont* also offers a loan program—2-year loans with a 0% interest rate. Finally, it provides inspections after installations to make sure the equipment is up and running as well as training to make sure the farmers know how to use the equipment.

Strengths: *Efficiency Vermont* ensures that information flows between the contractors to the farmers and back to *Efficiency Vermont*. Aggressive involvement and follow-up is essential to ensure that a project actually comes to fruition with information that is derived from the targeted audit. In addition, good relationships with contractors ensure that they are active participants—this is useful in terms of keeping Efficiency Vermont informed of possible opportunities since contractors will let them know when a farmer is interested in a project or making improvements.

Weaknesses and possible improvements: There have been some difficulties concerning ventilation and lighting installations. While the primary goal of the program is to reduce energy use, some projects simultaneously implemented energy efficiency measures while expanding production, resulting in increased energy use. For example, on dairy farms there are some that are promoting long day lighting, (supplemental lighting allows animals to perform better—increased milk production, for example). Some farms are looking to boost milk production and are looking to upgrade their lighting to do it, resulting in increased electricity use. The same is often true for ventilation equipment. Since the goal of the program is reducing energy use, not just energy efficiency, the program may need to find a way to weigh true savings differently than increased production savings.

9006: *9006* affects dairy farms very minimally. However, applicants in Vermont were very successful in getting funds in other agricultural sectors.

One problem with *9006* is that it seems that there are clusters of locations where grants were given out. There has been competition among USDA local offices that want their state or region to get the grants and thus are constantly trying to figure out ways to make that happen. Also, the process of complying on larger grants on digester projects is very cumbersome. The application process is difficult and once funding is approved, it's difficult to actually receive the money. In many cases it's out of the capability range of many farmers and they need help from someone whose specific job it is to do this. A more streamlined process would be beneficial.

[15] See http://www.veic.org.

Program Title	**Efficiency Vermont**[16]
Contact	Mike Raker
Geographical Area Served	Vermont
Eligible/Targeted Participants	Any type of agricultural operation is eligible, but heavy emphasis on dairy farms because they are a significant portion of agricultural base in Vermont
Number of Participants	70–80 dairy farms in 2006; since 1991, over 2000 installations have occurred; most dairy farms have participated at one time.
Years of Operation	In 1991, individual utilities were required to run their own programs; in 2000, those programs were consolidated into the Efficiency Vermont program.
Funding Sources	There is an energy efficiency surcharge that is assessed on all electric bills in Vermont. Those funds pass from the customers to the utility and then to the state—the state then pays VEIC to run programs and disperse funds for incentives.
Total Funding	
Energy Savings	
Cost Savings	
Other Success Metrics	Evaluations for every project
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	A few customers applied for *9006* funding

[16] See http://www.efficiencyvermont.com/pages .

EnSave

EnSave is an organization based in Vermont that focuses specifically on improving energy efficiency in the agricultural sector. It has carved out a niche for itself in the marketplace, building an extremely successful business of assisting agricultural producers and food processors in finding and implementing cost-effective ways of reducing operating costs through energy efficiency across the country.

EnSave is currently implementing five programs: *AG Efficiency Plus, Dairy Energy Efficiency Program, Diesel Emission Reduction Program, the Partnership with the National Association of Resource Conservation and Development Councils,* and the *Maryland Farm Energy Audit Program: Phase II.* Since the publication of ACEEE's January 2005 report, EnSave has completed an additional six programs: *Agricultural Ventilation Fan Efficiency Program, California Multi Measure Farm Program, Dairy Development Energy Program, Maryland Farm Energy Audit Program, Alabama Farm Energy Audit Program,* and the *Minnesota Farm Energy Conservation Improvement Program.* Since the *9006*-related information for EnSave is the same across all these programs, it has been included here at the top. Details on each of the eight programs follow.

*9006***:** In 2002, EnSave subcontracted with MACTEC Federal Programs to design guidelines, regulations, and a delivery model for the loan portion of *9006*. In addition to this direct experience with the loan portion, EnSave is familiar with the grant program. However, *9006* did not have any tangible effect on EnSave's programs either in terms of funding or program offerings and none of EnSave's customers applied for *9006* money.

