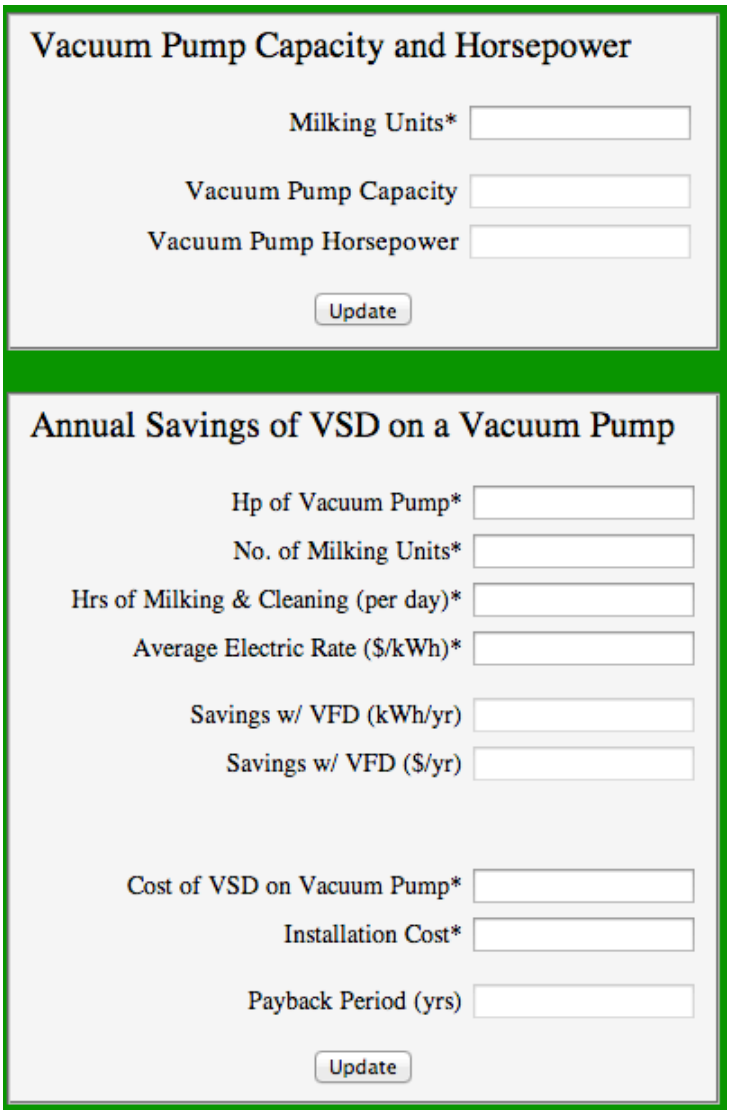
Vacuum Pump and VSD Calculator

The following calculators can be used to estimate the required vacuum pump capacity and horsepower. The calculators should only be used as a guide, and should not be used as final sizing criteria, since there may be other sizing factors not considered, such as additional capacity for milk meters, vacuum operated takeoffs, etc. These calculators can also help you assess whether your existing vacuum system is grossly oversized.



Directions:

1. The Textboxes with a " * " are inputs.
2. The Textboxes without a " * " are outputs.
3. Only digits and decimals are allowed as inputs.
4. Click on the Update Button to complete the calculations.

The purpose of this first calculator is to determine vacuum pump capacity and horsepower.

The purpose of the second calculator is to estimate the annual savings of VSD on a vacuum pump.

