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VIEWPOINT

Agricultural Energy Management Plans: Conception to implementation

Amelia Gulkis and Andrea Clarke

ENERGY CONSERVATION IN THE FARM BILL

As energy becomes a larger portion of a farmer's operating costs, farmers and ranchers can cut input costs, maintain production, protect soil and water resources, reduce the nation's dependence on fossil fuels, and save money by implementing conservation practices that promote energy conservation and efficiency. Since 1935, the USDA Natural Resources Conservation Service (NRCS) has provided leadership in a partnership effort to help America's private landowners and managers conserve their soil, water, and other natural resources. Energy conservation and energy efficiency are becoming important aspects of how NRCS delivers technical and financial assistance.

The 2002 Farm Bill expanded NRCS's role to directly address energy through the Conservation Security Program (CSP). Among the seven energy enhancements offered to CSP participants was an Energy Audit of Agricultural Operations. Unfortunately, locating local agricultural energy audit providers proved to be difficult and the low enhancement payment of $500 made offering the enhancement to farmers challenging. States such as Maryland were successful in providing on-farm energy audits to qualified CSP program participants by forming a unique partnership between federal, state, private, and nonprofit organizations. The Maryland Energy Administration, NRCS, the private farm energy efficiency consultants EnSave Inc., the Eastern Shore RC&D, and the Maryland Department of Agriculture all played a role in creating the Maryland Farm Energy Audit Program. The program provided 25 on-farm energy audits to farmers through a pilot effort with CSP farmers and was later expanded to offer energy audits and incentives for energy efficiency projects on a statewide basis.

With passage of the Food, Conservation, and Energy Act of 2008 (2008 Farm Bill), NRCS's Environmental Quality Incentives Program (EQIP) acquired new authority to directly address energy conservation and specialized conservation activities. EQIP has historically promoted implementing conservation practices that indirectly affect farm and ranch energy management, but with the new Farm Bill, NRCS can now address the energy used to run the farm—the electricity, propane, diesel, natural gas, and other fuels. The Conservation Title II of the 2008 Farm Bill (Subtitle F–EQIP, Section 2501) provides authority for use of EQIP funds to specifically provide flexible assistance to farmers to install and maintain conservation practices that conserve energy. Authority is also provided for using financial assistance funding to support development of conservation plans for EQIP participants. NRCS has associated the term Conservation Activity Plans (CAPs) (such as the Agricultural Energy Management Plan) with this funding authority.

AGRICULTURAL ENERGY MANAGEMENT PLANS

In fiscal year 2009, 35 of NRCS's state offices volunteered to participate in the EQIP Conservation Activity Plan pilot program. National criteria and guidance were developed for twelve different CAPs, including the Agricultural Energy Management Plan (AgEMP). Volunteer states agreed to pilot at least one of the twelve activity plans. Eight states volunteered to pilot the Agricultural Energy Management Plan. In fiscal year 2010, the NRCS Chief has authorized state conservationists to support all twelve of the CAPs. Each state may offer any or all of the twelve available CAPs during fiscal year 2010.

Only Technical Service Providers (TSPs) (USDA NRCS 2009) are authorized to create these specialized activity plans. The flexible assistance made available to interested farmers consists of up to 75% financial assistance from EQIP funds (up to 90% for historically underserved farmers and ranchers). It was anticipated that by offering flexible assistance to farmers, they would be motivated to examine their energy consumption as well as ways to become more energy efficient.

The Agricultural Energy Management Plan includes the on-farm energy audit that establishes a baseline of total energy consumption of the farm or ranch operation and also provides a strategy to explore and address on-farm energy problems and opportunities for energy conservation, energy efficiency, and energy generation on working agricultural lands.

The energy audit provides a plan for how the farmer can choose to prioritize his or her energy efficiency investment(s). The actual benefit—to both the farmer and society at large—is achieved only when the CAP recommendations are actually implemented. Therefore, it is important to have assistance available to help farmers implement the audit's recommendations and make sure those receiving energy audits are seriously committed to conserving energy by reducing their energy use. Funding to actually implement some of the recommendations made in the on-farm energy audit could be available through EQIP and other forms of financial assistance, such as USDA Rural Development's Rural Energy for America Program (REAP) low-interest loan and grant program or state and local programs.

For the fiscal year 2009 pilot program, four states were successful in being able to offer AgEMPs through their EQIP programs to interested farmers and ranchers. As stated earlier, one of the requirements of a CAP is that it must be created by a registered TSP. Technical Service Providers must meet qualification standards established by NRCS. The AgEMP criteria for these technical service providers includes holding a professional engineer license or certified energy manager certification, at least three years experience in energy sys-

Amelia Gulkis is the Program Development Manager for EnSave Inc., a provider of farm energy audits and farm energy efficiency programs. **Andrea Clarke** is a Management Analyst for the Financial Assistance Programs Division, USDA Natural Resources Conservation Service, Washington DC.

tems, and the completion of at least five farm energy audits. The on-farm energy audit needs to comply with the American Society of Agricultural and Biological Engineers (ASABE 2009) standard S612: Performing On-farm Energy Audits. This standard is provided to guide the reporting of data and the preparation of specific recommendations for energy reduction and conservation with estimates of energy savings. This means that TSPs registered to provide AgEMPs are highly qualified to provide these services.

