



Agricultural Consultation and Training

**Tiffany H. Ground
&
Rusty Van Leuven**

ACT

- Created in 1994
- ACT is an innovative compliance assistance program designed to assist farmers, ranchers and others involved in agriculture.
- ACT is not affiliated with enforcement activity within the Department and detected violations are not made available to regulatory personnel except in cases of imminent danger where human health and welfare are concerned.

ACT Programs

Pesticide
Safety Program

Agricultural BMP Program

Livestock & Crop Conservation
Grant Program

Councils and Board

Specialty Crop Block
Grant Program

GHP/GAP Certification
One-on-One Assistance Program

Agricultural Conservation
Education Program

On Farm Energy Audit
Implementation Program

Pesticide Safety Program



What are the most common mistakes made in pesticide handling?

- Not reading or following the label
- Not wearing Personal Protective Equipment
- Not watching surroundings, i.e. being aware of drift

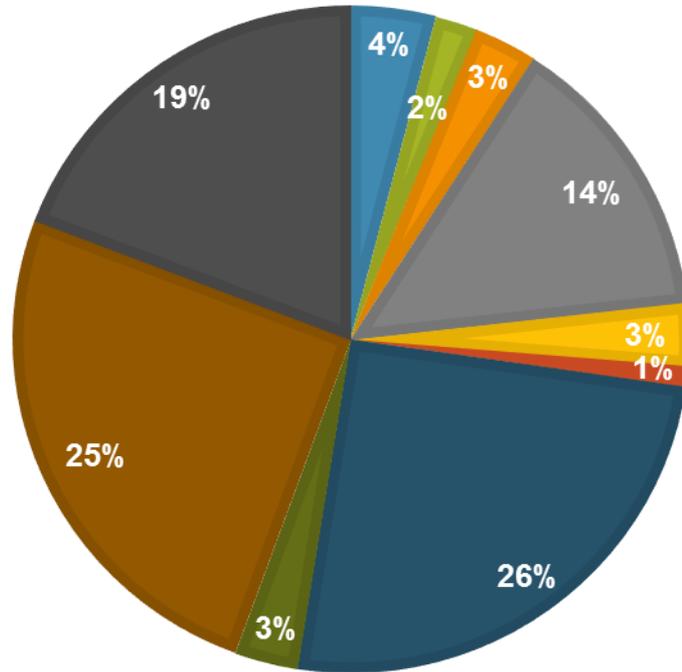
Livestock & Crop Conservation Grant Program



