Agricultural Energy Management Plan
Criteria
Conservation Activity Plan Practice Code (128) (No.)

I. Definition of an AgEMP

An Agricultural Energy Management Plan (AgEMP) is a detailed documentation and inventory of the energy consuming activities and components of the current agricultural operation. The plan will document a baseline year of on-farm energy consumption, and the strategy by which the producer will explore and prioritize their on-farm energy conservation concerns, objectives, and opportunities through the recommendation of energy efficient alternatives.

II. Definition of Terms

Baseline Energy Consumption— the energy consumption for the previous 12 months, or another recent 12 month period typical to that enterprise. Where weather or other extreme events alter the typical energy use in the previous 12 months, alternate years may be used for the evaluation with a complete documentation and rationale for this in the final report. This typical 12-month energy consumption becomes the baseline for comparison of recommended energy efficiency improvements.

Component (as used in the ASABE Standard) — individual parts of a major activity. For example, a lighting activity would include the following components: lamps, timers, and sensors.

Energy—for the purposes of these criteria, energy is the resource used to power equipment to do mechanical work such as heat, light, ventilation, irrigation or cooling.

Energy Resource—source from which energy is obtained, including gasoline, diesel fuel, biofuel, propane, natural gas, electricity, solar, wind, wood, biomass, geothermal, etc.

Farm Enterprise—the production category or categories of a farm. For example, a farm may include a field crop enterprise and a swine enterprise. (See ASABE S612 Table 1, appended to this document)

• Dairy
• Swine
• Poultry
• Beef/veal
• Field Crops
• Fruit/Vegetables
• Aquaculture
• Nursery/Greenhouse

Major Activity—a discrete activity associated with a farm enterprise that utilizes an energy resource or that controls energy resource use. For example, a poultry enterprise may include heating, ventilation; a dairy enterprise may include lighting (see ASABE S612 Table 1).

Relevant Enterprise—For purposes of the AgEMP, relevant enterprises are those that account for a significant energy use of the total farm energy use.

III. AgEMP-Criteria

A. General Criteria

• A certified Technical Service Provider (TSP) develops the AgEMP addressing Inefficient Energy Use for the farm enterprises. This will include all relevant enterprises and enterprises requested by the producer. Funding support from the Environmental Quality Incentives Program (EQIP) is provided through contracts with eligible producers. Producers in turn obtain services from certified TSPs for development of an AgEMP. The TSP proficiency criteria required to develop an AgEMP for an EQIP eligible producer is located on the TSP web site at: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/tsp. The AgEMP

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- An onsite visit is required by the TSP or their qualified representative to inventory and evaluate the enterprise components.

B. Criteria for Specific Elements of an AgEMP

1. Cover Page

   The AgEMP must have a cover page providing the following:
   a) Farm identification
      (1) Farm name, owner name, street address, and county/state.
      (2) Primary phone number of producer.
      (3) All enterprises of the farm, with addressed enterprises identified.
   b) TSP identification
      (1) Name, mail address, email, and primary phone number and TSP number.
      (2) Staff involved in site visit, analysis, report writing.
   c) Date that the AgEMP field visit was completed and date of plan delivery to the producer.


   Present the findings of the AgEMP in the ‘Summary’ section using Tables 1 and 2 with the headings as shown below.

   **Table 1: Summary of Energy Improvements** (Examples of recommended measures shown.)

<table>
<thead>
<tr>
<th>Recommended Measure</th>
<th>Electric Savings (kWh)</th>
<th>Natural Gas Savings (ccf)</th>
<th>Propane Savings (gal)</th>
<th>Other¹</th>
<th>Energy Savings (MMBtu)</th>
<th>Installed Cost² [a]</th>
<th>Annual Cost Savings [b]</th>
<th>Payback in Years [a/b]</th>
<th>Est. Life in Years³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>25,210</td>
<td></td>
<td></td>
<td>86</td>
<td></td>
<td>$1,740</td>
<td>$2,094</td>
<td>0.8</td>
<td>7</td>
</tr>
<tr>
<td>Seal Air Leaks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,500</td>
<td>$809</td>
<td>1.9</td>
<td>8</td>
</tr>
<tr>
<td>Insulate Brood Curtain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$450</td>
<td>$167</td>
<td>2.7</td>
<td>10</td>
</tr>
<tr>
<td>Exposed Foundation Wall Insulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$5,621</td>
<td>$651</td>
<td>8.6</td>
<td>20</td>
</tr>
<tr>
<td>Curtain to Solid Insulated Sidewalls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$7,168</td>
<td>$754</td>
<td>9.5</td>
<td>20</td>
</tr>
<tr>
<td>Totals:</td>
<td>25,210</td>
<td>1,400</td>
<td>215</td>
<td></td>
<td>$16,479</td>
<td>$4,475</td>
<td>3.7</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 Notes
1) Use the Other column to aggregate any miscellaneous sources of energy.
2) It is recommended that local cost estimates be obtained by the landowner. Estimated installed costs can be adjusted for completed AgEMP based on written local estimates for NRCS planning purposes without TSP rework.
3) Estimated Life is expected useful life of the equipment recommended with standard O&M activities.
Table 2: Estimated Annual Reduction in Emissions. (Examples of estimated reduction in emissions for recommended measures from Table 1 shown.)