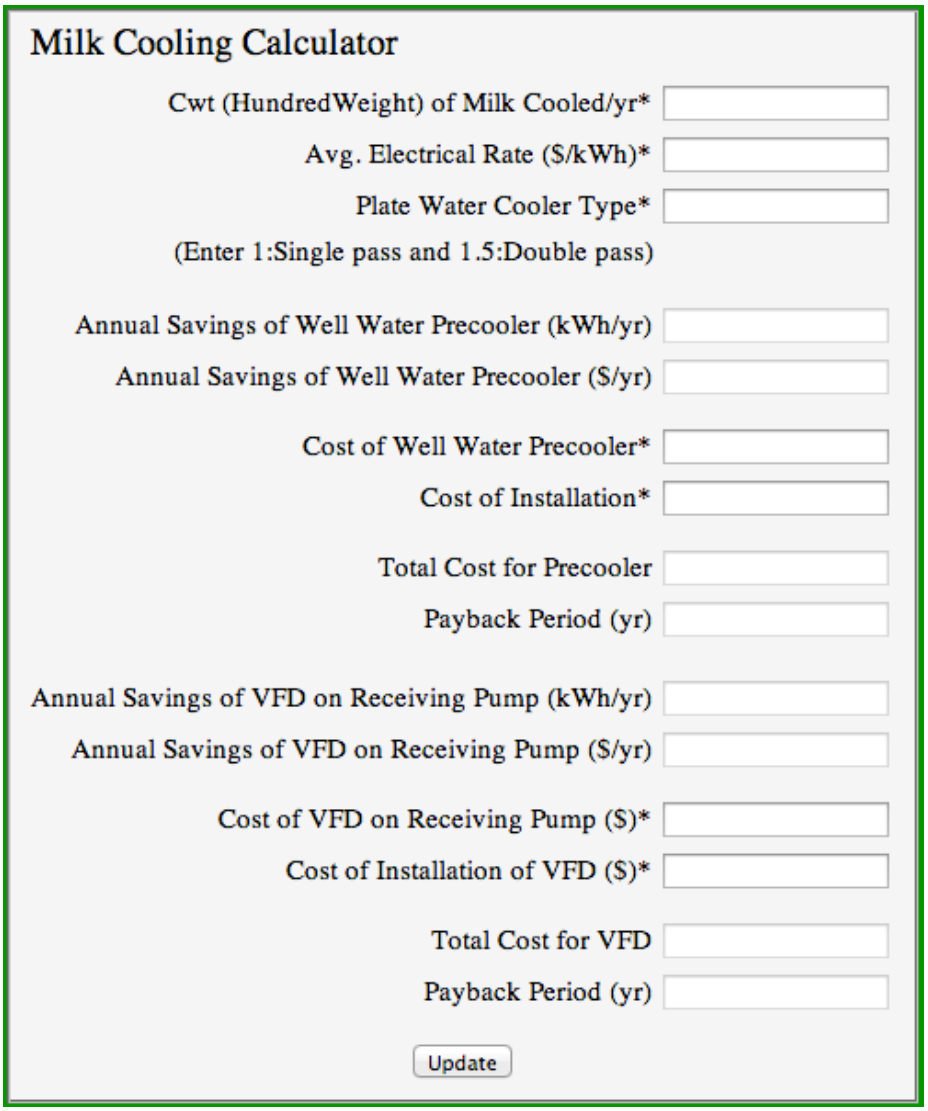
Milk Cooling Calculator

The following calculator can be used to estimate the savings of well water precoolers and VFDs on receiver pumps. The calculator should only be used as a guide.

Directions:

1. The Textboxes with a " * " are inputs.
2. The Textboxes without a " * " are outputs.
3. Only digits and decimals are allowed as inputs.
4. Click on the Update Button to complete the calculations.

The third textbox should be given special recognition. The textbox can have an input of 1 or 1.5