Agricultural BMP Program

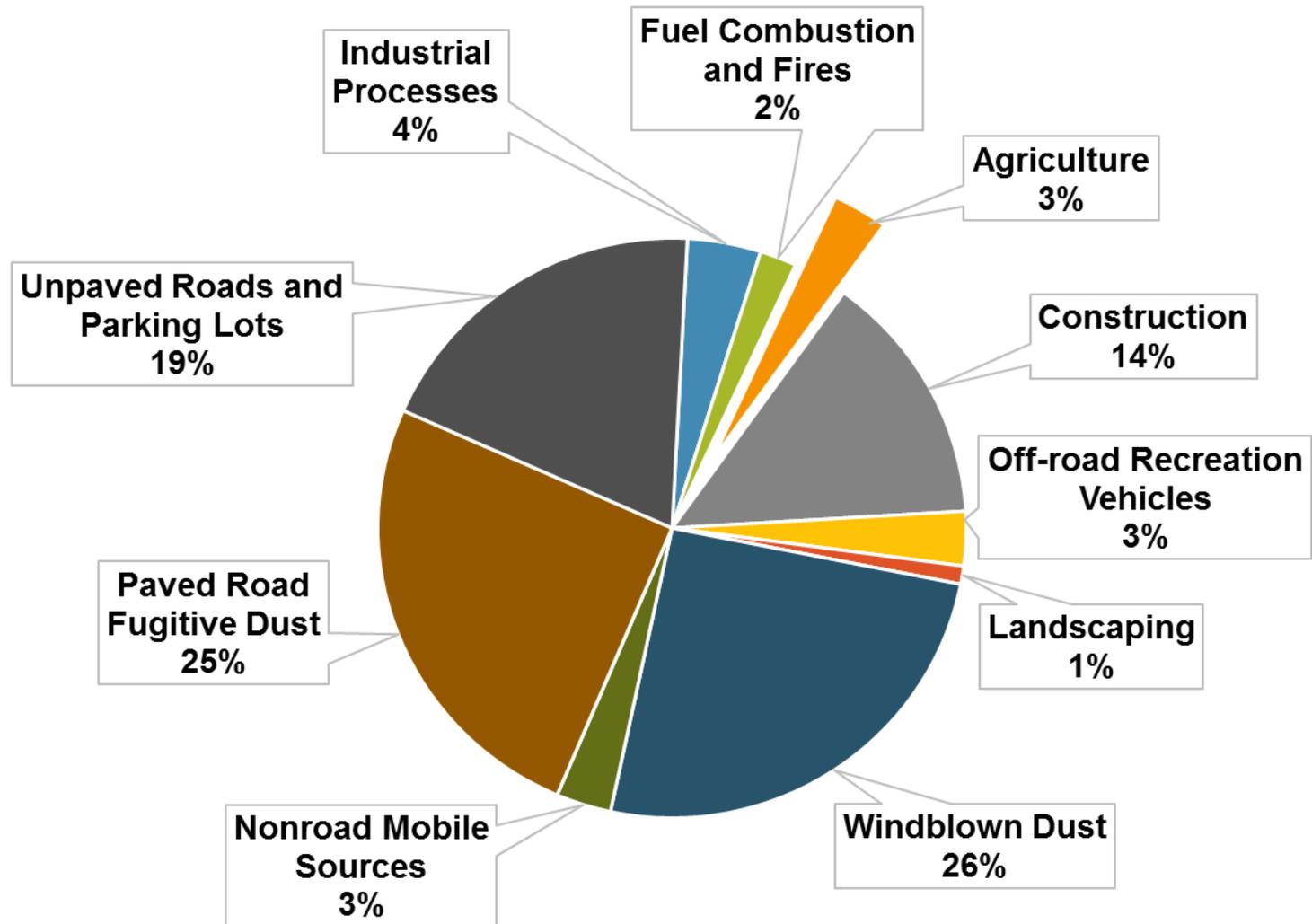


Who's Making Dust?



Who's Making Dust?

PM10 Sources



Councils and Board



Specialty Crop Block Grant Program



Name a Specialty Crop?

- Fruits
- Vegetables
- Tree Nuts
- Dried Fruit
- Horticulture
- Nursery Crops including Floriculture
- **Medicinal Cannabis is not a Specialty Crop**

GHP/GAP Certification One-on-One Assistance Program



Good Agricultural Practices: Pre-Harvest, still on the Farm

- Employee Hygiene
- Manure Handling
- Irrigation Water
- Training



Good Handling Practices: Post-Harvest, Washing & Packing

- Employee Hygiene
- Use Potable Water
- Maintain Equipment
- Training



Agricultural Conservation Education Program



Name a Natural Resource

➤ Soil

➤ Water

➤ Air

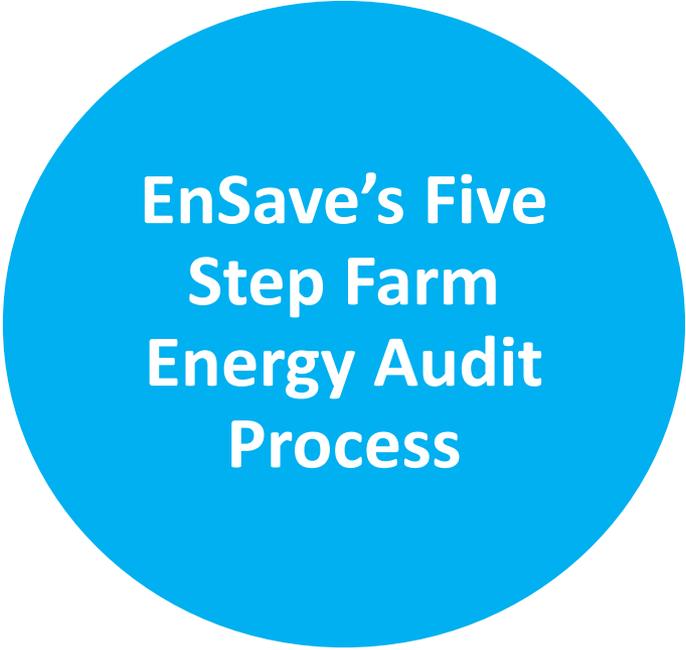
➤ Plants

➤ Animals

On Farm Energy Audit Implementation Program



Our AgEMP Process



**EnSave's Five
Step Farm
Energy Audit
Process**

1. Initial Interview
2. Farm Visit by local data collectors
3. Energy Analysis and Calculations
4. Plan Writing and Delivery
5. Follow-up