ELEMENTS OF AN AGRICULTURAL ENERGY MANAGEMENT PLAN

An Agricultural Energy Management Plan includes the following elements:

- Summary of the facility's location, production level, any unusual factors that affect energy use, and any energy efficiency measures already in use.
- Summary of the site's energy use over one year, broken down by type of usage and month.
- Summary of how much money the farmer would save if the recommended measures were included and how much money the farmer would continue to lose if no action were taken.
- A list of recommended measures to reduce energy use, including their annual energy (electricity, natural gas, propane, diesel, oil, etc.) savings and an estimated payback in years.
- A narrative summary of the recommendations made through the audit, including description of technology, how the technology would affect the site, and how much energy would be saved annually by installing the equipment.

Together, these elements both analyze the farmer's current energy use and create a custom plan for future energy savings.

BENEFIT TO THE FARMER

An AgEMP is a decision-making tool for farmers and ranchers. Its purpose is to help them choose the energy-saving activities that make sense for them. Many farmers already have some idea of what energy-saving project they would like to implement, but an AgEMP can either confirm the farmer's hunch or illuminate some other savings opportunities. For instance, a dairy farmer could be convinced that a ventilation project is the best choice for the farm, but the AgEMP could point out that lighting actually results in greater savings and a shorter payback. General recommendations about how to save energy abound, but it is only through an analysis of a farmer's unique energy usage and production patterns that a farmer can truly learn what opportunities are best for his or her operation.

AgEMPs also enable farmers to apply for funding to help offset the cost of energy efficient equipment, such as NRCS's EQIP or Rural Development's REAP. Ultimately, the AgEMP is a starting point for further consideration of energy use on the farm. For an AgEMP to be successful, farmers need to consider and implement the recommendations made in their AgEMP. Only upon adopting the report's recommendations does the farmer save energy and money, and society benefits from reduced energy consumption.

Table 1

Energy savings comparison.

Farm	Total mBTU energy savings	Percent of savings	Investment	Payback
Farm 1	450.7	33.4%	$71,052	7.1 years
Farm 2	352.3	16.8%	$24,214	4.5 years
Farm 3	581.3	41.2%	$29,995	3.6 years

Table 2

Farmer 1 detailed annual energy savings potential.

Recommended measure	Electric savings (Increase) (kWh)	Propane savings (Gal)	Energy savings (Increase) (MBtu)	Installed cost (a)	Energy cost savings (b)	Payback in years (a/b)
Seal air leaks		403	36.9	$400	$818	0.5
Curtainwall to solid sidewall		1,512	138.5	$12,192	$3,068	4.0
Circulation fans	(2,507)	504	37.6	$4,000	$862	4.6
Insulated tunnel doors		605	55.4	$9,360	$1,227	7.6
Radiant heaters		1,512	138.5	$33,320	$3,068	10.9
Attic inlets		479	43.9	$11,780	$971	12.1
Totals	(2,507)	5,014	450.7	$71,052	$10,014	7.1

A CASE STUDY FROM COMPLETED AGRICULTURAL ENERGY MANAGEMENT PLANS

AgEMPs are so new that only a few have been completed under the pilot program, but energy audits have been conducted for decades. In October 2009, EnSave Inc. became a TSP and completed three AgEMPs for West Virginia farmers participating in EQIP. EnSave is a national leader in providing farm energy audits and farm energy efficiency consulting and has provided over 2,000 farm energy audits since 1991.

All three West Virginia AgEMPs were poultry broiler operations (two turkey farms and one chicken facility).

Taking a closer look at the breakdown of recommendations for one of the farms highlights the importance of an AgEMP. Farm 1 and Farm 2 (table 1) are both turkey farms with similar-sized operations. However, farmer 1 was using all forced hot air heaters, and conversion to radiant heaters resulted in additional savings. Farmer 2 decided not to install solid sidewalls due to larger curtain openings and higher

installation costs; therefore, those potential savings cannot be recognized.

The Farm 1 farmer indicated he was most interested in an evaluation of insulated tunnel doors, radiant heaters, and attic inlets, all of which are analyzed in the AgEMP (table 2). However, all three of these measures have higher payback periods than other measures, which the farmer may not have even known about. For the same energy savings as radiant heaters, the farmer could convert his curtainwall to a solid sidewall at less than half the cost. Another option, while only providing a small percentage of the total energy savings potential, would be to seal the poultry house air leaks—a measure that pays for itself in six months and would lower the farmer's propane costs by around $800 annually.

Of course, these measures in table 2 are presented according to their energy savings values alone. It could be that farmer 1 was already planning on installing radiant heaters to obtain some other benefits. In this case, the pleasant surprise is that these heaters actually save $3,068 per year. Many energy saving activities also result in increased comfort for animals and staff, reduced maintenance costs, or higher productivity on the farm. All of these benefits should be considered along with the energy savings and in many cases can make energy efficiency an even more attractive choice.

These three AgEMPs demonstrate the importance of the energy audit as a decision-making tool. EnSave has seen in its nearly nineteen years of providing farm energy audits that, first and foremost, without an energy audit it can be difficult for farmers to know which options offer the best value for the long and short term. The AgEMP summary information for farmer 1 illustrates how energy audits are a helpful cost-saving tool for farmers. With AgEMPs typically costing just a few thousand dollars, and with NRCS now helping offset this cost, an energy audit can identify savings potential beyond the initial cost of getting an AgEMP completed.

When more farmers learn of the types of recommendations made in an energy audit (and the value they bring), they will be more likely to recognize the value of investing in an AgEMP for their farm. More importantly, when farmers understand the economic value of various energy-saving measures, they will be more likely to install recommended equipment and actually begin saving energy.

REFERENCES

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