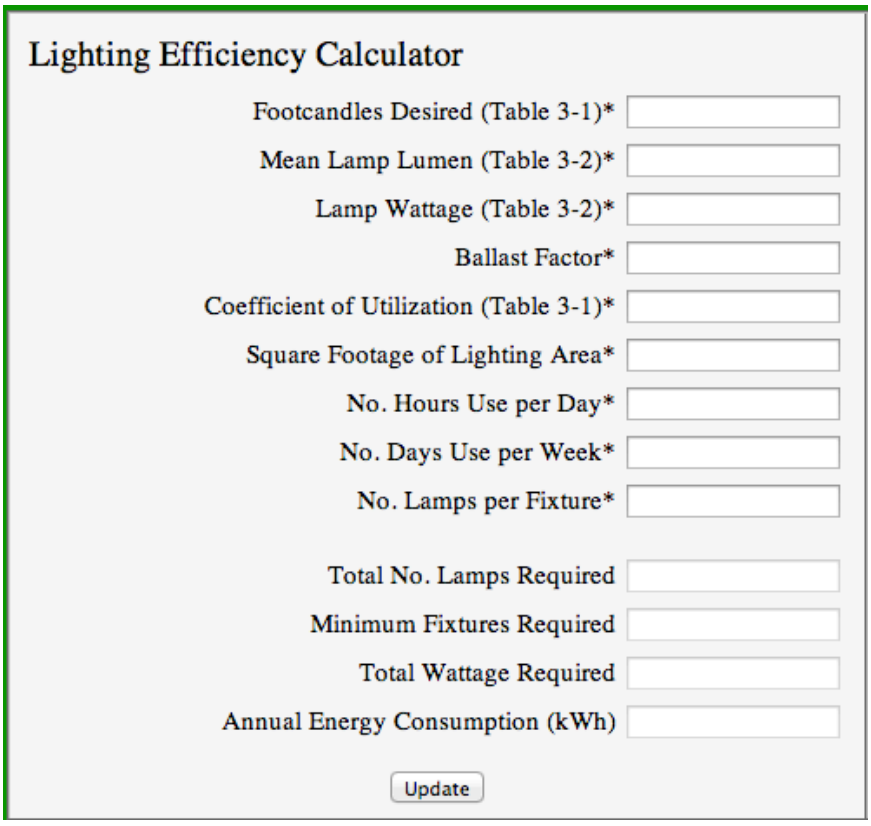
Lighting Calculator

The following calculators can be used to determine lamp watts required to illuminate a specific size room to a specific level of footcandles or lumens per square foot, as well as the number of light fixtures required. The annual energy consumption (kWh) is also calculated. The calculators should only be used as a guide.

Directions:

1. The Textboxes with a " * " are inputs.
2. The Textboxes without a " * " are outputs.
3. Only digits and decimals are allowed as inputs.
4. Click on the Update Button to complete the calculations.

1 footcandle = 1 lumen/sq ft



The purpose of this section of the calculator is to determine lamp watts and number of light fixtures required, and annual energy consumption. This example uses Milking Center Parlor as a location and 100W incandescent. CFLs will replace the incandescents. The purpose of the second section is to determine the savings by converting to more efficient lights.