Process for the Producer



EnSave's Five Step Farm Energy Audit Process

1. Initial Interview
2. Farm Visit by local data collectors
3. Energy Analysis and Calculations
4. Plan Writing and Delivery
5. Follow-up

1. **Submit application to AZDA**
2. **Brief Phone call with EnSave 5-10 minutes**
3. **Collect 1 year of utility data**
4. **Sign and return agreement packet**
5. **Phone Interview with EnSave up to 1 hour**
6. **AZDA completes Data Collection**
7. **Report Received/Follow up Call**

HEADQUARTERS AUDIT





Technical Service Provider TSP-B-09-845

Submits this

Agricultural Energy Management Plan

To:

**Dan Smith
ABC Dairy
1688 West Adams Street
Phoenix, AZ 85007**



Funded by:

Arizona Department of Agriculture

March 2012



March 2012

Dan Smith
ABC Dairy
1688 W. Adams Street
Phoenix, AZ 85007

Dear Mr. Smith:

We have enjoyed working with you over the past few weeks and would like to thank you again for taking part in our Arizona Data Collector Training event. For your participation as one of our dairy training farms, your enclosed Agricultural Energy Management Plan (AgEMP), conducted and developed by EnSave, Inc., has been funded through the Arizona Department of Agriculture. This plan has been developed in accordance with NRCS Practice/Activity Code 122. Our Lead Energy Engineer, Gary Gawor, has reviewed and signed off on the Energy Plan. Energy savings estimates are based upon information gathered during the site visit and therefore are as accurate as possible. However, changes in equipment operation, such as an increase in operating hours, may affect actual savings.

Before moving forward with any of the recommendations in your plan, we strongly encourage you to contact your local USDA NRCS and Rural Development offices to ensure your farm is eligible to apply for any funding available through the NRCS Environmental Quality Incentives Program (EQIP) Farmstead Energy Improvement Code 374 and the USDA Rural Energy for America Program (REAP). Your local USDA NRCS representatives at the Avondale Service Center ((623) 535-5055) and Rural Development representatives at the Phoenix Service Center ((602) 285-6327) can assist you with the application process for both programs. In the 'Resources' section of your plan, we've also included some helpful information and websites that can lead you to local utility and state programs where additional funding might also be available.

On behalf of all of us here at EnSave, we want to thank you for the opportunity to help you evaluate your farm's energy consumption and energy saving opportunities. This Energy Management Plan will help you determine the best way for you to increase your farm's energy efficiency and profitability. Even if you are not able to implement all of the recommendations immediately, this report will serve as a useful guide for future decisions and improvements on your farm.

We will be calling you discuss your Energy Management Plan, but in the meantime please feel free to contact us if you have any questions.

Sincerely,

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Reviewed by: _____ (Producer name / date)	NRCS Acceptance: _____ (NRCS representative name / date)
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SUMMARY

OVERVIEW

EnSave conducted an agricultural energy use site assessment at ABC Dairy in January 2012. This report has been developed with the use of FEAT™, a product of EnSave, Inc, and provides a plan to increase the facility's energy efficiency. This Headquarters – Agricultural Energy Management Plan (AgEMP) covers the primary energy uses at this location as identified by EnSave. These include stationary equipment and processes. Non stationary energy uses such as motor vehicles, tractors, trucks, and skid steers are outside the scope of a Headquarters AgEMP.

An average electricity cost of \$0.094 per kWh and an average cost of \$2.75 per gallon of propane were used in this report; however, if ABC Dairy's actual costs are different from these documented values, the energy cost savings in this report would vary accordingly.

TOTAL PROJECT ECONOMICS

Installation of the recommended energy efficient equipment identified within this report will result in annual energy cost savings. The recommended equipment may be eligible for federal, state and/or local incentives as well as grants and/or loans such as through the USDA NRCS Environmental Quality Incentives Program (EQIP) Farmstead Energy Improvement Code 374, the USDA Rural Energy for America Program (REAP) Section 9007 of the Farm Bill, and utility incentives. Your first step after deciding to move forward with some or all of these recommendations should be to explore these funding opportunities. Helpful links to these resources are provided at the end of this report to get you started.

FARMER PREFERENCES

The farmer expressed no concerns or preferences at this time.

CONSERVATION ACTIVITY PLAN

The recommended energy efficiency improvements should be implemented beginning in fiscal year 2012. NRCS Code 374, Farmstead Energy Improvement, provides funding assistance for various Energy Conservation Measures (ECMs).