<table>
<thead>
<tr>
<th>Recommended Measure</th>
<th>Energy Savings (MMBtu)</th>
<th>Estimated CO₂ (lbs)</th>
<th>Estimated N₂O (lbs)</th>
<th>Estimated CH₄ (lbs)</th>
<th>Estimated SO₂ (lbs)</th>
<th>Estimated NOₓ (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>86</td>
<td>37,902</td>
<td>0.6</td>
<td>0.5</td>
<td>125.4</td>
<td>35.1</td>
</tr>
<tr>
<td>Seal Air Leaks</td>
<td>44</td>
<td>6,036</td>
<td>0.2</td>
<td>1.0</td>
<td>0.1</td>
<td>4.8</td>
</tr>
<tr>
<td>Insulate Brood Curtain</td>
<td>9</td>
<td>1,240</td>
<td>0.1</td>
<td>0.2</td>
<td>0.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Exposed Foundation Wall Insulation</td>
<td>35</td>
<td>4,846</td>
<td>0.2</td>
<td>0.8</td>
<td>0.1</td>
<td>3.8</td>
</tr>
<tr>
<td>Curtain to Solid Insulated Sidewalls</td>
<td>41</td>
<td>5,593</td>
<td>0.2</td>
<td>0.9</td>
<td>0.1</td>
<td>4.4</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>215</strong></td>
<td><strong>55,618</strong></td>
<td><strong>1.3</strong></td>
<td><strong>3.4</strong></td>
<td><strong>125.7</strong></td>
<td><strong>49.1</strong></td>
</tr>
</tbody>
</table>

3. Background and Site Information

Provide a narrative in the AgEMP that includes:

a) Facility location(s).

b) Type, size, and overall management scheme of the operation. Include in the narrative a description of the enterprise(s), (e.g., poultry, dairy, field crop, etc.) along with production levels, and any unusual factors that affect energy use.

c) Include producer concerns and objectives for the enterprise(s). This is a description of why the producer wants an on-farm energy audit and their specific objectives. Identify current output levels of facility components, such as lighting and ventilation, and whether these levels are adequate. Identify if simple replacement (replacing components at current number and output) is adequate or if upgrades or an increased number of components are needed to meet producer needs or minimum standard requirements.

d) An aerial map or equivalent plan view indicating the farm operation including all the structures relevant to the AgEMP, such as animal housing, shops, grain storage, processing facilities and locations of the headquarters and the fields that were evaluated in the farming operation.

4. Current Equipment and Baseline Energy Use

The AgEMP will provide comprehensive documentation of the baseline energy consumption for all relevant enterprises, as a minimum. Separate the evaluation of energy usage by the major activities listed in, but not limited to, the ASABE S612 production category for the primary farm enterprise, and any other relevant farm enterprises. Address the major activities that are shown in ASABE S612 Table 1 with an “X” next to them in the column for the enterprises. The report must address all major activities for all of the relevant enterprises. The only exception is that cultural practices are an optional activity for CAP 128. For example: a field crop enterprise must address the following major activities: motors or pumps; drying; crop/feed storage; water management; material handling; and irrigation at a minimum.
The report must provide:

a) The usage and costs for the baseline energy consumption separated by energy resource.

b) A baseline energy use from a prior, typical 12 month period. The AgEMP must document all major activities associated with all enterprises being audited by:

   (1) Describing the components, primary equipment, and/or details of the activity, as appropriate according to the amount of energy used, such as:
       (a) Type and size of equipment;
       (b) Component equipment ratings/production levels such as hp., Btu input, Btu output, efficiency, lighting levels, ventilation levels;
       (c) Auxiliary items to enhance management such as thermostats, timers, and manual overrides of automatic systems.

   (2) Provide an estimate of the annual energy consumption, by energy type for each activity.

   (3) Provide an estimate of hours of use per year for each component evaluated.

5. Energy Improvement Measures

The AgEMP will identify potential energy improvement practices that will reduce energy use and address the energy management concerns of the relevant enterprises. The AgEMP must provide appropriate estimated energy savings relative to the baseline energy use for each examined improvement practice.

a) For each measure examined, the report must present:

   (1) Recommended replacement components – number, type, and location of components. Where increase of component output is needed to meet NRCS standard requirements (such as lighting or ventilation upgrades), provide options and justification for an increase. Replacement measures must meet applicable NRCS standards regarding required output levels.

