## Practice: 374 - Farmstead Energy Improvement

**Scenario # 1** **Lighting - Linear Fluorescent**

**Scenario Description:** **Actual Scenario # 3** **New York**

The lighting system consists of a four-foot, three-lamp fixture with a single electronic ballast. The high-efficiency lighting system uses high-efficiency T8 or T5 fluorescent lamps. Associated materials for installation of replacement fixtures are included. Appropriate disposal of existing lamps, ballasts and other materials is required.

**Before Practice Situation:**

Inefficient lighting (such as incandescent or T12 fluorescent tubes driven by magnetic ballasts) as evidenced by an on-farm energy audit.

**After Practice Situation:**

High-efficiency lighting system which reduces energy use. The new lighting equipment will provide suitable light levels and reduce overall power requirements (kW) compared to the existing lighting system as evidenced by the energy audit. Associated practices/activities: may include 122-AgEMP - HQ, 670-Lighting System Improvement, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Each fixture replaced

| **Scenario Typical Size:** | 1 | Each | Tot Unit Cost | $329.76 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Lighting, fixture, Fluorescent, 75 watt | 1 | Each | $289.94 | $289.94 |
| Labor | Skilled Labor | 1 | Hour | $39.82 | $39.82 |
| | | | | Total Cost: | $329.76 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $247.32 | EQIP-HU | $296.78 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

**Practice: 374 - Farmstead Energy Improvement**

**Scenario # 2 Lighting - Pulse-Start Metal Halide**

**Scenario Description:** **Actual Scenario # 4** **New York**

The lighting system consists of a Pulse-Start Metal Halide (PSMH) lamp with a matched ballast or light-emitting diode (LED) equivalent fixtures (as detailed in ASABE S612-compliant energy audit). Associated materials for installation of replacement fixtures are included. Appropriate disposal of existing lamps, ballasts and other materials is required

**Before Practice Situation:**

Inefficient high-bay or exterior lighting (such as mercury vapor, T12 fluorescent, or similar) as evidenced by an on-farm energy audit.

**After Practice Situation:**

High-efficiency lighting system which reduces energy use. The new lighting equipment will provide suitable light levels and reduce overall power requirements (kW) compared to the existing lighting system as evidenced by the energy audit. Associated practices/activities: may include 122-AgEMP - HQ, 670-Lighting System Improvement, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Each fixture replaced

| **Scenario Typical Size:** | 1 | Each | Tot Unit Cost | $40.69 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Lighting, Pulse Start Metal Halide | 1 | Watt | $0.87 | $0.87 |
| Labor | Skilled Labor | 1 | Hour | $39.82 | $39.82 |
| | | | | Total Cost: | $40.69 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $30.52 | EQIP-HU | $36.62 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

## Practice: 374 - Farmstead Energy Improvement

**Scenario # 3** **Plate Cooler**

**Scenario Description:** **Actual Scenario # 7** **New York**

The installation of all stainless steel dual pass plate cooler, type 316 stainless steel. Practice installation will be by a factory trained dairy techician and according manufacturer's specifications. Practice certification to be made by a qualified Professional Engineer. Associated Practices: AgEMP CAP 122

**Before Practice Situation:**

Inefficient milk cooling (minimal pre-cooling of milk before entering the bulk tank).

**After Practice Situation:**

High-efficiency milk cooling system which reduces energy use. The new milk cooling equipment will pre-cool the milk and reduce overall power requirements (kW) compared to the existing milk cooling system (where most of the cooling was accomplished in the bulk tank) as evidenced in an energy audit. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Each

| **Scenario Typical Size:** | 1 | Each | Tot Unit Cost | $6,392.57 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Plate Cooler, 750 - 999 gal/hr | 1 | Each | $6,074.01 | $6,074.01 |
| Labor | Skilled Labor | 8 | Hour | $39.82 | $318.56 |
| | | | | Total Cost: | $6,392.57 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $4,794.43 | EQIP-HU | $5,753.31 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

**Practice: 374 - Farmstead Energy Improvement**

**Scenario # 4 Scroll Compressor**

**Scenario Description:** **Actual Scenario # 8** **New York**

Install a new scroll compressor, associated controls, wiring, and materials to retrofit an existing refrigeration system. A new condenser is not included in this typical scenario. Typical scenario includes a new 5 horsepower scroll compressor. Associated Practices: AgEMP CAP 122

**Before Practice Situation:**

Inefficient reciprocating compressor as a key component of the refrigeration system used to cool milk. The compressor is a critical part of a milk cooling system, affecting milk quality, system reliability, and system efficiency.

