

2014 Final Report for Cornell University SARE NY State Program

Project Title: Improving Farm Energy Sustainability in New York

1. Report Summary

a. Why this project?

As erratic weather and rising energy/fuel costs become more challenging variables to operating a sustainable farm business, education on energy efficiency and renewable energy is increasingly important. Simple and inexpensive measures can save farmers money and stabilize rising energy costs while improving air quality and reducing the environmental footprint of the farm.

b. What was done in this project to address the problem?

The project began with an introductory workshop called “Crash Course for Educators: Saving Energy and Converting to Renewables on the Farm” held at the CCE Centennial Conference in Syracuse, NY on October 13th, 2011. Presenters taught an audience of 20 Extension educators how to identify simple and inexpensive energy conservation measures to recommend to farmers during a farm visit. Educators also learned about the range of grants and opportunities to install renewable energy available to their client farmers. The following Fall, 4 of these educators hosted field days on farms in their region that showcased innovative sustainable design. A total of 95 farmers and 9 educators attended the 2012 field day series which featured solar and wind energy, radiant heat, solar thermal, off-grid farming and water conservation. In Spring of 2013, the project expanded education to beyond the classroom with a 4-part webinar series called “New Generation Energy: Sustainable Power for your Farm or Homestead”. A total of 212 people attended these farmer-led virtual tours, which walked viewers through images of efficient greenhouse design, off-grid farming, generating heat with compost, and where to find grants and incentives. Once again, in Fall of 2013, 4 educators that completed this series were selected to host field days on farms in their region. The 2013 series was attended by 60 farmers and 15 educators who learned about solar and wind turbine installations and on-farm biomass/biofuel production. The project culminated in a final webinar series held in Spring 2014. This second series, titled “2014 Sustainable Farm Energy Virtual Tours” attracted 150 viewers. The series featured farmer-led tours of an earth-cooled barn and root cellar, wind powered vineyard, canola and sunflower farm, and a remote livestock watering system.

c. What happened as a result of this project?

The project’s educational activities reached a total of 404 educators and 709 farmers. From this audience, 129 educators and 178 farmers reported an increase in knowledge, skills, confidence and 98 educators and 146 farmers reported an intention to use knowledge and/or skills learned. At the close of this 3 year project, our survey results show that 11 farms have undergone energy audits. 14 have upgraded equipment. 11 have installed renewable energy. Although some of these results are below the target goals, 43% of respondents *still* plan to upgrade equipment and 57% *still* plan to install renewable energy within a year. At the start of the project, the SARE state program was the only existing statewide project serving the sustainable farm energy sector. Over the past two years, two other state organizations cropped up with similar goals, the ‘CT Farm Energy Program’ and ‘Renewable Energy Vermont’. Both of these projects sited the NY SARE program as ‘paving the way’ for sustainable energy education in the Northeast.

2. Performance Target(s)

12 agriculture service providers deliver an educational program about energy conservation and renewable energy opportunities and incentives to an audience of 300 farmers. 30 of these farms undergo farm energy assessments; 24 farms upgrade old equipment to higher efficiency standards; and 9 farms install renewable energy.

3. Report on 2013-2014 Milestone Accomplishments

1. 12 farmers each attend one of four 2013 Sustainable Farm Energy field days. The field days take place on farms that have implemented energy efficient strategies and/or renewable energy. The educator host coordinates appropriate speakers to present an educational program relevant to the farm energy features of the farm followed by a farmer-led interactive tour. Educator host distributes evaluation on-site. **October 2013**

A total of 60 farmers and 15 educators attended the following field days:

- Milking Energy from the Wind, Larry Doody & Sons LLC, Tully, NY. Hosted by Erin Hull, CCE Onondaga County.
- Making Farm Fibers with Energy from the Sun, Songwood Meadows, Tully, NY. Hosted by Amanda Barber, SWCD Cortland County.
- Using Residual Biomass to Fuel the Farm, Dedrick Farms, Lansing, NY. Hosted by Betsy Keokosky, Community Biomass Energy.
- Sourcing Solar: On-Farm Production to Retail, Schoharie Valley Farms, Schoharie, NY. Hosted by David Cox, CCE Schoharie and Otsego Counties.