State specific measures eligible under Code 374 applicable to this plan are:

- Retrofit Fluorescent Lighting
- Scroll Compressor

However, you should contact your NRCS representative to confirm that these measures are still available as well as check to see if other measures recommended in this plan may now be available for funding assistance.

SIGNIFICANT FINDINGS

The dairy facility at ABC Dairy was equipped with many energy efficient technologies at the time of our visit and should be commended for conservation, efficiency practices, and equipment currently in place. Existing energy efficient equipment on the farm includes: vacuum pump VSDs, well-water and glycol chilled plate coolers, and high efficiency

motors. This report focuses on the remaining opportunities at ABC Dairy for the installation of energy efficient equipment and has identified the potential for approximately \$16,485 in annual energy cost savings, if all of the recommended equipment is installed. This represents about 10.2% of the baseline energy costs of \$160,967.

Bottom Line: Installation of all the recommended energy efficient equipment identified within this report will result in annual energy cost savings of approximately \$16,485.



ENERGY EFFICIENT EQUIPMENT EVALUATION

SUMMARY OF RECOMMENDATIONS

ABC Dairy operates a 1,900 cow dairy farm that produces approximately 52,561,600 pounds (lbs.) of milk per year. This report presents cost effective recommendations for ABC Dairy to upgrade to more efficient milk cooling, water heating, lighting, and motors.

During a recent twelve-month period, ABC Dairy purchased 1,564,920 kilowatt-hours (kWh) of electricity with a total cost of \$146,535, for an average cost of \$0.094 per kWh. The location also used a total of 5,247 gallons of propane and paid approximately \$14,432, for an average cost per gallon of \$2.75. These average costs are used here and throughout this report.

Tables 1 and 2 summarize the benefits of the recommended energy saving equipment for measures with simple payback period of 10 years or less. Energy saving equipment lowers energy use costs by performing the same or greater work with lower energy inputs. More detailed explanations of energy efficiency equipment are provided later in this report.

Table 1. Summary of Estimated Annual Energy Efficiency Improvements

Measure	Estimated Reduction in Energy Use			Estimated Costs, Savings, Payback, and Prioritization for Implementation			Environmental Benefits ¹				
	Est. Annual Electricity Savings (kWh)	Est. Annual Propane Savings (gal)	Energy Savings (MBtu)	Est. Cost to Location	Est. Annual Cost Savings	Est. Payback (Years)	Greenhouse Gas (Estimated Values)			Air Pollutant Co-Benefits (Estimated Values)	
							CO ₂ (lbs)	N ₂ O (lbs)	CH ₄ (lbs)	SO ₂ (lbs)	NO _x (lbs)
Hot Water		2,160	199	\$5,460	\$5,942	0.9	0.0	0.2	0.0	0.0	0.0
Lighting	34,568		118	\$10,639	\$3,236	3.3	40,050	0.6	0.5	36.3	55.9
Other Motors and Pumps	5,616		19	\$3,000	\$526	5.7	6,506	0.1	0.1	5.9	9.1
Refrigeration: Milk Cooling	72,458		247	\$39,920	\$6,782	5.9	83,948.7	1.2	1.1	76.0	117.1
Totals	112,642	2,160	583	\$59,019	\$16,486	3.6	130,505.2	2.1	1.7	118.2	182.1

Notes:

1. Environmental Benefits are reduction estimates, values are as per <http://cometfarm.nrel.colostate.edu/>.

Table 2. Energy Savings of Recommendations

Fuel Type	Current Use	MBTU Use	Savings	MBTU Savings	% Savings
Purchased Electricity (kWh)	1,564,920	5,341	112,642	384	7%
Propane (gal)	5,247	483	2,160	199	41%
Totals		5,824		583	10%

LOW COST ENERGY SAVING TIPS

Some energy savings potential involves primarily management and requires either no or minimal investment other than minor planning or labor. Examples include combining trips and eliminating unnecessary energy expenditure by turning off lights and shutting down engines during periods of inactivity. In another example although replacing older ventilation fans with those of higher efficiency can be cost effective, periodic cleaning of fan blades in dusty environments (e.g., every 3 to 4 weeks) and maintaining belt tension may increase existing fan efficiency by 10% or more without replacement.

CURRENT VS. PROJECTED ELECTRIC USE

Figures 1 and 2 reflect location electricity use from January 2011 through December 2011, ABC Dairy used approximately 1,564,920 kilowatt-hours (kWh) of electricity. The total cost of electricity was \$146,535. The peak months typically coincide with hot weather and are the result of increased milk cooling and ventilation loads. The actual monthly electricity use is depicted in Figure 1.