**After Practice Situation:**

A more efficient scroll compressor, which will reduce energy use, is evidenced by the energy audit. A comparably sized scroll compressor provides refrigeration capacity at a higher efficiency than a reciprocating compressor. Newer scroll compressor systems typically reduce electricity use by 15 to 25 percent compared to reciprocating compressors. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Number of compressors

**Scenario Typical Size:** 1 | Each | Tot Unit Cost | $2,644.75

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Scroll Compressor - 5 HP | 1 | Each | $2,485.47 | $2,485.47 |
| Labor | Skilled Labor | 4 | Hour | $39.82 | $159.28 |
| | | | | Total Cost: | $2,644.75 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $1,983.56 | EQIP-HU | $2,380.28 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

## Practice: 374 - Farmstead Energy Improvement

**Scenario # 5** **Variable Speed Drive > 5 HP**

**Scenario Description:** **Actual Scenario # 9** **New York**

The typical scenario consists of a variable speed drive (VSD) and appurtances, such as hook-ups, control panels, wiring, control blocks, filters, switches, pads, etc. attached to an electric motor used to drive a ventilation fan, irrigation pumps, vacuum pump, or similar equipment involved with agricultural production. The motor size, on which the VSD is added, is 10 HP or less. Associated Practices: AgEMP CAP 122

**Before Practice Situation:**

The system is inefficient when a motor operates at constant speed to satisfy a load which varies as to flow rate and/or pressure requirements.

**After Practice Situation:**

An on-farm energy audit has determined that energy use can be reduced through use of a VSD to control electric motors. After the VSD is applied, the motor speed can be adjusted to reduce power requirements and better match varied flow or pressure requirements. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

HP of VFD

**Scenario Typical Size:**

| 50 | Horsepower | Tot Unit Cost | $221.41 |
|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Variable Speed Drive, 50 HP | 50 | Horsepower | $215.04 | $10,752.00 |
| Labor | Skilled Labor | 8 | Hour | $39.82 | $318.56 |
| | | | | Total Cost: | $11,070.56 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $166.06 | EQIP-HU | $199.27 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

**Practice: 374 - Farmstead Energy Improvement**

**Scenario # 6 Building Envelope - Wall Insulation**

**Scenario Description:** **Actual Scenario # 19** **New York**

Enclose both sidewalls and endwalls from ceiling to floor in one of two manners: 1) metal exterior, 3.5" fiberglass batts (R-11), vapor barrier, & interior plywood or OSB sheathing, or 2) closed-cell polyurethane foam application (minimum 1" thickness (R-7) of 2.5 lbs/cu.ft. or higher density, (3.0 or higher density preferred) with a form of physical protective barrier on lower 2' (may be 6 lbs/cu.ft. or higher density 1/8" thick foam, or treated lumber). Based on a 40' x 400' poultry house.

**Before Practice Situation:**

A poultry house with an inefficient building envelope with limited wall insulation.

**After Practice Situation:**

A more effective and efficient building envelope can be created through addition of, or increased, insulation. Associated practices/activities: may include 122-AgEMP - HQ, 672-Building Envelope Improvement, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Area of Wall Insulated

| **Scenario Typical Size:** | 4500 | Square Foot | Tot Unit Cost | $1.83 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Insulation, Panel, R-11 with | 4500 | Square Foot | $1.83 | $8,235.00 |
| | | | | Total Cost: | $8,235.00 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $0.92 | EQIP-HU | $1.37 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

## Practice: 374 - Farmstead Energy Improvement

**Scenario # 7** **Building Envelope - Greenhouse Screens**

**Scenario Description:** **Actual Scenario # 21** **New York**

The mechanical energy screen system consists of a drive motor, support cables, controls, and shade material, which may be woven, knitted, or non-woven strips of aluminum fiber, polyethylene, nylon or other synthetic material. The screen provides a means to better control solar heat gain and heat transfer during night or cold weather conditions to reduce energy use. Screens and similar devices may also be used to divide internal areas and allow for differentiated heating, ventilation, or cooling system operation to reduce energy use.

**Before Practice Situation:**

Heating and cooling of an existing greenhouse, or similar structure with conditioned spaces, is inefficient due to poorly regulated heat transfer. A need to regulate an entire space for uniform conditions when some portions have differing, intermittent requirements can also reduce efficiency.