An evaluation conducted immediately after the field days documented that a total of 10 farmers planned to conduct an energy audit within 1 year, 14 farmers planned to upgrade equipment within a year, and 14 farmers planned to install renewable energy on their own farms within 1 year. The evaluation also showed that 13 educators were somewhat or very likely to reproduce the information presented and 6 are very likely to recommend the strategies presented to farmers. 3 plan to host a workshop or training on sustainable energy. See milestone # 5 for one year follow up evaluation results.

2. Educator hosts receive \$300 stipend. **September 2013**

Reimbursements were paid by November 2013

3. The NY SARE PDP staff conducts one year evaluations with *all* SPRING 2013 webinar attendees. **December 2013**

A total of 147 people opened the email invitation to complete the survey. 57 clicked on the survey. 31 completed it. Results have been combined with Years 1 and 2 of the project and are posted in Section 4 "3-Year Summary of Activities, Participants, Learning Outcomes and Products" below.

4. 100 ag service providers receive invitations to a series of short lunch-time webinars on sustainable farm energy topics geared toward farmers and agricultural service providers called “2014 Sustainable Farm Energy Virtual Tours” **February – March 2014**

Press for this 4-part webinar series reached over 6000 people via the Small Farms Program Contact list. In addition, we sent targeted press to 371 previous registrants of sustainable farm energy field days and 419 previous registrants of project webinars. A total of 156 attendees tuned in to one or more webinars. Webinar details are below. The full press is available at <http://smallfarms.cornell.edu/2014/04/01/sustainable-farm-energy-2014-virtual-tours/> Archived links are available at <http://smallfarms.cornell.edu/resources/farm-energy/>

2014 SUSTAINABLE FARM ENERGY VIRTUAL TOURS

A webinar series of farmer-led virtual tours and fun, informational tips for saving energy and converting to renewables on your farm or homestead!

April 4th: Organic Vegetable Farm Cools with the Earth: Warms with the Sun

Noon – 1:00pm with Jay Armour of Four Winds Farm, Gardiner, NY

Is it possible to operate a 24 acre diversified vegetable farm with minimal energy use? Yes! Jay Armour will take us on a virtual tour of his passive-solar heated and earth-cooled straw-bale vegetable barn with attached greenhouse. At one end of the barn are two root cellars built into a hillside that store root crops throughout the winter with minimal energy use. A 14-kw grid-intertied PV electric system is situated on the barn roof, which is being financed by a combination of a NYSERDA grant and a low-interest loan. A permanent raised bed system in the vegetable garden requires very little tractor time and hence very minimal fuel use. The Armours also transport vegetables to market in a diesel van converted to run on waste vegetable oil (WVO). The farm raises produce, heirloom seedlings, grass-fed beef, pasture raised turkeys, and intermittently pasture-raised pork.

April 11th: Family Vineyard Shrinks Carbon Footprint by 40%

Noon – 1:00pm with Art Hunt of Hunt Country Vineyards, Branchport, NY

Since 2007, Hunt Country Vineyards has reduced total energy costs on their vineyard by 30% and their carbon footprint by more than 40%. How have they gone about it? Art Hunt will lead us on a virtual tour of their energy efficient winery, newly insulated warehouse, geothermal heating and cooling system, and vertical wind turbine. In 2012 the Hunts launched a Locavore Room which celebrates the bounty of local foods and beverages in the Finger Lakes. The Hunts are proud to say that all food & beverage items (other than wine) they offer for sale on the farm travel an average Distance-from-Source (DfS) of just 162 miles. Art will also share a variety of ecological production techniques. For example, in 2005, the Hunt family began mixing grape pomace with animal manure and then composting the mix before applying it to the vineyard. The compost adds vital minerals and nutrients to the soil that help produce outstanding grapes

for winemaking and reduce the use of other fertilizers.

April 18th: Sunflowers & Canola to Fuel: Dairy Becomes Biodiesel Production Facility

Noon – 1:00pm with Roger Rainville of Borderview Farm, Alburgh, Vermont

Interested in making biodiesel on your farm or in cooperation with other farmers? Roger Rainville will take us on a virtual tour of his former dairy-turned-energy farm in Alburgh, Vermont. In 2008, when diesel prices rose from \$4 to \$5 per gallon, Roger began planting sunflowers and canola on a portion of his 214 acres and installing biodiesel processing equipment. He harvests the oilseed with a combine, and uses a seed cleaner and grain dryer to prepare the seed for storage in a 60-ton grain bin prior to processing. He'll show us how he presses the seed to get two products: oil for biodiesel and pelletized meal for feed or to burn in a pellet stove. He then sends the oil through a BioPro 190 automated biodiesel processor which can process 100 gallons of oil to fuel per day. Learn more about his equipment and the seed to fuel process by tuning in to this video. Cosponsored by the Vermont Bioenergy Initiative

April 25th: Thirsty Livestock? Use Sun or Wind to Power a Remote Watering System.