Though none of EnSave's current programs work directly with section *9006*, one of EnSave's services is farm energy audits. These audits could qualify for the energy audit that is required to apply for an energy efficiency grant.

EnSave believes that *9006* has raised the profile of energy issues within agriculture throughout the U.S. and also that it has been successful in generating interest in energy efficiency improvements for agriculture.

Section *9006* has provided a means for agricultural producers to make energy efficiency upgrades, many of whom do not have access to other grant funds. Section *9006* is a good first step in leveling the playing field so that producers are able to receive assistance with energy efficiency regardless of whether their state or utility company offers assistance. Main barriers to implementation have been the complexity of the grant application, the short window in which to apply, and the uncertainty of whether a project will be funded.

The *9006* program could be improved by improving coordination with other large scale agricultural programs. For example, EnSave is conducting farm energy audits for several electric utilities. Recipients of these audits could work with EnSave or the utility to apply for a *9006* grant. The grant could be in addition to other rebates available through EnSave or the utility.

AG Efficiency Plus

EnSave's *AG Efficiency Plus* program is a component of Southern California Edison's Agricultural Energy Efficiency Program, which includes other energy efficiency programs to benefit the agricultural sector. Global Energy Partners is the prime contractor, and EnSave is the subcontractor to Global Energy Partners. The program offers free energy audits, free site surveys, and rebates on several energy efficiency measures including energy-efficient interior lighting, exterior lighting, custom lighting, air conditioning, pumping, refrigeration, ventilation, cooling, controls, and motors.

Global Energy Partners and EnSave are working closely with Southern California Edison's agricultural representatives in order to implement the program and inform their customers of the opportunities available. Following the introduction of the program information, EnSave works with producers to install the equipment through a local equipment dealer of their choice.

Strengths: Program affects entire agricultural marketplace in Southern California Edison's service territory with multiple options for participation.

Global Energy Partners and EnSave introduced the program first to manufacturers of the equipment promoted, followed by equipment dealers and contractors as well as the agricultural community, and then finally to farmers. This process ensures that by the time farmers hear about the program directly from Global/EnSave, they have already heard about it from people that they know and trust.

Program Title	**AG Efficiency Plus**[17]
Contact	Craig Metz
Geographical Area Served	Southern California Edison service territory
Eligible/Targeted Participants	All farms and food processing facilities
Number of Participants	
Years of Operation	2006–2008
Funding Sources	Southern California Edison
Total Funding	$6.7 million not including incentives/rebates
Energy Savings	
Cost Savings	
Other Success Metrics	Program marketing materials available on Web site
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

[17] See www.agefficiencyplus.com .

Dairy Energy Efficiency Program

The *Dairy Energy Efficiency Program* is implemented by Pacific Gas & Electric Company (PG&E). The program is a continuation and modification of EnSave's successful *California Multi Measure Farm Program*, operated for PG&E and Southern California Edison (SCE) dairy customers. The program offers cash incentives on several dairy measures, including variable speed drives, plate coolers, compressor heat recovery units, scroll compressors, lighting, time clocks, ventilation, and premium efficiency motors. Following the introduction of the program information, EnSave works with producers to install the equipment through a local equipment dealer of their choice. It is a performance-based program, where EnSave is paid on a time and materials basis for its initial marketing efforts until the first customer is enrolled, and is then paid a set amount per kWh saved.

Strengths: This program is affecting one of the largest dairy markets in the United States. EnSave introduced the program first to manufacturers of the equipment promoted, followed by equipment dealers and contractors as well as the agricultural community, and then finally to farmers. This process ensures that by the time farmers hear about the program directly from EnSave, they have already heard about it from people that they know and trust.

Weaknesses: The program is limited to dairy. EnSave hopes to affect PG&E's entire agricultural service territory through future programs.