Figure 1. Twelve Month Electricity Use

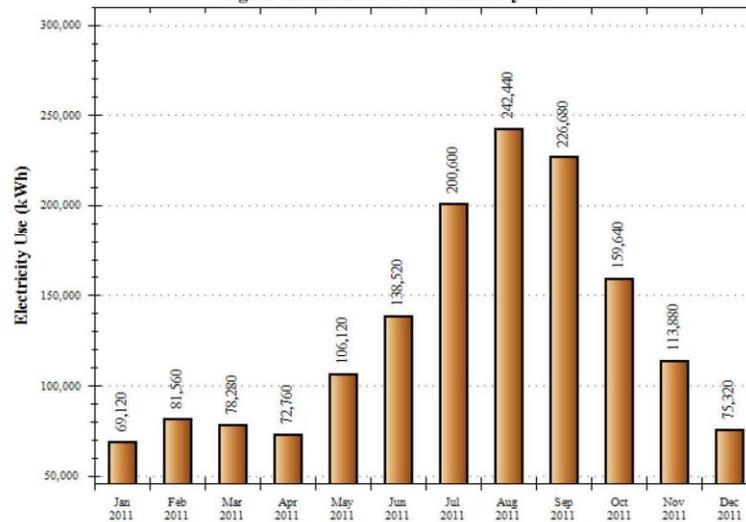


Figure 4. Milk Cooling Electricity Use

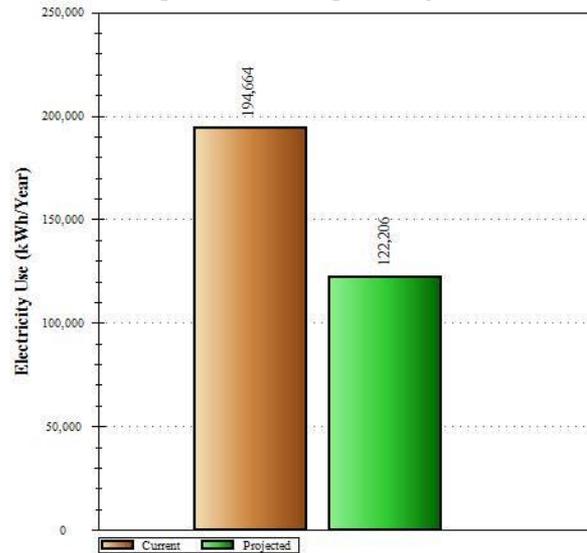


Table 7. Milk Cooling: Recommended Energy Saving Equipment

Equipment Description	Current Equipment	Recommended Equipment	# to Install	Est. Annual Energy Savings	Est. Annual Cost Savings	Est. Cost to Location	Est. Payback (Years)
Cabinet #1 Copeland 4DE3-200E-TSK-300	2 Chiller Compressors with Inefficient Compression	2 Scroll Compressor Retrofit Kits	2	72,458	\$6,782	\$39,920	5.8
Cabinet #2 Copeland 4DA3-2000-TSK-100	2 Chiller Compressors with Inefficient Compression	2 Scroll Compressor Retrofit Kits	2				

Notes:

- Energy savings for each recommended piece of equipment assume that all other recommended equipment has been installed.
- Condensing units and fans must be properly maintained and in good operating condition to insure uniform airflow through the condenser to maximize the energy efficiency ratio. We also recommend making sure the refrigerant lines are properly insulated and the condensing units are cleaned periodically following the manufacturer's specifications.
- Compressor performance charts for the chiller compressors recommended for replacement can be found at the end of the report.