Noon – 1:00pm with Jonathan Barter of Barter Farm, Branchport NY

Are you getting tired of hauling water to livestock in remote pastures? Jonathan Barter will show us the renewable energy powered watering system on his 210 acre livestock farm (40 Angus cattle and 130 Cheviot and Dorset sheep). In 2010, Jonathan installed a combination wind and solar pumping system which supplies water to 58 acres of pasture. The pumping system consists of a 350 watt turbine, 400 watt solar panels, back up batteries and a deep well pump. Partial funding for this project was provided by USDA – Natural Resources Conservation Service's Conservation Innovative Grants program.

5. Project Coordinator conducts 1 year follow up evaluation with FALL 2013 field day attendees. **October, 2014.**

Field day results have been aggregated with Years 1 and 2 and are presented in the 3-year summary in Section 4 below.

6. Project Coordinator conducts follow up evaluation with all SPRING 2014 webinar attendees. **November, 2014.**

Webinar results have been aggregated with Year 2 and are presented in the 3-year summary in Section 4 below.

7. Project Coordinator conducts final 3 year evaluation of all project participants. **December, 2014**
Results are posted in Section 4 below.

4. 3-Year Summary of Activities, Participants, Learning Outcomes and Products

Table 1 –Activities.

Type of Educational Activity Conducted by Project	Number of Each Activity Conducted
Workshop/Field Day	13
On-farm Demonstration	
Tour	
Webinar/Talk/Presentation	18
Other on-line training	
Individual Consultations (an estimate is acceptable)	50
Other (specify)	

Table 2 – Participants.

Type of Agricultural Service Provider	Number Who Participated
Extension	
NRCS	
Other Federal/State Agency	
Other (specify)	
Total Number of Agricultural Service Providers*	404
Farmers	709

Table 3 - Learning Outcomes.

	Total Number of Agricultural Service Providers	Total Number of Farmers	Total number of acres or animals the farmers manage, if known
Verified an increase in knowledge, skills, confidence	129	178	
Verified intention to use knowledge and/or skills learned	98	146	
*Bulleted list of only the key knowledge and skill areas for which you verified an increase in knowledge and skills.			

- Generating Heat with Compost
- Wind/Solar Powered Remote Livestock Watering Systems
- Efficient Vineyard Design
- CSA Off-grid farming
- Using storage batteries
- Earth cooled building design
- Solar Electric/PV and Solar Thermal Systems
- Using Radiant Heat in Greenhouse Design
- Energy Conservation and Smart Energy Use
- How to source Renewable Energy Grants and Loans
- How to Site/Install a wind turbine
- Water Conservation Strategies
- DIY Biomass Pelletizing Systems
- Installing Biomass-Based Boilers
- Making On-Farm Biodiesel

Table 4 – Products.

Type of Information Product Produced	Number of Each Type Produced	Description
Fact sheet/Guidance document	1	<u>Guide to Hosting a Sustainable Farm Energy Field Day</u> , a short manual for educators
Decision tool		
Website/web content	1	Sustainable Farm Energy Project Pages: http://smallfarms.cornell.edu/resources/farm-energy/
Article (newsletter, press)	4	Spring, 2013 Edition. IS WIND ENERGY RIGHT FOR YOUR FARM? by Mark Mayhew. See http://smallfarms.cornell.edu/2013/03/27/is-wind-energy-right-for-your-farm/ Fall, 2013 Edition. SUNFLOWERS: FROM FIELD TO FUEL. Drawing the connection between diversified agriculture, renewable energy, and food production in Vermont. By Rachel Carter. See http://smallfarms.cornell.edu/2013/10/07/sunflowers-from-field-to-fuel/ Winter, 2014 Edition. LOCAL COMPOST MATERIALS HEAT COMMUNITY GREENHOUSE. Jessica Clark of South Pine Street City Farm trials compost substrates to find a sustainable way to heat an urban greenhouse. By Abigail Woughter. See

		http://smallfarms.cornell.edu/2014/01/14/local-compost-materials-heat-community-greenhouse/ Summer, 2014 Edition. ANAEROBIC DIGESTERS: UP AND COMING FOR SMALL FARMS?. By Abigail Woughter. See http://smallfarms.cornell.edu/2014/07/08/anaerobic-digesters-up-and-coming-for-small-farms/
Curricula		
Video		
Other (specify)		