Program Title	**Dairy Energy Efficiency Program**
Contact	Craig Metz
Geographical Area Served	Pacific Gas & Electric (PG&E) service territory
Eligible/Targeted Participants	Dairy farms
Number of Participants	There are approximately 1,300 dairies eligible to participate in the program. EnSave is anticipating enrolling approximately 140 dairies in the program,
Years of Operation	2006–2008
Funding Sources	California's Public Goods Charge
Total Funding	$868,392, including approximately $316,000 in pass-through rebates to the farmer
Energy Savings	
Cost Savings	
Other Success Metrics	Program marketing materials are available. Case studies/ annual report will be available upon completion of the program. Program application and equipment standards are also available.[18]
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

[18] See http://www.ensave.com/page.php?PID=3&Page=CurrentPrograms&CID=18 .

Diesel Emission Reduction Program

The *Diesel Emission Reduction Program* is implemented by the Upper Columbia Resource Conservation and Development Council and EnSave. EnSave provided program design, as well as marketing and technical assistance for the program. This program offers cash incentives of $4 per acre to farmers who convert conventionally tilled land to no-till/direct-seed practices. The goal of the program is to reduce the pollutants resulting from diesel emissions.

Strengths: Encouraging conservation tillage among a region that has been slow to adopt the practice.

Weaknesses: Funding level for program was reduced to $100,000 from $250,000, forcing the program to reduce the incentive payment to farmers.

Program Title	**Diesel Emission Reduction Program**
Contact	Craig Metz
Geographical Area Served	Asotin, Columbia, Garfield, Spokane, Walla Walla, and Whitman counties in Eastern Washington
Eligible/Targeted Participants	Crop growers using conventional tillage practices
Number of Participants	The program will target 250–500 producers in the geographic area. About 15–30 participants are projected in order to reach the goal.
Years of Operation	1 year; program ends December 31, 2007
Funding Sources	U.S. Environmental Protection Agency—Region 9 & 10 Diesel Emissions Reduction Grant
Total Funding	$100,000, including approximately $65,000 in incentive payments to producers
Energy Savings	As of April 2007, the program has enrolled 12,000 acres, out of the program goal of 16,000 acres. Associated emissions reductions to be realized from these conversions have not yet been calculated.
Cost Savings	
Other Success Metrics	As the primary goal of the program is to reduce diesel emissions, EnSave is tracking and reporting the reduction of nitrogen oxide, carbon monoxide, oxides of sulfur, particulate matter, and volatile organic material; program brochure available; case study will be available at the end of the program.
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

Partnership with the National Association of Resource Conservation and Development Councils

The National Association of Resource Conservation and Development Councils (NARC&DC) represents the nation's 375 resource conservation and development councils (RC&Ds). The local councils deliver coordinated resource conservation and rural development assistance throughout rural America. EnSave has partnered with NARC&DC to train RC&D staff nationwide in how to perform data collection for farm energy audits. This partnership will provide more areas of the U.S. with farm energy audits.

EnSave will partner with individual RC&D councils to implement audit programs, as well as measure-installation programs and other energy efficiency and pollution prevention projects. The USDA Natural Resources Conservation Service's Conservation Security Program (CSP) and section *9006* of the farm bill have generated demand for farm energy audits. This partnership will provide energy audits to meet this demand.

Program Title	**Partnership with the National Association of Resource Conservation and Development Councils**
Contact	Craig Metz
Geographical Area Served	Nationwide
Eligible/Targeted Participants	All farms
Number of Participants	TBA
Years of Operation	2006–present
Funding Sources	
Total Funding	TBA
Energy Savings	TBA
Cost Savings	TBA
Other Success Metrics	
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	Yes, this partnership was designed to fill a need for qualified energy auditors created by section *9006* funding.
What interaction, if any, has the program had with *9006*?	

Maryland Farm Energy Audit Program Phase II

The *Maryland Farm Energy Audit Program Phase II* will promote farm energy audits and energy efficiency to agricultural producers in Maryland. Farmers will be charged $250 per audit, but the cost will be reimbursed if participants install one or more of the technologies recommended through the audit.

Maryland NRCS and the Eastern Shore RC&D Council will enroll farmers into the program. EnSave will then conduct an initial interview with the farmers to learn more about their facilities and let them know the process that will take place during the onsite data collection. Then, EnSave will collect energy end-use data on site, and complete a farm energy audit report. Finally, EnSave will send the audit report to the farmer and conduct a follow-up interview. During the follow-up interview, EnSave will encourage farmers to implement technologies and take advantage of low-interest loans and grants available through Maryland Agricultural and Resource-Based Industry Development Corporation (MARBIDCO). The audit will also gauge farmers' interest in renewable energy opportunities; this information will be sent to the Maryland Energy Administration, which will work with these producers to explore those options further.

