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Engineering and Energy Updates

MN STAC

September 2023

Engineering Updates

- Major changes to supplements for existing practices
- New practices and interims
- Energy practices

Changes to Supplements

Animal Mortality Facility (316)

New Scenario

- Incineration greater than 100 CF chamber

Changes to Supplements

On-Farm Secondary Containment Facility (319)

Not offering

- Secondary Containment Structure
- Precast Containment Facility for Existing Fuel Storage
- Fueling Pad for existing fuel storage

Changes to Supplements

Combustion System Improvement (372)

New scenarios

- IC Engine Repower, 50-99 bhp
- Mobile IC System/Tractor Replacement, 25-160 bhp
- Renewable Energy in-lieu of Fossil Fuel Power Source
- Tractor Replacement, Electric

Changes to Supplements

Energy Efficient Agricultural Operation (374)

New scenarios

- Grain Dryer, <= 675 bushel capacity
- Reverse Osmosis (<= 250 GPH)

Changes to Supplements

Grade Stabilization Structure (410)

The size ranges for the scenarios were realigned

Old scenarios

- Embankment Dam - Drainage Area 0 to 5 Acres
- Embankment Dam - Drainage Area 10.1 to 20 Acres
- Embankment Dam - Drainage Area 40.1 to 70 Acres
- Embankment Dam - Drainage Area > 200 Acres

New scenarios

- Embankment Dam - Drainage Area 0 to 10 Acres
- Embankment Dam - Drainage Area 10.1 to 40 Acres
- Embankment Dam - Drainage Area 40.1 to 100 Acres
- Embankment Dam - Drainage Area >100 Acres

Changes to Supplements

Irrigation Water Management (449)

Not offering

- Basic IWM, <1 ac
- Intermediate IWM, <1 ac
- Advanced IWM, <1 ac

New Scenario

- IWM, less than or equal to 30 acres

Changes to Supplements

Pumping Plant (533)

New scenario

- Variable Frequency Drive, 15HP or Less

Changes to Supplements

Roof Runoff Structure (558)

New scenario

- Roof Gutter, 6 inches wide with runoff storage tank

Changes to Supplements

Heavy Use Area Protection (561)

New scenarios

- Rock/Gravel on Geotextile, Small
- Asphalt Pavement

Not offering

- Rock/Gravel Surfacing Without Geotextile (includes Hoof Contact Gravel & Rock)

Changes to Supplements

Trails and Walkways (575)

New scenario

- Wood Chips, Walkway, 1000 sqft or less

Changes to Supplements

Watering Facility (614)

New scenario

- Geothermal or heated livestock watering facility

Modified scenario

- Frost Free Fountain: Added 0.5 cy of concrete for a pad recommended by the equipment manufacturer.

New Practices

Wastewater Treatment – Milk House (627)

New scenarios

- Milkhouse Wastewater Filter Mound
- Dosing System

These scenarios were transferred over from the Waste Treatment standard (CPS 629) which has been retired.

New Practices

Constructed Wetland (656)

New scenario

- Constructed Wetland

This practice differs from Wetland Creation (658) in that it is intended for areas that are not historically wetlands in order to provide water treatment, such as a storage structure for milkhouse wastewater.

New Practices

Waste Gasification Facility (735) - Interim

New scenario

- Waste Gasification, less than or equal to 700lbs./hour

This practice involves the processing of livestock waste and byproducts in a high temperature low oxygen environment.

New Practices

Phosphorus Removal System (782) - Interim

New scenario

- Tile discharge, in-ground tank
- Tile Discharge, in-ground earthen chamber

A system installed to intercept subsurface (tile) flow, groundwater or surface runoff flow, and reduce the concentration of phosphorus.

New Practices

Groundwater Recharge Basin or Trench (815) - Interim

New scenario

- Recharge Basin < 10 ac-ft storage
- Recharge Basin >= 10 ac-ft storage

An impoundment with a permeable base used to recharge an underlying aquifer.