Figure 5. Lighting Electricity Use

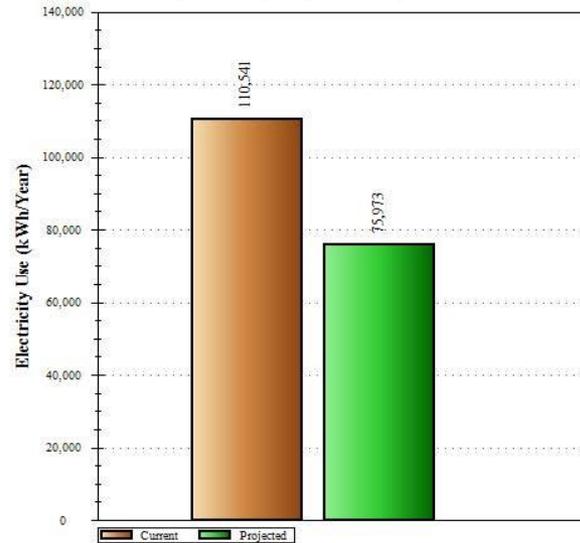


Table 10. Lighting: Recommended Energy Saving Equipment

Equipment Description	Current Equipment	Recommended Equipment	# to Install	Est. Annual Energy Savings	Est. Annual Cost Savings	Est. Cost to Location	Est. Payback (Years)
Back of Barn	250W Standard Metal Halide (291W Total Input Watts)	6-Lamp, 4ft.T8 (32W Bulbs, 153.6W Total Fixture Wattage), Vapor-Proof Fixture	10	11,051	\$1,034	\$1,770	1.7
Outside Lights	1000W High Pressure Sodium (1100W Total Input Watts)	750W PSMH (795W Total Input Watts)	9	11,990	\$1,122	\$3,621	3.2
Outside Lights	250W High Pressure Sodium (295W Total Input Watts)	175W PSMH (191W Total Input Watts)	4	1,817	\$170	\$760	4.5
Milk Parlor	T12 Linear Fluorescent Fixture	Appropriate T8 or T5 Linear Fluorescent Fixture	14	4,183	\$392	\$1,796	4.6
Barn and Engine Room	T12 Linear Fluorescent Fixture	Appropriate T8 or T5 Linear Fluorescent Fixture	8	2,390	\$224	\$1,026	4.6
Hot Water Heater Room	T12 Linear Fluorescent Fixture	Appropriate T8 or T5 Linear Fluorescent Fixture	5	1,494	\$140	\$641	4.6

Figure 6. Water Heating Energy Use

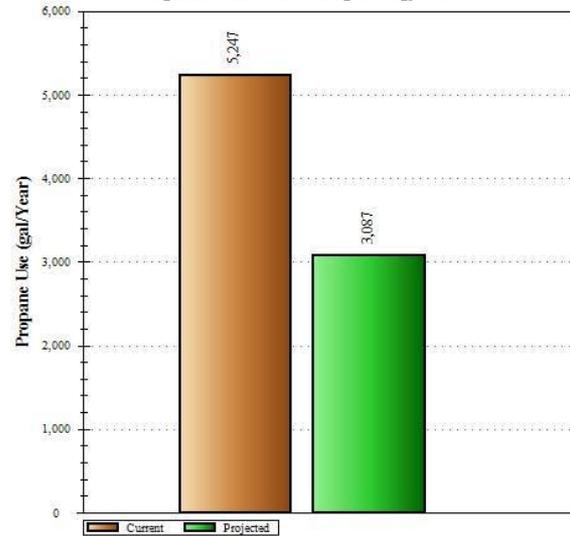


Table 17. Water Heating: Recommended Energy Saving Equipment

Equipment Description	Current Equipment	Recommended Equipment	# to Install	Est. Annual Energy Savings	Est. Annual Cost Savings	Est. Cost to Location	Est. Payback (Years)
Propane Fired Hot Water Heater	None	Compressor Heat Recovery System	1	2,160	\$5,942	\$5,460	0.9



STOCK WATERING

There are no activities or equipment at this site that are applicable to this section.

AIR HEATING AND BUILDING ENVIRONMENT

There are no activities or equipment at this site that are applicable to this section.

CONTROLLERS

ABC Dairy's controllers associated with the milk harvesting, milk cooling, and misting systems are present and there are no energy efficiency or savings recommendations at this time.