**After Practice Situation:**

The greenhouse is fitted with a mechanically controlled energy screen installed truss-to-truss or gutter-to-gutter, with side screens as necessary, reducing heat loss in the greenhouse. Associated practices/activities: may include 122-AgEMP - HQ, 672-Building Envelope Improvement, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Area of Screen

| **Scenario Typical Size:** | 25000 | Square Foot | Tot Unit Cost | $1.84 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Thermal blanket 10,001 - 50,000 | 25000 | Square Foot | $1.81 | $45,250.00 |
| Labor | Skilled Labor | 16 | Hour | $39.82 | $637.12 |
| | | | | Total Cost: | $45,887.12 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $1.38 | EQIP-HU | $1.65 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

**Practice: 374 - Farmstead Energy Improvement**

**Scenario # 8 Grain Dryer**

**Scenario Description:** **Actual Scenario # 23** **New York**

A replacement continuous dryer rated for an appropriatle rated bushel/per hour capacity for the operation that includes a microcomputer-based control system that adjusts the amount of time the crop remains in the dryer in order to achieve a consistent and accurate moisture content in the dried product. Alternate types of replacement dryers which reduce energy use are acceptable as evidenced by the energy audit. The typical operation requires a rated capacity of 860 bushels per hour.

**Before Practice Situation:**

Wet crop is loaded in the top of a horizontal, continuous dryer. Dried crop is augured from the bottom of the dryer. The heated air from the unit's burners passes from the burner plenum through the grain. An on-farm energy audit has identified inefficient manual control of the dryer where the operator controls the plenum temperature and the discharge auger speed to achieve the desired final moisture content. Moisture content is based on measurement of grain leaving the dryer. The plenum temperature setting depends on the moisture content of crop with a typical value of 220 F. The burner cycles on and off, automatically, as necessary to maintain the plenum temperature selected by the operator.

**After Practice Situation:**

Energy use is reduced through installation of a more efficient continuous dryer that uses a microcomputer-based controller to reduce overdrying and total time of operation. Associated practices/activities may include: 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Rated capacity of the dryer

| **Scenario Typical Size:** | 860 | Bushel per Hour | Tot Unit Cost | $87.04 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Grain dryer, Centrifugal, 20' | 172 | Bushels per Hour | $84.01 | $14,449.72 |
| Materials | Grain dryer, Axial, 16' | 172 | Bushels per Hour | $78.54 | $13,508.88 |
| Materials | Grain dryer, Centrifugal, 24' | 172 | Bushels per Hour | $89.97 | $15,474.84 |
| Materials | Grain dryer, Axial 28' | 172 | Bushels per Hour | $87.99 | $15,134.28 |
| Materials | Grain dryer, Axial, 12' | 172 | Bushels per Hour | $90.97 | $15,646.84 |
| Labor | Skilled Labor | 16 | Hour | $39.82 | $637.12 |
| | | | | Total Cost: | $74,851.68 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $65.28 | EQIP-HU | $78.33 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

## Practice: 374 - Farmstead Energy Improvement

**Scenario # 9** **RO<=200 GPH**

**Scenario Description:** **Actual Scenario # 25** **New York**

Reverse osmosis (RO) unit is installed to concentrate the sugar content of sap prior to boiling to decrease boiling time and fuel use. RO units use a combination of electric high pressure pumps and membranes to concentrate the sap. Use for units rated at 200 GPH or less. Complete unit is added to operation with an existing evaporator to process sap before it enters the maple evaporator. Boiling time for concentrated sap is greatly reduced. Typical capacity of the RO unit is 125 GPH. Completion of an Agricultural Energy Managment Plan AgEMP or equivelant energy audit indentifies the energy savings with planned installation of the RO unit. Units are typicllay manfactured for maple applications. Associated Practices: AgEMP CAP 122

**Before Practice Situation:**

1000 tap maple operation with a fuel oil fired evaporater running all sap through the evaporator and no existing RO. Sap is 1-2% sugar . All concentration is through evaporator with excessive boil time, fuel use, and emissions.