Program Title	**Maryland Farm Energy Audit Program: Phase II**
Contact	Craig Metz
Geographical Area Served	Maryland's Allegany, Carroll, Garrett, Frederick, and Washington counties
Eligible/Targeted Participants	All farms
Number of Participants	TBA
Years of Operation	2007
Funding Sources	Maryland Energy Administration, Maryland NRCS, Maryland Department of Agriculture, MARBIDCO, Sustainable Agriculture Research and Education, and Washington County Soil Conservation District. The Maryland Eastern Shore Resource Conservation and Development Council is the contract administrator.
Total Funding	$76,500
Energy Savings	TBA
Cost Savings	TBA
Other Success Metrics	
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	
What interaction, if any, has the program had with *9006*?	

Agricultural Ventilation Fan Efficiency Program

The *Agricultural Ventilation Fan Efficiency Program* was implemented by EnSave under contract with Southern California Edison. This program offered cash rebates for the purchase of energy-efficient ventilation fans. Eligible fan sizes ranged from 12-inch to 52-inch fans. Also included were high-volume, low-speed (HVLS) fans, which range in size from 8 feet to 24 feet. Following the introduction of the program information, EnSave worked with producers to install the equipment through a local equipment dealer of their choice. Following the installation, Southern California Edison performed inspections on a sample of the participants.

Strengths: The program succeeded in bringing energy-efficient ventilation fans to multiple sectors of agriculture. It also led to the publication of EnSave's Energy Efficient Ventilation Fan Ranking Guide. This guide compiled the energy efficiency rankings of various fan manufacturers. This was distributed as a tool for manufacturers and dealers, with the goal of moving the marketplace towards energy-efficient fans for agriculture.

EnSave introduced the program first to manufacturers of the equipment promoted, followed by equipment dealers and contractors as well as the agricultural community, and then finally to farmers. This process ensures that by the time farmers hear about the program directly from EnSave, they have already heard about it from people that they know and trust.

Weaknesses and possible improvements: There are still significant barriers to installing HVLS fans within agriculture. Longer program duration to allow for significant ramp-up to reach the agricultural sector would be an improvement to the program. The timing of the contract missed out on the spring season, when producers are most likely to purchase fans.

Program Title	**Agricultural Ventilation Fan Efficiency Program**
Contact	Craig Metz
Geographical Area Served	Southern California Edison's service territory (Inyo, Mono, San Bernardino, Santa Barbara, Tulare, Los Angeles, Riverside, Ventura, and Kern counties)
Eligible/Targeted Participants	All farms and ranches that use ventilation fans (dairies, livestock, crops, poultry)
Number of Participants	30 producers installed 2,154 fans through the program
Years of Operation	March 2005–July 2006
Funding Sources	Southern California Edison's Innovative Designs for Energy Efficiency Activities (IDEEA) solicitation
Total Funding	$724,069, including approximately $348,000 as pass-through rebates to the producers
Energy Savings	2.2 million kWh net energy saved annually; 694 kW net demand reduced
Cost Savings	$297,800 annually
Other Success Metrics	Internal case study, program marketing materials, final report; Program evaluation completed by Quantec, LLC
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

California Multi Measure Farm Program

The *California Multi Measure Farm Program* was administered by PG&E with funding oversight from the California Public Utilities Commission. The program offered cash rebates to dairy producers for five dairy-specific energy efficiency measures: milking vacuum pump variable speed drives, milk transfer pump variable speed drives, plate pre-coolers, scroll compressors for bulk tanks, and compressor heat recovery units. Following the introduction of the program information, EnSave worked with producers to install the equipment through a local equipment dealer of their choice.

Strengths: EnSave introduced the program first to manufacturers of the equipment promoted, followed by equipment dealers and contractors as well as the agricultural community, and then finally to farmers. This process ensures that by the time farmers hear about the program directly from EnSave, they have already heard about it from people that they know and trust.