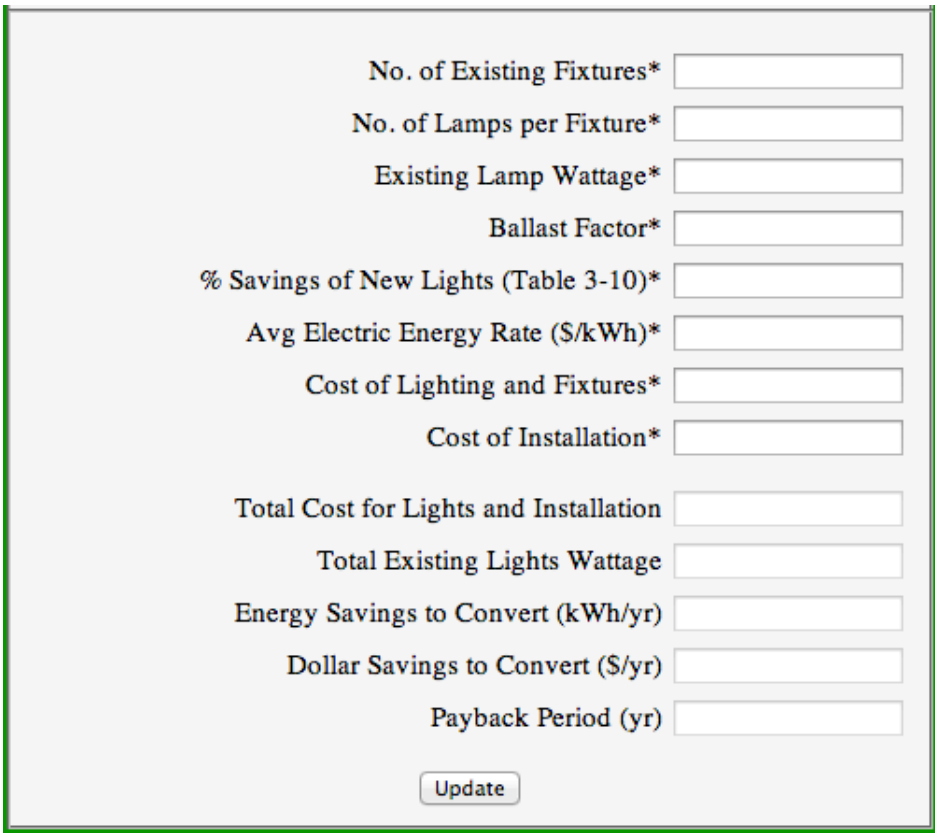


Table 3-1: Suggested Dairy Facility Illumination Levels

Work Area	Recommend Illumination Level fc [1]	Coefficient Utilization Estimate % [2]	Lamp(s) Output lm/sq ft [3]	Lamp Output (lm/W) [4]	Power Required W/sq ft [5]	Fixture Suggested [6]
Milking Center						
Parlor, general lighting	20 fc	35	57	84	0.68	psmh
Operator pit (cows udder)	50 fc	30	167	84	2.0	psmh
Cow return alleys	20 fc	35	57	84	0.68	psmh
Cow holding area	10 fc	35	29	84	0.34	psmh
Milk Room						
General lighting	20 fc	35	57	89	0.64	Fluor 8
Equipment washing area	100 fc	40	250	89	2.8	Fluor 8
Bulk tank/silo interior	100 fc	80	125	82	1.5	
Utility/Equipment Room						
General lighting	20 fc	30	67	89	0.75	Fluor 8
Equipment repair and maintenance	100 fc	45	220	17	13	halogen
Maternity/Treatment areas						
General lighting	20 fc	30	67	84	0.80	psmh
Treatment or surgery	100 fc	50	200	17	12	halogen

Cattle confinement areas (indoor)	20 fc	30	67	84	0.80	psmh
Cattle confinement areas (outdoor)	1 fc	20	3.3	101	0.03	hps
Feed Storage areas						
Grain bin areas	5 fc	20	25	101	0.25	hps
Commodity buildings	10 fc	25	40	101	0.40	hps

Source for Table 3-1.

1. Source: ASAE Lighting Systems for Agriculture Facilities
2. Coefficient of utilization given for luminaries direct at least 65 percent of light down
3. Lamp output needed to meet recommended lighting level, lumens/sq ft
4. Lumen output of selected lamp, mean lumens per Watt (rated) [does not include ballast]
5. Wattage required for selected lamp per sq ft
6. psmh – pulse start metal halide, fluor 8 – fluorescent T8, hps – high pressure sodium

Example: Select the lighting fixtures needed for a milking parlor operator pit that is 8 ft x 45 ft. Referring to Table 3-1, light intensity must be 50 fc or 50 lumens per sq ft and the coefficient of utilization will be 35%. Pulse start metal halide lights will be used.

Area to be lighted at 50 fc: $8ft\ x\ 45tft = 360\text{sqft}$

Lumen output needed: $\frac{50lumens}{sqft} \div 0.35 = \frac{143lumens}{sqft}$

Lamp rated output for psmh: $96\ lumens/W$

Lamp Watts required: $\frac{143lumens}{sqft} \times \frac{W}{96lumens} = \frac{1.5W}{sqft}$