5. Performance Target Outcomes and Additional, Unanticipated Outcomes

a. Summarized Outcome Data

Table 5 – Numbers of agricultural service providers taking action

The total number of agricultural service providers who incorporated information and/or used skills learned through the state program training activities in their educational activities, services and/or information products for farmers.	51
The total number of farmers these agricultural service providers reached through their efforts.	1020

Table 6 – Actions taken by the agricultural service providers

Place an X next to all that apply	Types of Educational Activities Ag Service Providers incorporated information they learned into	Number of Each Activity Type, if known
x	Workshop/Field Day	11
	On-farm Demonstration	
x	Webinar/Talk/Presentation	3
	Other on-line training	
x	Individual Consultation (an estimate is acceptable)	4
x	Fact sheet/Guidance document	5
x	Article (newsletter, press)	4
x	Web content	6

x	Other (specify) <ul style="list-style-type: none"> • Future pilot project in state 	1
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Table 7 – Actions taken by farmers

The number of farmers who made a management change as a result of learning from the project activities and/or the trained agricultural service providers?	36
Bulleted list of the changes made by farmers	
<ul style="list-style-type: none"> • We made too many upgrades to list! • New energy efficient appliances • Installed a very efficient wood burning stove • We installed solar panels on the roof of our new barn • We installed 12V solar battery system for chicken coop lighting and water heating, I am saving \$50 - \$100/month • We installed 3.6KW grid tied photovoltaic system with battery backup for house and 90W photovoltaic with battery storage for chicken coop. Already had geothermal heating for home for 23 years • Within the past year we have upgraded our windows and doubled our homes insulation. We have also taken measures to tighten our home against heat loss by outside air infiltration. • Solar panels on the roof of my new barn • Solar off grid power system. • We installed an outside wood burning system to provide heat to our home as well as heat our out buildings and the greenhouse • We installed a solar hot water heating for our milkhouse • Installed solar panels on the roof of my newly-built barn • Solar energy system with 40 panels that will cover all of our electricity needs 	
Number of acres, animals, or other appropriate production units that were affected by these changes. <i>(please enter your best estimate; you may leave this blank if you have no idea)</i>	

Table 8 – Additional outcomes as a result of the project

Type of Outcomes Achieved	Number of Each Outcome
New working collaboration	13
Grants applied for	
Grants or other funds received	
Other (describe)	

b. Outcome Narrative

Since the project began in 2011, the topic of sustainable farm energy has risen to the forefront of the New York farming community due to the possibility of ‘fracking’ – injecting fluids into subsurface rock formations causing large fractures which allow release of natural gas – coming to New York. While this high tech method of resource extraction could bring farmers much needed revenue in the way of ‘gas leases’, many NY farmers and ag service providers are concerned about toxic fluids seeping into wells and contaminating livestock or produce. The threat of fracking has motivated farmers and communities in NY to switch to renewable energy in an effort to reduce the demand for fossil fuels and demonstrate the possibilities of sustainable energy. Thus, the focus of this 3 year project has been surprisingly timely!

Attendance and interest in the program was high, reaching a cumulative total of 404 service providers and 709 farmers. Farmers intentions to adopt sustainable energy practices were also high. Evaluations immediately following educational events showed that an average of 52% of farmer participants planned to conduct an energy audit within 1 year, 59% planned to upgrade equipment within a year, and 65% planned to install renewable energy on their own farms. However, at the close of this 3 year project, documented outcomes show that 11 farms have undergone energy audits, 14 have upgraded equipment and 11 have installed renewable energy. Why haven’t more farmers intentions transformed into action? Participants cited cost and time as the top two barriers to implementing energy upgrades or renewable energy. Even though partial grants and incentives are available to NY farmers through NYSERDA, many of the farmers enrolled in the field days or webinars had been farming for under 5 years and lacked capital, or prioritized reinvesting their existing capital toward other more urgent needs. Furthermore, participants reported that fluctuating production plans and storage needs have made it challenging to plan for future energy demands. Many are waiting for their businesses to mature and stabilize and for their spare capital to grow. The fact that an average of 43% of respondents *still* plan to upgrade equipment and 57% *still* plan to install renewable energy at the close of this project supports this gap between intention and action. 1-3 years is simply not enough time for many of these participants to act.