New Practices

Land Reclamation, Abandoned Mined Land

Land Reclamation, Landslide Treatment

Energy Practices

Recent changes to energy practices

- Conservation Activity Plans (CAP plans) have been replaced with Conservation Activities
- Auditor requirements and TSP certification
- Prescriptive upgrades
- Revised supporting documents

Energy Practices

Retired

- CAP 128 Agricultural Energy Management Plan
- CAP 136 Agricultural Energy Design Plan

Conservation Activities

- CEMA 228 Agricultural Energy Assessment
- DIA 120 Agricultural Energy Design

Energy Practices

Auditor Requirements and TSP Certification

- Eligibility for energy improvements are no longer directly tied to recommendations made in an audit
- There are no certified TSPs for CEMA 228
- The energy practice standards (374, 670 and 672) require an auditor to be a Professional Engineer (PE), Certified Energy Auditor (CEA) or Certified Energy Manager (CEM)
- Coming soon: Vendor's lists for energy auditors

Energy Practices

Prescriptive Upgrades

- Prescriptive upgrade lists will be available for FY 2024 for CPS 374 Energy Efficient Agricultural Operation, CPS 670 Energy Efficient Lighting System and CPS 372 Combustion System Improvement
- Prescriptive upgrades are improvements which can be made without the need for an audit. They have been evaluated and shown to improve energy efficiency as long as the upgrade described in the prescriptive list is followed.

USDA United States Department of Agriculture

Minnesota
October 2023

Minnesota Prescriptive Upgrades

Energy Efficient Lighting System (Code 670)

The following Energy Prescriptive Upgrade activities have been evaluated for energy efficiency improvement and have been determined to meet the resource concern of "Energy efficiency of equipment and facilities". The prescribed upgrades do not require additional evaluation but do require a written summary of installation specific parameters to document compliance with the prescriptive upgrade and conservation practice standard.

Eligibility for prescriptive upgrades is based on a 1 to 1 replacement of an existing less efficient lighting fixture with a more efficient fixture.

Lighting – Replace Existing Lighting Fixture with General or Low Bay Lighting

These are industrial grade lighting fixtures which meet the criteria established in NRCS Conservation Practice Standard 670 – Energy Efficient Lighting System. They are designed to withstand the humid and dusty environmental conditions where they are installed. The fixtures also commonly have a diffuser which acts to spread light over a large area. Some examples of general or low bay lighting fixtures include wall mounted LED wall pack fixtures, low intensity flood or ceiling mounted fixtures. They do not include low wattage screw-based LED lamps commonly used to replace incandescent lightbulbs.

Initial condition: A less efficient lighting fixture, such as T-5, T-8 or T-12 linear fluorescent, High Pressure Sodium, Metal Halide, Mercury Vapor or similar.

Prescribed Upgrade: The replacement fixture is LED 70 or less watts. The typical design operating life is 50,000 hours or more.

Assumptions:

- Typical cost for new fixture is $185.
- Lights operate 12 hours daily average * 365 days = 4,380 hours per year
- Average cost of electricity $0.12 / KWhr

Description	Typical Rating (Watts)	Annual Energy Usage (KWhr)	Annual Savings if replaced (KWhr)	Estimated Annual Cost savings if replaced	Payback in years if replaced
LED	70	306.6	-	-	-
High Pressure Sodium	150	657.0	350.4	$42.05	4.4
Metal Halide	175	766.5	459.9	$55.19	3.4
Linear fluorescent	180	788.4	481.8	$57.82	3.2
Mercury Vapor	250	1095.0	788.4	$94.61	2.0

Energy Practices

Prescriptive Upgrades

Energy Efficient Lighting System (670)

- Lighting – Replace Existing Lighting Fixture with General or Low Bay Lighting
- Lighting – Replace Existing Lighting Fixture with Flood Lighting
- Dairy Freestall Barn, High Bay Lighting, Fixtures Replacement
- Poultry House Lighting
- Swine Facility Lighting

Energy Practices

Prescriptive Upgrades

Energy Efficient Agricultural Operation (374)

- Dairy Equipment
  - Plate Cooler – Small
  - Plate Cooler Large
  - Scroll Compressor
  - Washer – Extractor
  - Water Heating – Compressor Heat Recovery

Energy Practices

Prescriptive Upgrades

Energy Efficient Agricultural Operation (374)