Figure 7. Motor Electricity Use

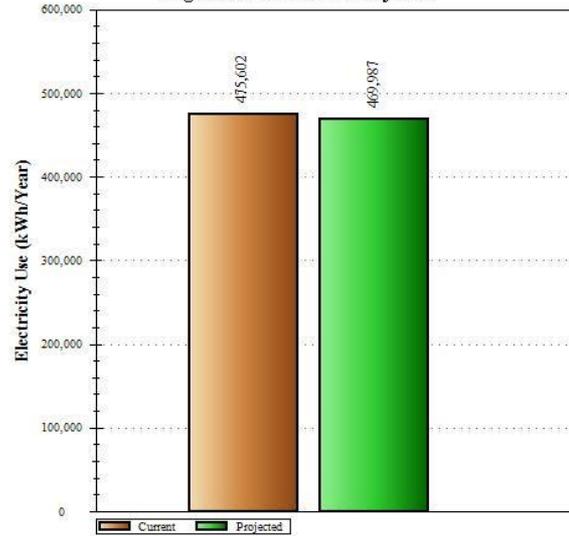


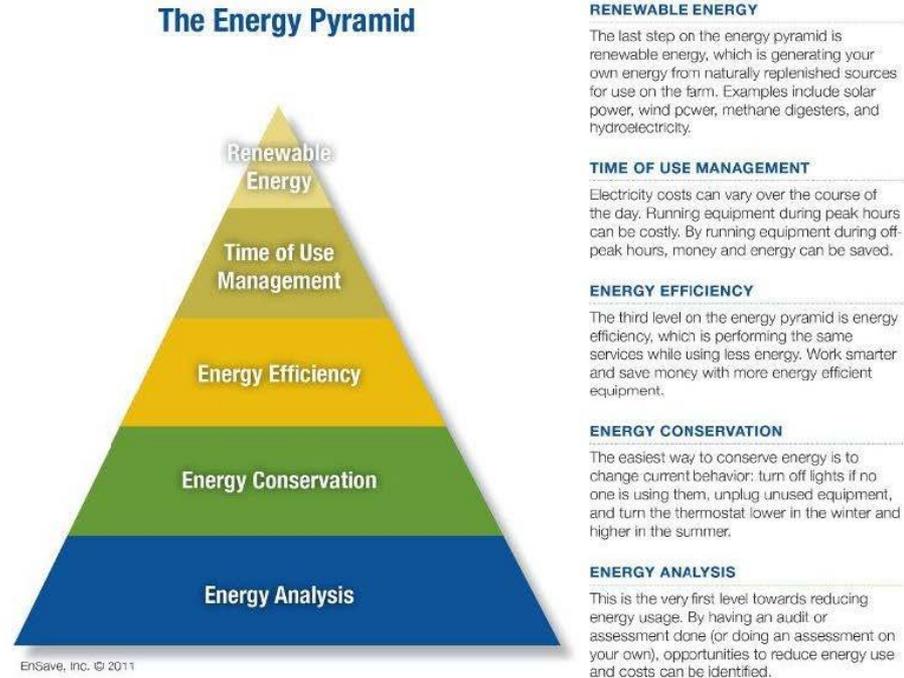
Table 19. Motors: Recommended Energy Saving Equipment

Equipment Description	Current Equipment	Recommended Equipment	# to Install	Est. Annual Energy Savings	Est. Annual Cost Savings	Est. Cost to Location	Est. Payback (Years)
Cooling Tower Pressure Pump	7.5 HP, TEFC, 1500-2700 RPM, 87.5% Efficiency	7.5 HP, TEFC, 1500-2700 RPM, NEMA Premium®, 91.7% minimum nominal efficiency	1	1,993	\$187	\$1,000	5.4
Chiller Pump Motors	7.5 HP, TEFC, 1500-2700 RPM, 87.5% Efficiency	7.5 HP, TEFC, 1500-2700 RPM, NEMA Premium®, 91.7% minimum nominal efficiency	2	3,623	\$339	\$2,000	5.9
Totals				5,616	\$526	\$3,000	5.7

ENERGY PYRAMID

EnSave uses an energy pyramid as a model to outline the steps necessary for reducing energy usage. Figure 8 shows the energy pyramid.

Figure 8. Energy Pyramid



The energy pyramid is a concept used to help guide farmers toward energy independence. The energy pyramid has been proven to be very effective, and it serves as a road map to show where a farm is on their way to energy independence. ABC Dairy has done a great job with energy analysis and conservation. The next step for the farm would be to implement the energy efficiency measures recommended in this report.

RESOURCES

The following resources provide additional information on ways to save energy at your facility.

1. *Best Environmental Management Practices Farm Animal Production, Manure Nutrient Recycling*, publication funded by USDA Special Needs, Purdue University, and Michigan State University
2. *Best Practices Guide: Energy Savings for Dairy*, published by EnSave, Inc.
3. *Farm Safely With Electricity*, published by the Rural Electricity Resource Council (formerly NFEC)
4. *Agricultural Ventilation Fans: Selection and Maintenance*, published by the RERC
5. *Dairy Heat Reclaimers*, published by the Rural Electricity Resource Council (formerly NFEC)
6. *Scroll Compressors on the Dairy Farm*, published by EnSave, Inc.
7. *Dairy Farm Lighting*, published by EnSave, Inc.
8. *Compact Fluorescent Lighting*, published by EnSave, Inc.
9. *T-8 and T-5 Efficient Fluorescent Lighting*, published by EnSave, Inc.
10. *High Performance 4' T8 Lamp and Ballast Qualifying List*, published by CEE
11. *Compressor Heat Recovery*, published by EnSave, Inc.
12. *NEMA Premium[®] Motors*, published by EnSave, Inc.
13. *Managing Mercury on the Farm*, published by EnSave, Inc.