Performance Target Outcomes

“Improving Farm Energy Sustainability in New York” was not a template “Train the Trainer” project because most agriculture service providers can’t be expected to become experts in a subject area that requires specific, highly technical and specialized knowledge. In many cases, the educators enrolled in the project were taught by farmers who had become ‘sustainable energy experts’ by trial and error, experimenting with sustainable energy design over many seasons on their farms. These educators were introduced to a range of sustainable energy practices and ‘people’ resources to better prepare them to direct client farmers to the appropriate networks - energy auditors, farmer mentors or sustainable energy companies. Farmers were as much a direct beneficiary of the project’s programs as educators. Several farmers that attended the YEAR 1 field day series implemented sustainable design features on their farms and went on to become field day hosts in YEAR 2 and YEAR 3 (Leo Siemion, Tim and Jean McCumber)

The value of the project to farmers is indicated in the quotes below:

- The webinars were truly inspiring, informative and full of really applicable information that we will implement in the near future. The real value of the knowledge we gained will come when

we move to the country in a year to 18 months and start our little farm. I am particularly excited about using a totally solar powered radiant heat system to extend the growing season in our hoop and green houses. So, though we have taken no action as yet as a result of the webinars, they were very helpful to us!

- The Fuess farm tour was a great introduction for me as I had never done any research into the options that were out there and did not have an understanding of placement of wind turbines and how roof tops are the worst due to air turbulence. It was also my first introduction to Bergey and their products.
- I was encouraged to install the solar power for my chicken coop as a result of the tour. I learned helpful information for my home system as well.
- Thank-you for the field days and rattling my cage about the energy audit - the next step I need to take toward sustainability. I would be happy to share my farm's journey down the path to energy independence in future field days.
- I believe that learning about working models of sustainable energy done by real farmers is both informative and motivating.
- I really like the sustainable energy webinar series. I have made small changes throughout the year and have plans to implement more as time and money allow. Excellent info - thank you!

The value of the project to educators is indicated in the quotes below:

- All of these programs are practical, useful, easily accessible & you should keep offering them!
- Outside of these programs, we don't have access to this kind of [sustainable farm energy] education, which is increasingly important!
- Really enjoyed these energy seminars! Would love to see more done, they're great and easy resources to share too!
- Great information, and I hope my article coverage led to more exposure and understanding of the issues.

Other Results, Unanticipated Outcomes and Interesting Finding

Since sustainable farm energy is an important topic for farm enterprises of all kinds and sizes, this project initiated collaborations with a wide range of organizations and companies. The NY SARE office reached out to 7 organizations to cohost or present at field days and webinars (Cornell Cooperative Extension, Northeast Organic Farming Association of NY, NY Soil Water Conservation District, NY Energy Research and Development Authority, Vermont Bioenergy Initiative, Community Biomass Energy, and Compost Power Network) and 4 renewable energy companies (Alternative Power Solutions of NY, One Earth Energy, Paradise Energy Solutions and Earth, Wind and Solar). In addition, the project teamed up with two New England based non-profits (CT Farm Energy Program and Renewable Energy Vermont) to swap resources and program ideas.

6. 2013-2014 SARE Outreach Activities

Event/Activity	Date	Number of Contacts <i>(please enter your best estimate)</i>	
		Farmers	Ag. Professionals
Field Day: Milking Energy from the Wind	9/20/2013	5	5
Field Day: Making Farm Fibers with Energy from the Sun	9/27/2013	18	11
Field Day: Using Residual Biomass to Fuel the Farm	10/4/2013	10	9
Field Day: Sourcing Solar: On-Farm Production to Retail	10/11/2013	18	6
“Get Plugged into Farm Energy in NY” presented at the SWCD Statewide Employee Training	3/12/14	0	25
Organic Vegetable Farm Cools with the Earth: Warms with the Sun, with Jay Armour of Four Winds Farm	4/4/2014	35	25
Family Vineyard Shrinks Carbon Footprint by 40% with Art Hunt of Hunt Country Vineyards	4/11/2014	27	13
Sunflowers & Canola to Fuel: Dairy Becomes Biodiesel Production Facility	4/18/2014	18	7
Thirsty Livestock? Use Sun or Wind to Power a Remote Watering System with Jonathan Barter of Barter Farm	4/25/2014	17	8
Hosted Webinar: Get a Grant! NESARE Farmer and Partnership Grants by Carol Delaney	10/10/14	39	21
Workshop: “SARE Farmer Grant Opportunities” Presented at the Agricultural Funding Opportunities Forum	11/21/2014	10	2