- Motors
  - Motor Upgrade = 1 HP
  - Motor Upgrade > 1 and < 10 HP
- Livestock Housing
  - Ventilation – Replacement of Conventional Exhaust Fan with High Efficiency Exhaust Fan
  - Ventilation – Replacement of Horizontal Air Flow Fan with Efficient HAF Fan
  - Heating (Building)
  - Heating – Root Zone Heating
  - Heating – Radiant Systems
  - Low Energy Livestock Waterers

Energy Practices

Prescriptive Upgrades

Energy Efficient Agricultural Operation (374)

- New Grain Dryer
- New Evaporator
- Reverse Osmosis
- Enhanced Preheater

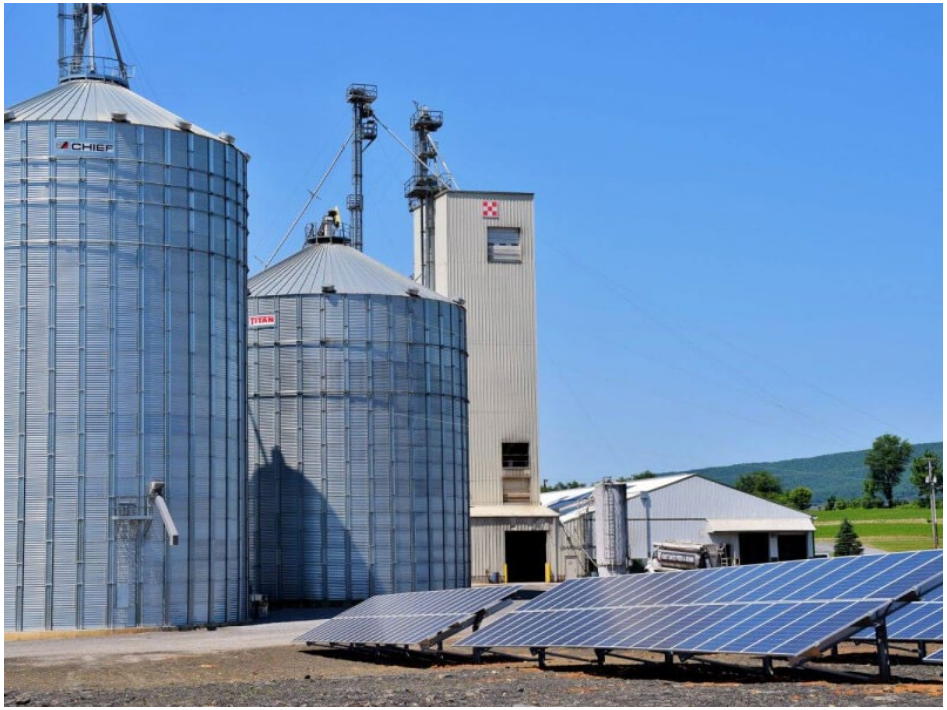
Energy Practices

Prescriptive Upgrades

Combustion System Improvement (372)

- Electric Motor in-lieu of IC Engine
- IC Engine Repower, 50-99 bhp
- Mobile IC System/Tractor Replacement, 25-160 bhp
- Renewable Energy in-lieu of Fossil Fuel Power Source
- Tractor Replacement, Electric

Renewable Energy in-lieu of Fossil Fuel Power Source



- Replace a fossil fuel combustion power source with an on-site renewable power source.
- The typical scenario includes ground mounted solar panels, inverter, necessary wiring and controls and professional installation.
- The primary resource concern being addressed is Air Quality Impacts but the improvement would also provide a benefit toward reducing energy use.

- Examples of agricultural combustion systems include diesel-fired pumping plant power units, emergency generators, grain dryers, or engines providing power for other agricultural systems.

Supporting Materials for Energy Practices

USDA United States Department of Agriculture

Energy Efficient Lighting System

Minnesota Practice Job Sheet 670
Practice Certification and Checkout Requirements

Prepared for: _____
Prepared by: _____
Farm: _____ Tract: _____ Date: _____

DEFINITION AND PURPOSE

Replacement of lighting fixtures to increase energy efficiency.

REQUIREMENTS

All components, including their installation and workmanship, shall meet or exceed all federal, state and local standards and guidelines.