   (2) The estimated energy savings—first in the common sale units (kWh, gallons, etc.) and then converted to energy units of millions of British thermal units (MMBtu).

   (3) The estimated annual energy cost savings in dollars per year as a departure from the baseline.

   (4) The estimated installed cost in dollars. Utilize landowner obtained estimates where available.

   (5) The estimated reductions in emissions for CO₂, N₂O, CH₄, SO₂, and NOₓ. Guidance on how to calculate greenhouse gas emission reductions and air pollutant co-benefits is provided in Appendix A.

   (6) The simple payback period in years (installation cost divided by estimated annual cost saving, in years).

   (7) Estimated life span, in years, of the recommended measure.

b) Only practices that have a payback period less than the estimated life of the practice should be recommended. Recommended practice payback period limits are at the discretion of the auditor, but should be reasonably within the farm planning timeframe. Include energy use reduction and emissions reduction for all recommended practices in Tables 1 and 2 in the report. Energy savings and cost data for beneficial practices may be include where appropriate for future use by the landowner.

c) The report must include sufficient information in the way of product specifications, to include product output, energy efficiency and cost, product information or comparisons between products to support the recommendations. The report must include references to support assumptions, and calculations that support numerical cost or savings values. Organize this
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...
d) The recommended placement of the signature page is immediately behind the last page of
the audit report, but preceding any appendices or references.

7. References

The report must include technical documentation of sources used for the AgEMP. The report
should include the actual documents or references that contain technical information used to
estimate energy savings and cost, such as:
   a) Fact sheets.
   b) Existing component product information or manufacturer product information sheets, etc.
   c) Product recommendations and or comparisons of specific products.
   d) Journal article citations.

IV. Deliverables and Certification

A. The auditor is encouraged to generate separate sections for separate enterprises of a farm. These
sections must be bound together and delivered to the Client with a single cover and signature page.

B. Deliverables from the TSP to the Client include:
   1. A complete hardcopy and/or electronic copy of the finalized AgEMP report, with the TSP
      signature.

C. Deliverables from the TSP to the NRCS Field Office include:
   1. A complete electronic copy of the finalized AgEMP report. The preferred format is PDF, using
      software digital conversion rather than scanning, except for the signature page, which should
      have original signatures from the TSP and Client. The MS Word format is also acceptable.
APPENDIX A

Estimated Reduction in Emissions

Guidance on how to determine values for greenhouse gases and air pollutant co-benefits environmental benefits.

In order to estimate the reduction in emissions associated with estimated energy savings, NRCS has developed a Quick Energy calculator that estimates air emission effects due to energy saving measures for fuels and electricity into atmospheric emission reductions. The Quick Energy Tool relies on the U.S. Energy Information Administration state-level aggregated emission factors for electricity, to generate estimates of emissions savings for electricity, and emission factors for liquid and gaseous fuels, to generate estimates of emissions savings for liquid and gaseous fuels.

The Web link to the NRCS COMET Quick Energy Calculator for converting fuel savings into emissions reductions is located at: http://cometfarm.nrel.colostate.edu/QuickEnergy.
### Table 1 – Suggested Components within Major Activities by Farm Enterprises for Audit Assessment

<table>
<thead>
<tr>
<th>Major Activity</th>
<th>Dairy</th>
<th>Swine</th>
<th>Poultry</th>
<th>Beef/veal</th>
<th>Field crops</th>
<th>Fruit/vegetables</th>
<th>Aquaculture</th>
<th>Nursery/Greenhouse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilation</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x(aeration)</td>
</tr>
<tr>
<td>Refrigeration</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x(x)</td>
</tr>
<tr>
<td>Milk harvesting</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controllers</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other motors/pumps</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water heating</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Heating/Big environment</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drying</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste handling</td>
<td>x</td>
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<td>x</td>
<td>x</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Air Cooling</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop/field Storage</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water management</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material handling</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planting, tilling, harvesting engine driven equipment</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

### Footnotes:

Listed references are guidance documents or tools useful for assessing the energy use and/or efficiency associated with various major activities and/or farm enterprise. Not included here are the numerous planning guides that address the design of farm enterprise systems and the major activities involved because most do not directly assess energy conservation or efficiency. These planning and design guides provide a reference for understanding elements of efficient production systems, but do not specifically address energy use or efficiency as is the intent of this standard. These are by no means the only guides and tools that can be used in performing these audits.


Table 1 used courtesy of the American Society of Agricultural and Biological Engineers, ASABE S612, July 2009.