Program Title	**California Multi Measure Farm Program**
Contact	Craig Metz
Geographical Area Served	PG&E and SCE service territory
Eligible/Targeted Participants	Dairy farms
Number of Participants	122 farms participated in the program, out of approximately 1,900 dairies in PG&E and SCE service territories
Years of Operation	2005–2006
Funding Sources	California Public Utilities Commission
Total Funding	$676,618, including about $278,200 for pass-through incentives payments to producers
Energy Savings	3.9 million net kWh annually; 714 coincident peak net kW
Cost Savings	$546,000 annually
Other Success Metrics	Internal case study, program marketing materials, final report; evaluation completed by Summit Blue Consulting
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

Dairy Development Energy Program

The *Dairy Development Energy Program* is implemented by NYSERDA. This program has offered free energy audits to 75 agricultural producers, and also has offered cash incentives on energy efficiency and production increase equipment. The program emphasizes economic development of Montgomery and Schenectady counties. The program ties farmers in with National Grid's economic development funding, so that many farmers are eligible for rebates that cover up to 75% of the cost of equipment. Following the introduction of the program information, EnSave works with producers to install the equipment through a local equipment dealer of their choice.

Strengths: EnSave introduced the program first to manufacturers of the equipment promoted, followed by equipment dealers and contractors as well as the agricultural community, and then finally to farmers. This process ensures that by the time farmers hear about the program directly from EnSave, they have already heard about it from people that they know and trust.

Program Title	**Dairy Development Energy Program**
Contact	Craig Metz
Geographical Area Served	New York's Montgomery and Schenectady counties
Eligible/Targeted Participants	Dairy farms
Number of Participants	There are approximately 223 dairy farms in the area. EnSave audited 75 farms and oversaw measure installation on 51 farms.
Years of Operation	2006–2008
Funding Sources	New York State Legislature, New York Power Authority, U.S. Department of Energy, and NYSERDA
Total Funding	$502,000
Energy Savings	620,000 kWh saved annually
Cost Savings	$74,400 annually
Other Success Metrics	NOx reduction = 0.5 tons, SOx reduction = 0.95 tons, and CO_2 reduction = 340 tons; Program marketing materials available
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

Maryland Farm Energy Audit Program

The *Maryland Farm Energy Audit Program* is operated by EnSave with the Maryland Energy Administration, the Maryland Natural Resources Conservation Service, and the Maryland Department of Agriculture. The contract administrator is the Maryland Eastern Shore Resource Conservation and Development Council. This program offers farm energy audits to satisfy the energy audit enhancement portion of the USDA Natural Resources Conservation Service's Conservation Security Program. CSP participants are reimbursed for the cost of the audit, but the program is also open to non-CSP participants who wish to pay for the audit themselves.

Maryland NRCS and the Eastern Shore RC&D Council enrolled farmers into the program. EnSave then conducted an initial interview with the farmer to learn more about their facility and let them know the process that would take place during the onsite data collection. Then, EnSave collected energy end-use data on site, and completed a farm energy audit report. Finally, EnSave sent the audit report to the farmer and reviewed the results over the phone.

Program Title	**Maryland Farm Energy Audit Program**
Contact	Craig Metz
Geographical Area Served	Eastern Shore of Maryland
Eligible/Targeted Participants	All farms
Number of Participants	25
Years of Operation	2006
Funding Sources	Maryland Energy Administration, Maryland NRCS, and Maryland Department of Agriculture
Total Funding	$50,000
Energy Savings	Potential to save 470,000 kWh and 46,000 gallons of propane annually recommended through the audits
Cost Savings	To be determined based on actual installations of recommended equipment
Other Success Metrics	EnSave is collecting information about producers interested in renewable energy opportunities. EnSave is tracking energy efficiency as well as production-increasing recommendations through this audit program; program final report is available.
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)? What interaction, if any, has the program had with *9006*?	No

Alabama Farm Energy Audit Program

The *Alabama Farm Energy Audit Program* is a pilot program and was designed to provide farm energy audits and train data collectors to perform onsite data collection for energy audits. These audits identified opportunities for farms to reap energy, environmental, and economic benefits. They examined both energy efficiency and production-increasing techniques.