All components shall be designed and installed in strict accordance with all manufacturers' recommendations and guidelines.

Proper disposal of all outdated components which could be considered hazardous or contain potentially polluting materials shall be in accordance with all federal, state and local standards and guidelines.

Written certification by a licensed or certified professional shall
this practice unless noted otherwise. Any required permits or ins
governments shall be obtained by the participant. See **Appendi**
for each payment scenario and **Appendix C** for a template of an

PRACTICE CERTIFICATION REQUIREMENTS

The following documentation is required prior to practice certifi

- ☐ Copy of all receipts and invoices required to verify quan
manufacturer and quantity installed.
- ☐ A signed copy of the Lighting System Installation Bid S
- ☐ Photographs (either hardcopy or digital files) of complet
exterior view of the structure where improvements are i
component from a distance that is appropriate for the co
- ☐ Certifications, as required. See **Appendix A** for certifi
and **Appendix C** for a template of an installation certifi

The cooperator certifies that the receipts, invoices, pictures, and
represent the materials and workmanship necessary for the equip
hold the NRCS responsible for any damages associated with the
components.

Cooperator's Signature

Job Sheet – Energy Efficient Lighting System (670)

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October 2023

Fact Sheet – EQIP Scenarios

Energy Efficient Agricultural Operation (Code 374)

The purpose of this practice is to implement improvements to improve energy efficiency of agricultural operations.

Energy Efficiency Evaluation

There are two options available to obtain financial assistance for installing more efficient equipment in agricultural facilities.

1. Energy Audit

   An Agricultural Energy Assessment, or Energy Audit is a detailed inventory and evaluation of all equipment which uses energy on an agricultural operation. An individual who is certified as a Certified Energy Manager (CEM) a Certified Energy Auditor (CEA), or a licensed Professional Engineer in Minnesota, performs this analysis and develops a report which meets the requirements of ANSI/ASABE S612 Performing On-farm Energy Audits. This report includes the auditor's recommendations for improvements which can be made to improve energy efficiency.

   EQIP funding is also available to assist landowners with obtaining an energy audit through the Conservation Evaluation and Monitoring Activity (CEMA) 228 – Agricultural Energy Assessment. The professional who develops the CEMA 228 must be a CEM or CEA, or be a licensed professional engineer in Minnesota.

2. Prescriptive Upgrade

   Prescriptive upgrades are activities have been evaluated for energy efficiency improvement and have been determined to meet the resource concern of "Energy efficiency of equipment and facilities". The prescribed upgrades do not require additional evaluation but do require a written summary of installation specific parameters to document compliance with the prescriptive upgrade and conservation practice standard.

   The Minnesota Prescriptive Upgrade list is available on the Minnesota Field Office Technical Guide, Section 4, under Energy Efficient Lighting System (670).

Ventilation

Exhaust Fans

Exhaust fans are used to pull outside air through a building. They are typically used in tunnel or cross ventilation systems.

Horizontal Air Flow Fans

Circulation fans within the building provide air mixing within a building by establishing a horizontal air circulation pattern within the building.

Figure 1: Exhaust Fans (above) and Horizontal Air Flow Fans (below)

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Minnesota Practice Job Sheet 670 - Ene
Appendix B: Lighting System

PARTICIPANT INFORMATION
Name:
Address:
Phone:

EQIP Scenario

Location Equipment Will be Installed	Original Equipment Identified for Replacement	Replacement Equipm		

COOPERATOR ACCEPTANCE STATEMENT
I have reviewed and understand the construction plans and specifications and agree to complete the work accordingly. Failure to meet these plans and specifications may jeopardize any continued NRCS technical assistance or program financial assistance. I understand that it is my responsibility to secure all necessary permits and licenses, and to complete the work in accordance with all local, state, and federal laws. Modification of these construction plans or specifications must be approved by the NRCS before installation. I assume all responsibility for negotiations and contract agreements with the construction contractors.

Cooperator's Signature Date

Job Sheet - Energy Efficient Lighting System (670)

Minnesota
October 2023

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Minnesota Prescriptive Upgrades

Energy Efficient Lighting System (Code 670)

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