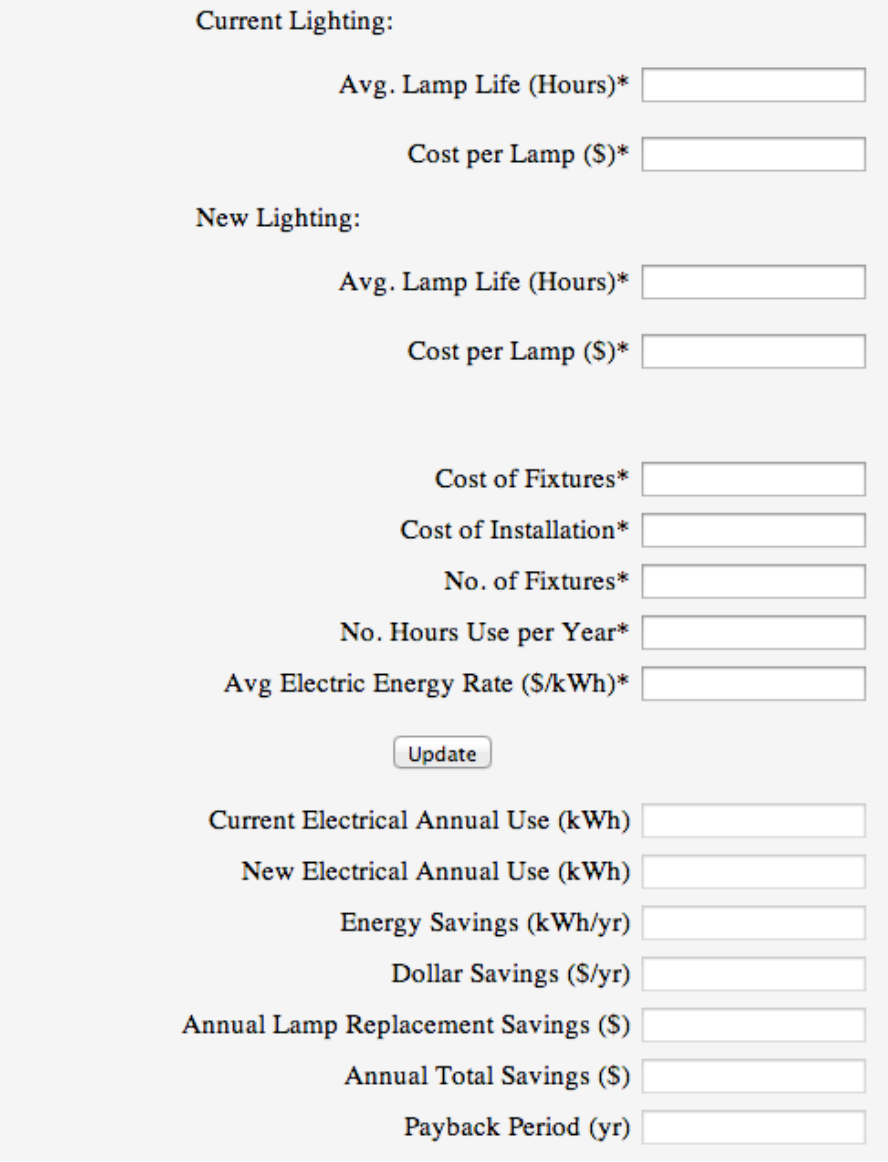
Lamp Watts required for job: $\frac{1.5W}{sqft} \times 360sqft = 536W$

Table 3-10. Lighting Energy Conservation Measures and Savings

Lighting Type	Energy Conservation Measure	% Energy Savings
Incandescent	Convert to halogen lamps	20-38%
Incandescent	Convert to compact fluorescent, if appropriate	75%
Incandescent	Convert to fluorescent tube luminaires	80-85%
Fluorescent T-12 Magnetic ballasts	Convert to fluorescent T-8 with energy efficient ballasts	25%
Mercury vapor	Convert to Metal Halide, if appropriate	43-54%
Mercury Vapor	Convert to High Pressure Sodium, if appropriate	44-59%

Use this rule of thumb: If you use 60, 75, or 100-watt incandescent bulbs daily for four hours or more, replace them with 17, 20, or 23-watt compact fluorescents.

If the fluorescent tubes in your barns and work areas are more than 12 years old, there's a good chance that they're due for an upgrade to modern T8 fluorescent lamps. T8 lamps are the highest efficiency lamps for 4 and 8-foot fixtures, and can provide the same amount of illumination using 20 to 40 percent fewer watts. An electronic ballast with the T8 lamp saves an additional 7 to 10 percent.