**After Practice Situation:**

Sap is processed through RO before entering the evaporator. Sap is concentrated to 8% or more drastically reducing boil time, fuel consumption and emissions. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Capacity of RO

| **Scenario Typical Size:** | 125 | Gallon per Hour | Tot Unit Cost | $31.54 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Reverse Osmosis unit, fixed cost | 1 | Each | $1,474.14 | $1,474.14 |
| Materials | Reverse Osmosis unit, variable cost | 125 | Gallons per Hour | $17.20 | $2,150.00 |
| Labor | Skilled Labor | 8 | Hour | $39.82 | $318.56 |
| | | | | Total Cost: | $3,942.70 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $23.66 | EQIP-HU | $28.39 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

## Practice: 374 - Farmstead Energy Improvement

**Scenario # 10 RO>200-600 GPH**

**Scenario Description:** **Actual Scenario # 26** **New York**

Reverse osmosis (RO) unit is intalled to concentrate the sugar content of sap prior to boiling to decrease boiling time and fuel use. RO units use a combination of electric high pressure pumps and membranes to concentrate the sap. Use for units rated at greater than 200 GPH and less than or equal to 600 GPH. Complete unit is added to operation with an existing evaporator only to increase existing RO capacity to process sap before it enters the maple evaporator. Boiling time for concentrated sap is greatly reduced. Typical capacity is 600 GPH. Completion of an Agricultural Energy Managment Plan AgEMP or equivelant energy audit indentifies the energy savings with planned installation of the RO unit. Units are typicllay manfactured for maple applications. Associated Practices: AgEMP CAP 122

**Before Practice Situation:**

3000 tap maple operation with a fuel oil fired evaporater running all sap through the evaporator and no existing RO. Sap is 1-2% sugar. All concentration is from combustion evaporation with excessive boil time, fuel use, and emissions.

**After Practice Situation:**

Sap is processed through RO before entering the evaporator. Sap is concentrated to 8% or more drastically reducing boil time, fuel consumption, and emissions. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Capacity of RO

| **Scenario Typical Size:** | 600 | Gallon per Hour | Tot Unit Cost | $20.72 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Reverse Osmosis unit, fixed cost | 1 | Each | $1,474.14 | $1,474.14 |
| Materials | Reverse Osmosis unit, variable cost | 600 | Gallons per Hour | $17.20 | $10,320.00 |
| Labor | Skilled Labor | 16 | Hour | $39.82 | $637.12 |
| | | | | Total Cost: | $12,431.26 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $15.54 | EQIP-HU | $18.65 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

## Practice: 374 - Farmstead Energy Improvement

**Scenario # 11** **RO >600 GPH or add on**

**Scenario Description:** **Actual Scenario # 27** **New York**

Reverse osmosis (RO) unit is intalled to concentrate the sugar content of sap prior to boiling to decrease boiling time and fuel use. RO units use a combination of electric high pressure pumps and membranes to concentrate the sap. An add-on unit is added to an existing RO unit to increase existing RO capacity to process sap before it enters the maple evaporato or a large complete RO unit greater than 600 GPH is installed. Typical unit is 1200 GPH. Boiling time for concentrated sap is greatly reduced. Completion of an Agricultural Energy Managment Plan AgEMP or equivelant energy audit indentifies the energy savings with planned installation of the RO unit. Units are typicllay manfactured for maple applications. Associated Practices: AgEMP CAP 122

**Before Practice Situation:**

5000 tap maple operation with a fuel oil fired evaporater running all sap through an existing RO that is under sized causing increased boil time, fuel consumption, and emissions.

**After Practice Situation:**

Sap is processed through expanded RO before entering the evaporator. Sap is concentrated to 14% or more drastically reducing boil time, fuel consumption, and emissions. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Capacity of RO

| **Scenario Typical Size:** | 1200 | Gallon per Hour | Tot Unit Cost | $17.47 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Reverse Osmosis unit, variable cost | 1200 | Gallons per Hour | $17.20 | $20,640.00 |
| Labor | Skilled Labor | 8 | Hour | $39.82 | $318.56 |
| | | | | Total Cost: | $20,958.56 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $13.10 | EQIP-HU | $15.72 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

**Practice: 374 - Farmstead Energy Improvement**

**Scenario # 12 Enhanced preheater, small**

**Scenario Description:** **Actual Scenario # 28** **New York**

The unit is installed over the evaporator pan and uses steam from the evaporator pan to pre-heat the sap to as high as 200ºF while at the same time injecting air into the sap to promote evaporation. Use for units less than 40 sq ft. Evaporation rates are increased by 65-75%, based on vendor analysis, leading to 40-43% energy savings. Sap is concentrated from Brix 2% to 4% or more before it enters the flue pan. Steam-enhanced systems require at least 9 feet from floor to ceiling. With increased evaporation, it takes less time to boil the sap down, thus saving significant energy (oil & wood fuel) used in the process, as well as labor.

**Before Practice Situation:**

Existing evaporator uses cold sap at inflow causing long boil times. inefficient fuel use and increased emissions.