Other Option SARE Outreach Activities

The following profiles of recent SARE grant recipients were published in the “Northeast SARE Spotlight”, a regular feature in the seasonal Small Farm Quarterly Magazine. The “Northeast SARE Spotlight” also details upcoming grant deadlines and latest SARE resources. The Small Farm Quarterly reaches a readership of 27,000 farmers, educators, and service providers from Pennsylvania up to Maine. Online issues are posted at: www.smallfarms.cornell.edu/pages/quarterly

- Fall, 2013 Edition. QUINOA CURIOSITY. Farmers David McClelland and Mei-ling Hom used SARE funding to trial the increasingly popular grain quinoa on their rural New York farm. By Abigail Woughter. See <http://smallfarms.cornell.edu/2012/10/01/taking-agritourism-as-high-as-a-hot-air-balloon/>
- Fall, 2014 Edition. WATCH OUT DIESEL: THERE’S A NEW FUEL IN TOWN. Dave Dolan of Flying Rabbit Farm creates syngas out of locally produced grass pellets. By Rachel Whiteheart. See <http://smallfarms.cornell.edu/2013/10/07/watch-out-diesel-theres-a-new-fuel-in-town/>
- Winter, Fall, 2014 Edition. TAKING A BUTTER KNIFE TO KEFIR CHEESE. Rose Belforti of Finger Lakes Dexter Creamery received a second SARE grant to make her newly perfected kefir cheese recipe spreadable. By Rachel Whiteheart. See <http://smallfarms.cornell.edu/2014/01/14/taking-a-butter-knife-to-kefir-cheese/>
- Summer, Fall, 2014 Edition. DUCKS WITH A PURPOSE. Two-year SARE grant funded the investigation of cost-effectively raising slug-eating ducks in a shiitake mushroom yard. By Abigail Woughter. See <http://smallfarms.cornell.edu/2014/04/07/ducks-with-a-purpose/>
- Summer, Fall, 2014 Edition. INVESTIGATING THE PROFITABILITY OF THE PAPER POT TRANSPLANTER ON A SMALL SCALE VEGETABLE FARM. By Liz Martin. See <http://smallfarms.cornell.edu/2014/07/08/paper-pot/>
- Winter, Fall, 2014 Edition. BEEF COOPERATIVE MAKES DOLLARS AND SENSE. By pooling product, the 25 farmer members of Adirondack Grazers have more than doubled their return on grass-fed beef. By Sarah Nechamen. See <http://smallfarms.cornell.edu/2014/10/06/beef-cooperative-makes-dollars-and-sense/>

SARE grant opportunities were advertised regularly in the Small Farms Monthly Update, a monthly e-newsletter reaching over 6,000 farmers, agricultural press, educators, and service providers. 80% of these recipients live in the Northeast region. Archive issues of the Update are posted at:

<http://smallfarms.cornell.edu/news/>

SARE Display and Materials were distributed at 3 regional conferences.

Conference	Date	Location
NY Agriculture Society Meeting	January 9th, 2014	Syracuse, NY
Silvopasture & Grazing Conference	January 25th, 2014	Lathem, NY
Strategic Marketing	November 11 th , 2014	Canandaigua, NY

Conference		
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7. Assessment of Project Approach /Lessons Learned/Future Recommendations

If I were to continue with this project theme, I would look for ways to offer more advanced, detailed workshops. These wouldn't be appropriate for educators, but farmers that participated in the field day series and obtained basic information expressed interest in day-long, hands-on workshops on similar topics. This participant captured it well: "I was a little disappointed with the limited production and conversion information on the bio-fuel webinar. I was also somewhat disheartened by lack of comparative information on traditional wind powered farm water pumps and wind generated electricity used to power electric pumps". Most farmers don't feel comfortable setting up sustainable energy designs – compost heat systems or radiant heat greenhouses, for example, after participating in a field day or webinar. Advanced, DIY workshops on sustainable farm energy may not be an appropriate theme for a NESARE PDP project, but I recommend it as additional education programming that is needed.