Larger incandescent fixtures, such as pole lights or floodlights should be replaced with more efficient lights such as sodium or metal halide lamps. These are designed specifically to cast a big pool of light over a wide area but with significantly less energy consumption. These lights, which require unique fixtures, are typically seen in streetlights, modern warehouses, and large stores.

The environmental benefits of making the change are considerable. Replacing a 75-watt incandescent light with a 20-watt compact fluorescent saves about 550 KwH over its lifetime. If the electricity comes from a coal fired generating plant, the savings represents about 1300 pounds of carbon dioxide and 20 pounds of sulfur dioxide that would have otherwise been released into the atmosphere.

Automated energy saving calculators are found at http://www.eren.doe.gov/buildings/forms/light.cgi and http://www.eren.doe.gov/femp/procurement/calc-index.html.

Air Circulation & Ventilation Calculator

FAN EFFICIENCY CALCULATOR

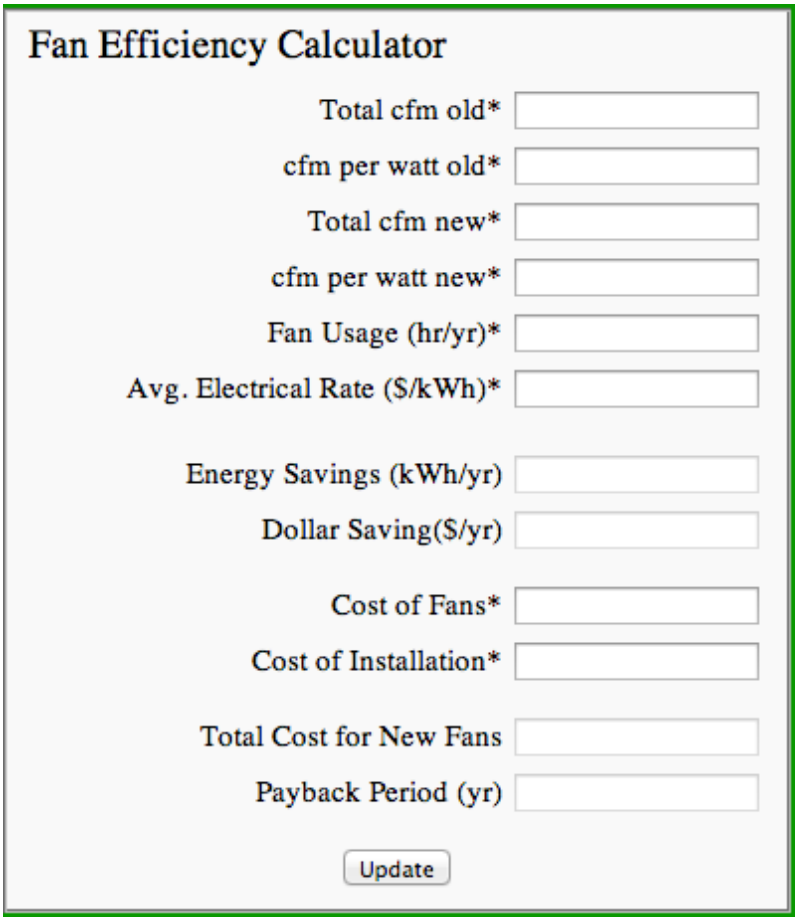
The following calculator can be used to estimate the annual energy savings of installing higher efficiency fans. The calculator should only be used as a guide.

Directions:

1. The Textboxes with a " * " are inputs.
2. The Textboxes without a " * " are outputs.
3. Only digits and decimals are allowed as inputs.
4. Click on the Update Button to complete the calculations.

CFM (Cubic Feet Per Minute) – air flow rate.

Note: Further savings can be achieved by installing thermostat controls or timers.