**After Practice Situation:**

Use of a preheater captures waste heat from the evaporator and preheats cold sap and concentrates sap. Boil time, fuel use, and emissions are reduced. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Area of pan

| **Scenario Typical Size:** | 24 | Square Foot | Tot Unit Cost | $380.97 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Sap Pre-Heater, High efficiency, | 1 | Each | $4,102.19 | $4,102.19 |
| Materials | Sap Pre-Heater, High efficiency, | 24 | Square Foot | $203.41 | $4,881.84 |
| Labor | Skilled Labor | 4 | Hour | $39.82 | $159.28 |
| | | | | Total Cost: | $9,143.31 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $285.73 | EQIP-HU | $342.87 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

## Practice: 374 - Farmstead Energy Improvement

**Scenario # 13** **Enhanced preheater, large**

**Scenario Description:** **Actual Scenario # 29** **New York**

This unit is installed over the evaporator pan and uses steam from the evaporator pan to pre-heat the sap to as high as 200ºF while at the same time injecting air into the sap to promote evaporation. Use for units 40 sq ft and larger. Evaporation rates are increased by 65-75%, based on vendor analysis, leading to 40-43% energy savings. Sap is concentrated from Brix 2% to 4% or more before it enters the flue pan. Steam-enhanced systems require at least 9 feet from floor to ceiling. With increased evaporation, it takes less time to boil the sap down, thus saving significant energy (oil & wood fuel) used in the process, as well as labor.

**Before Practice Situation:**

Existing evaporator uses cold sap at inflow causing long boil times. inefficient fuel use and increased emissions.

**After Practice Situation:**

Use of a preheater captures waste heat from the evaporator and preheats cold sap and concentrates sap. Boil time, fuel use, and emissions are reduced. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Area of pan

| **Scenario Typical Size:** | 40 | Square Foot | Tot Unit Cost | $211.37 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Sap Pre-Heater, High efficiency, | 40 | Square Foot | $203.41 | $8,136.40 |
| Labor | Skilled Labor | 8 | Hour | $39.82 | $318.56 |
| | | | | Total Cost: | $8,454.96 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $158.53 | EQIP-HU | $190.24 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

## Practice: 374 - Farmstead Energy Improvement

**Scenario # 14** **High Efficiency Pans for < 1000 taps**

**Scenario Description:** **Actual Scenario # 30** **New York**

Install high efficiency pans to an existing 2.5 ft. by 8 ft. maple syrup evaporator. High efficiency pans have increased flue surface area and improved flue arrangement to increase boiling rate given the same overall rate of energy inputs. Specific equipment and resulting efficiences need to be documented in an approved Agricultural Energy Management Plan (AgEMP). Installation needs to according to manufactures's recommendation and schematic. Installation needs to be provided by a Maple Equipment Technician and approved by a qualified Engineer. Associated Practices: CAP 122

**Before Practice Situation:**

Existing maple operation has an existing maple syrup evaporater with documented inefficiences from an approved AgEMP. Identified efficiency improvement is from pan replacement on an existing arch that is deemed efficient and can be retrofitted with new evaporater pans.

**After Practice Situation:**

New pans are installed with increased flue surace area and or improved flue agrangements. Boiling rate is increased, boiling time and fuel use are decreased. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Each High Efficiency Pan

| **Scenario Typical Size:** | 1 | Each | Tot Unit Cost | $4,161.15 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Maple Evaporator Pan (without | 1 | Each | $3,842.59 | $3,842.59 |
| Labor | Skilled Labor | 8 | Hour | $39.82 | $318.56 |
| | | | | Total Cost: | $4,161.15 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $3,120.86 | EQIP-HU | $3,745.04 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

## Practice: 374 - Farmstead Energy Improvement

**Scenario # 15** **High Efficiency Pans >=1000 taps**

**Scenario Description:** **Actual Scenario # 31** **New York**

Install high efficiency pans to an existing 4 ft. by 16 ft. maple syrup evaporator. High efficiency pans have increased flue surface area and improved flue arrangement to increase boiling rate given the same overall rate of energy inputs. Specific equipment and resulting efficiences need to be documented in an approved Agricultural Energy Management Plan (AgEMP). Installation needs to according to manufactures's recommendation and schematic. Installation needs to be provided by a Maple Equipment Technician and approved by a qualified Engineer. Associated Practices: CAP 122

**Before Practice Situation:**

Existing maple operation has an existing maple syrup evaporater with documented inefficiences from an approved AgEMP. Identified efficiency improvement is from pan replacement on an existing arch that is deemed efficient and can be retrofitted with new evaporater pans.