EnSave partnered with the Alabama Mountains, Rivers, and Valleys Resource Conservation and Development Council to train its staff in data collection procedures, who then conducted data collection on six farms. The data collectors forwarded the data to EnSave, which completed the energy audit reports and followed up with farmers. EnSave considers this successful pilot program to be a model for how it plans to work with other resource conservation and development councils through its national partnership with the National Association of Resource Conservation and Development Councils.

Program Title	**Alabama Farm Energy Audit Program**
Contact	Craig Metz
Geographical Area Served	Northern Alabama
Eligible/Targeted Participants	All farms
Number of Participants	6
Years of Operation	2006
Funding Sources	Alabama Department of Economic and Community Affairs, Energy, Weatherization, and Technology Division
Total Funding	$7,923
Energy Savings	Recommended potential to save 251,000 kWh and 34,000 gallons of propane annually
Cost Savings	Potential to save $70,000 per year, with an additional $55,000 in potential income from increase in production in poultry houses
Other Success Metrics	
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	None

Minnesota Farm Energy Conservation Improvement Program

The *Minnesota Farm Energy Conservation Improvement Program* is implemented by EnSave. This program offered one hundred free farm energy audits to the utilities' farm customers. EnSave also offered cash rebates on the installation of scroll compressors; plate coolers; milk transfer pump variable speed drives; milking vacuum pump variable speed drives; energy-efficient fans; high-volume, low-speed fans; stock waterers; lighting; compressor heat recovery units; and low pressure irrigation systems. Farmers were also eligible to receive a free engine block heater timer and up to two compact fluorescent bulbs for use on the farm. Following the introduction of the program information, EnSave worked with producers to install the equipment through a local equipment dealer of their choice. This was a performance-based program where EnSave was paid $0.125 per kWh saved throughout the program.

Strengths: EnSave introduced the program first to manufacturers of the equipment promoted, followed by equipment dealers and contractors as well as the agricultural community, and then finally to farmers. This process ensures that by the time farmers hear about the program directly from EnSave, they have already heard about it from people that they know and trust.

Program Title	**Minnesota Farm Energy Conservation Improvement Program**
Contact	Craig Metz
Geographical Area Served	Minnesota service areas of Xcel Energy, Minnesota Power, and Interstate Power & Light
Eligible/Targeted Participants	All farms
Number of Participants	1,697
Years of Operation	2005–2006; Program for Minnesota Power and Interstate Power & Light ended April 2006 and program for Xcel Energy ended December 2006.
Funding Sources	Minnesota utility ratepayers through a system benefits charge; Program is operated under contract with the Minnesota Department of Commerce.
Total Funding	This is a performance-based program where EnSave was paid $0.125 per kWh saved throughout the program.
Energy Savings	4,149,980 annual kWh savings; 4,973 annual kW savings
Cost Savings	$269,748 in annual cost savings
Other Success Metrics	Final reports for all three utilities are available.
Did the presence of Section *9006* affect the program in any way (funding/program offerings/etc.)?	No
What interaction, if any, has the program had with *9006*?	

ELPC and NREL

There are a host of organizations that play critical roles in helping to advance energy efficiency practices in the agricultural sector in different ways than most of the organizations described above. These organizations may not work directly with producers on the farm, but they are essential in supporting efforts to get those producers what they need in terms of funding and policy options to continue to be successful. The organizations work to make policy recommendations and support legislation such as Section *9006* of the *2002 Farm Bill*, and play an active role as advocates for agricultural interests. They also provide information through their Web sites and organized workshops directly to the end-users. Finally, they act as facilitators of dialogue among other advocacy groups, research organizations, and various interested parties by hosting meetings and conference calls that allow for valuable sharing of information and ideas and help keep the community updated.

The Environmental Law and Policy Center (ELPC) is an advocacy organization based in the Midwest that works to implement sustainable energy strategies. It was instrumental in the drafting and passing of the *2002 Farm Bill* and continues to actively distribute information about the benefits and funding opportunities. It also undertakes valuable research that outlines where *9006* money has gone—to which states, to what kinds of projects, and how much. This information has been particularly valuable in determining where *9006* has been successful and where it has not been able to reach. Through its recently redesigned Web site, www.farmenergy.org, it provides information and updates to the agricultural community. Finally, it has also recently been working on a critical effort to support an expanded funded Section *9005* program, something we also believe to be a crucial piece of legislation, as discussed in the recommendations section of this report.