INTERNET RESOURCES

The following resources provide additional information on ways to save energy at your facility.

1. *Arizona NRCS Environmental Quality Incentives Program*
<http://www.az.nrcs.usda.gov/programs/eqip03/index.html>
2. *USDA Farm Service Agency*
<http://www.fsa.usda.gov>
3. *Bioenvironmental and Structural Systems Laboratory (BESS Labs)*
<http://www.bess.uiuc.edu/>
4. *Database of State Incentives for Renewables & Efficiency (DSIRE)*
<http://www.dsireusa.org/>
5. *USDA Section 9007 Information*
<http://www.rurdev.usda.gov/rbs/farmbill/>
6. *National Renewable Energy Laboratory*
<http://www.nrel.gov/>
7. *United Dairymen of Arizona*
<http://uda.coop/>
8. *Consortium for Energy Efficiency (CEE) High Performance T8 Specifications*
<http://www.cee1.org/com/com-lt/com-lt-specs.pdf>

LANDSCAPE AUDIT





Technical Service Provider TSP-B-09-845

Submits this

Agricultural Energy Management Plan

To:

**Les Shipley
Civano Nursery
Physical: 12190 Old Nogales Highway
Mailing: 5301 South Houghton Rd.
Tucson, AZ 85747
(520) 885-3007**



70 Acres

December 2012

SUMMARY

OVERVIEW

EnSave conducted an agricultural energy use site assessment at Civano Nursery on October 23, 2012. This report has been developed with the use of AutoAudit™, a product of EnSave, and provides a plan to increase the facility's energy efficiency. This Headquarters – Agricultural Energy Management Plan (AgEMP) covers the primary energy uses on this farm as identified by EnSave. These include stationary equipment and processes. Non-stationary energy uses such as motor vehicles, tractors, trucks, and skid steers are outside the scope of a Headquarters AgEMP. An inventory of the off-road non-stationary equipment used on the farm and the nitrogen fertilizer used is also included in the report.

Average energy costs of \$0.134 per kWh for electricity, \$3.982 per gallon for diesel, \$7.817 per gallon for kerosene, and \$3.277 per gallon for propane are used in this report; however, if Civano Nursery's actual costs are different from these documented values, the energy cost savings in this report would vary accordingly.

TOTAL PROJECT ECONOMICS

Installation of the recommended energy efficient equipment identified within this report will result in annual energy cost savings. The recommended equipment may be eligible for federal assistance such as through the USDA NRCS Environmental Quality Incentives Program (EQIP) grants and/or loans through the USDA Rural Energy for America Program (REAP) Section 9007 of the Farm Bill, and utility company incentives. Your first step after deciding to move forward with some or all of these recommendations should be to explore these funding opportunities. Helpful links to these resources are provided at the end of this report to get you started.

FARMER PREFERENCES

The farmer expressed an interest in improving energy efficiency on the farm, specifically in the area of irrigation. Irrigation energy use was evaluated, and any cost effective measures related to irrigation can be found in Table 1 and Table 3.

CONSERVATION ACTIVITY PLAN

The recommended energy efficiency improvements could possibly be implemented through the use of NRCS Code 374, Farmstead Energy Improvement. Check with your local NRCS field office for the most current listing of eligible measures that are applicable to this plan.

SIGNIFICANT FINDINGS

By taking action on the energy efficiency recommendations detailed in this report, you can save approximately \$5,062 in electricity (37,774 kWh). This represents about 5.7% of the farm's baseline energy costs of \$88,729.

Bottom Line: Taking no action would be expensive. EnSave recommends acting on these recommendations to avoid having to pay years of energy costs that are higher than necessary.



efficiency by 10% or more without replacement. These actions can also increase the useful life of fans.

AERIAL VIEW

Figure 1 shows an aerial view of the farm.

Figure 1. Aerial View



Summary of On-Farm Energy Audit Implementation Program

Completed Energy Audits:

2012 – 27

2013 – 13

Total of 40

Summary of On Farm Energy Audit Implementation Program

Current Applications:

14

Summary of On Farm Energy Audit Implementation Program

Estimated Yearly Energy Savings:

2012	\$246,154.00
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2013	\$117,122.00
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Total Savings: \$363,276



Questions?

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