**After Practice Situation:**

New pans are installed with increased flue surace area and or improved flue agrangements. Boiling rate is increased, boiling time and fuel use are decreased. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Each High Efficiency Pan

| **Scenario Typical Size:** | 1 | Each | Tot Unit Cost | $15,187.70 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Maple Evaporator Pan (without | 1 | Each | $14,869.14 | $14,869.14 |
| Labor | Skilled Labor | 8 | Hour | $39.82 | $318.56 |
| | | | | Total Cost: | $15,187.70 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $11,390.78 | EQIP-HU | $13,668.93 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

**Practice: 374 - Farmstead Energy Improvement**

**Scenario # 16 High Efficiency arch < 1000 taps**

**Scenario Description:** **Actual Scenario # 32** **New York**

Install high efficiency 2.5 ft by 8 ft. combustion arch to provide combustion for evaporating maple sap. High efficiency arches use air injection, gasification technology,and/or increased insulation properties to increase energy efficiency by increasing boil rate and edits to reduce fuel use. Existing boiling pans are used or if new pans are specified in the AgEMP are installed under the appropriate scenario if available. Specific equipment and resulting efficiences need to be documented in an approved Agricultural Energy Management Plan (AgEMP). Installation needs to according to manufacturer's recommendation and schematic. Installation needs to be provided by a Maple Equipment Technician and approved by a qualified Engineer. Associated Practices: CAP 122

**Before Practice Situation:**

An older inefficient maple evaporator uses excessive amounts of energy to produce a given amount of maple syrup. An approved AgEMP indentifies efficiency improvements by replacing the combustion arch with a newer energy efficient combustion arch unit.

**After Practice Situation:**

A high efficiency arch is installed that will increase boil rate and decrease boil time and energy used. Existing boilng pans are used on the new arch or if replaced are cost shared under an appropriate scenario. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Each Combustion Arch

| **Scenario Typical Size:** | 1 | Each | Tot Unit Cost | $2,018.73 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Maple Evaporator Combustion Arch | 1 | Each | $1,700.17 | $1,700.17 |
| Labor | Skilled Labor | 8 | Hour | $39.82 | $318.56 |
| | | | | Total Cost: | $2,018.73 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $1,514.05 | EQIP-HU | $1,816.86 |
| WHIP | $0.00 | WHIP-HU | $0.00 |

**Practice: 374 - Farmstead Energy Improvement**

**Scenario # 17 High Efficiency arch >= 1000 taps**

**Scenario Description:** **Actual Scenario # 33** **New York**

Install high efficiency 4 ft by 16 ft. combustion arch to provide combustion for evaporating maple sap. High efficiency arches use air injection, gasification technology,and/or increased insulation properties to increase energy efficiency by increasing boil rate and edits to reduce fuel use. Existing boiling pans are used or if new pans are specified in the AgEMP are installed under the appropriate scenario if available. Specific equipment and resulting efficiences need to be documented in an approved Agricultural Energy Management Plan (AgEMP). Installation needs to according to manufacturer's recommendation and schematic. Installation needs to be provided by a Maple Equipment Technician and approved by a qualified Engineer. Associated Practices: CAP 122

**Before Practice Situation:**

An older inefficient maple evaporator uses excessive amounts of energy to produce a given amount of maple syrup. An approved AgEMP indentifies efficiency improvements by replacing the combustion arch with a newer energy efficient combustion arch unit.

**After Practice Situation:**

A high efficiency arch is installed that will increase boil rate and decrease boil time and energy used. Existing boilng pans are used on the new arch or if replaced are cost shared under an appropriate scenario. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

**Scenario Feature Measure:**

Each Combustion Arch

| **Scenario Typical Size:** | 1 | Each | Tot Unit Cost | $15,315.46 |
|---|---|---|---|---|

| Cost Category | Component Name | Quantity | Unit | Unit Cost | Cost |
|---|---|---|---|---|---|
| Materials | Maple Evaporator Combustion Arch | 1 | Each | $14,996.90 | $14,996.90 |
| Labor | Skilled Labor | 8 | Hour | $39.82 | $318.56 |
| | | | | Total Cost: | $15,315.46 |

**Payment types:**

| PayType | Unit Payment | PayType | Unit Payment |
|---|---|---|---|
| EQIP | $11,486.60 | EQIP-HU | $13,783.91 |
| WHIP | $0.00 | WHIP-HU | $0.00 |