The National Renewable Energy Laboratory (NREL) is a national laboratory of the U.S. Department of Energy based in Golden, Colorado. It is the nation's leading center for renewable energy technology, market, and policy. Most relevant to this report, it has conducted technical reviews of the *9006* program—collecting information about applications and awards, documenting projects, and monitoring progress. NREL is also currently working on a post award tracking system, a Web-accessible database that will help state office staff update and enter data regarding project progress and development. This will be extremely valuable because it will enable easier data retrieval, help identify barriers to project development, and facilitate benefits analysis (Walters, Savage, and Brown 2006).

Discussion

This discussion will highlight some of the characteristics common to the successful programs outlined above, identify trends in programs over the past few years, and analyze the relationship of those programs to *9006*. In addition, the text box (above) provides a

discussion of two organizations that are key players in the field of energy efficiency in agriculture.

The programs that achieved the greatest success in terms of energy and cost savings as well as project completion seem to be the ones that offer targeted services to their customers. These services include audits, site surveys, rebates, or assistance with loan applications. In addition, an open flow of communication among all parties involved—the customer, the program implementer, the equipment vendors, and/or the contractors—is clearly crucial to project success. It also helps the program identify and target new opportunities and makes it easier for potential customers to become aware of their options.

Leveraging of the local agricultural network is also key to the success of programs since these networks help address local needs. As Rich Hackner with the Wisconsin Focus on Energy program characterized it, "the Ag community acts as a 'community' and the information channels are different and work differently than other sectors." In part this results from the rural culture that depends upon strong community ties. This connectedness has been noted in earlier programs where key stakeholders enable the rapid transfer of successful experiences (Elliott 1993; Brown and Elliott 2005).

Finally, aggressive follow-up helps ensure that projects are up and running. Providing information through Web sites and workshops is extremely useful, but one-on-one follow-up with the customer makes project completion and success much more likely.

It seems that the success of most of these programs, and in fact most of their operations in general, exist entirely independently of Section *9006* of the *2002 Farm Bill*. Most individuals we spoke to at organizations that were working with the agricultural sector on energy efficiency before the *9006* program funding became available reported that neither their own funding nor their service offerings changed substantially as a result. An example of this is the well-funded California programs that have made little attempt to secure the *9006* funding. In this case the successful programs, which already have adequate incentive funding, appear to see no need to expend resources seeking the supplemental funding available.

Those programs that emerged after the *9006* program began reported that the *2002 Farm Bill* had little or nothing to do with their initial establishment. Furthermore, most individuals observed that there was an increased awareness of energy efficiency opportunities, but that this was not due to *9006*. Instead, they attributed it mostly to high fuel prices and a general increase in understanding nationwide of U.S. energy challenges and global warming.

There were a few programs that did begin to offer assistance on *9006* applications to their customers, but most contacts explained that these instances were few and far between. Many explained that the applications for acquiring *9006* funding were extremely cumbersome and difficult for the average farmer or rural businessperson, and furthermore that once an application was approved, there were often difficulties receiving the actual grant or loan. The contacts believed that these problems could be rectified if there were organizations or

programs whose specific focus was to assist potential *9006* beneficiaries with filling out their applications, receiving their money, and putting that money towards the proposed project.

Given the increase in energy prices and the presence of *9006* funding, we would have anticipated a significant private sector response to these energy efficiency opportunities. With one notable exception, EnSave, this private response has not emerged. EnSave has significantly expanded its activities across the country and is now running programs from Vermont to California. EnSave has made support for customers seeking *9006* funding a part of many of its programs. Although this expansion of the EnSave programs does represent a success of the *9006* program in terms of encouraging capacity building, it is surprising that more private sector entrepreneurs have not become more involved.

These observations support the argument that *9006* funds were not evenly distributed across the country because of a lack of institutions and programs in many states to assist potential beneficiaries. Grants and loans were allocated in clumps in regions where organizations were able to figure out the most effective way to fill out the applications and acquire funding. The states that were most successful in acquiring *9006* grants and loans were those where there was active outreach by programs like the ones outlined above as well as state energy offices and the USDA, which raised awareness about the opportunities *9006* had to offer. For example, Wisconsin, Nebraska, and Vermont received significant funding through grants and loans because of existing infrastructure of assistance programs serving the agricultural sector, while states like Connecticut, Kentucky, and New Mexico did not receive any awards because of a lack of similar infrastructure. The *9006* program was successful where farmers and rural businesses were informed of the federal incentives and where they were given assistance to lower transaction costs in acquiring those incentives. There is a clear need for programs to fill this void in many states where the infrastructure does not currently exist. The ELPC is leading an initiative supporting an expanded *9005* program that would address these issues (Kharbanda 2007). Funding for the upcoming Farm Bill energy provisions is likely to be much larger than in 2002, making the impact of these policy recommendations that much more significant.

Conclusions and Recommendations

It is clear that Section *9006* has achieved many of its goals in the areas and states around the country where agricultural energy program infrastructure was already in existence to support it. The states that were able to receive the most and the largest grants from the *9006* program were also the places where technical assistance programs targeting the agricultural sector had been up and running for some time. A lack of experienced and trained energy experts in many states that could assist with the identification of opportunities and implementation of projects has hindered the deliverability of *9006* funding and benefits. Contrary to original hopes by some legislators, the existence of *9006* did not create enough of an incentive for new programs to emerge and existing programs to expand their range of activities. This increase and expansion of programs did occur in many places, but it does not seem to have resulted directly from *9006*, but instead, from other market trends and a general upsurge in awareness about the emerging energy challenges (as well as opportunities) in the agricultural sector.

In order for the *9006* program to reach its full potential, it must be complemented by a program that promotes and funds the development of technical assistance programs across the country. It has become clear that these kinds of programs are essential to make the potential beneficiaries of *9006* funding aware of their options and to assist them through the somewhat cumbersome application process by providing information, audits, and direct technical support. The most appropriate legislative approach to do this is through the funding and refinement of the Section *9005* program, which as discussed earlier, was a missed opportunity since it already exists in draft language in the *2002 Farm Bill*, but never received funding. In the next Farm Bill, the improved *9005* should establish a rural energy efficiency and renewable energy capacity building grant program to provide the support necessary for the emergence of new agricultural energy programs that result in a more equitable allocation of *9006* funding across the country.

This enhanced *9005* program would make entities such as state energy offices, state departments of agriculture, land-grant universities, community colleges, nonprofits, and retail electric providers eligible to compete for grants to develop capability to deliver energy services in their service regions. These grants would allow these institutions to provide on-farm energy management by conducting energy efficiency audits and renewable energy assessments. A few examples of newly developed capability might include staff training, expansion of energy management divisions, or improvement of informational services either through Web sites or organized workshops. Essentially, the central goal would be to advance the capability of these "middle men" organizations, institutions serving the rural community, to assist the end beneficiaries in achieving their goals.

9005 awards would be based on the quality of the proposal, local cost-sharing (e.g., from utilities, farm organizations, or state agencies), and projected impacts that would result from the additional capacity. Multi-agency proposals that demonstrate that the grant would facilitate long-term cooperation among the parties would be given preference in the awards. Funding possibilities vary, but we recommend that total grants under this provision to an individual state would not exceed $1 million and $10 million would be authorized annually through FY 2012. As mentioned in the discussion section, the ELPC has outlined such a plan that details the design and implementation of *9005*, and would be an appropriate model for this provision (Kharbanda 2007).

In addition, funding for the *9006* program should be increased in the next Farm Bill. These programs will achieve their greatest potential when paired together. *9006* has already proven to be successful, and the *9005* program described above will increase *9006's* reach and deliverability so that its benefits can be felt nationwide. Together, these programs will help to provide cost relief to U.S. agricultural producers and assist them in tackling and adapting to their energy challenges. The end result will be rural economic development, food security, reduced dependence on foreign energy sources, and improved environmental quality.

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