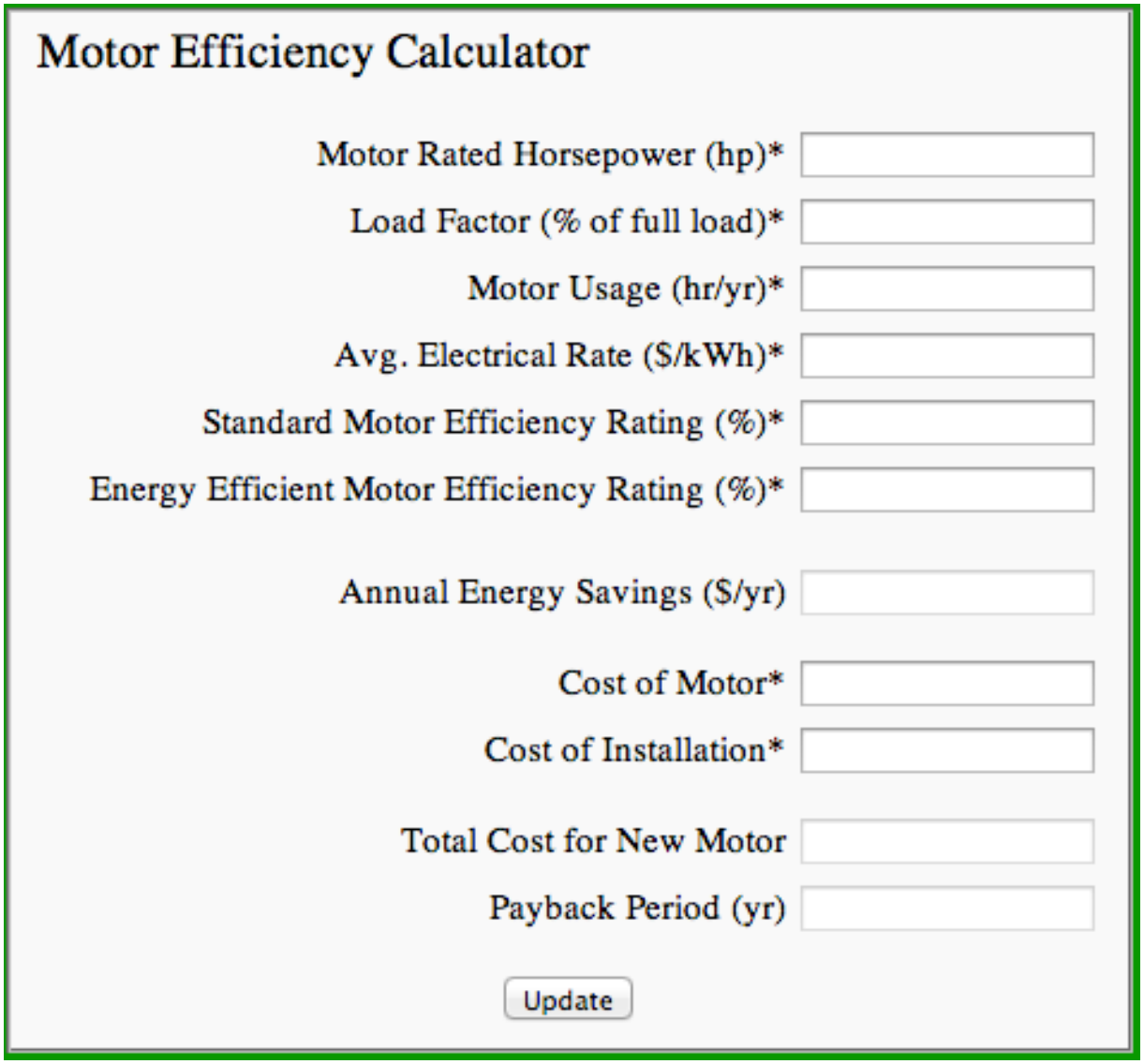


Efficient Motor Calculator

The following calculator can be used to estimate the annual energy savings using a more efficient motor. The calculator should only be used as a guide.

Directions:

1. The Textboxes with a " * " are inputs.
2. The Textboxes without a " * " are outputs.
3. Only digits and decimals are allowed as inputs.
4. Click on the Update Button to complete the calculations.
5. (% of full load is ideally 100%

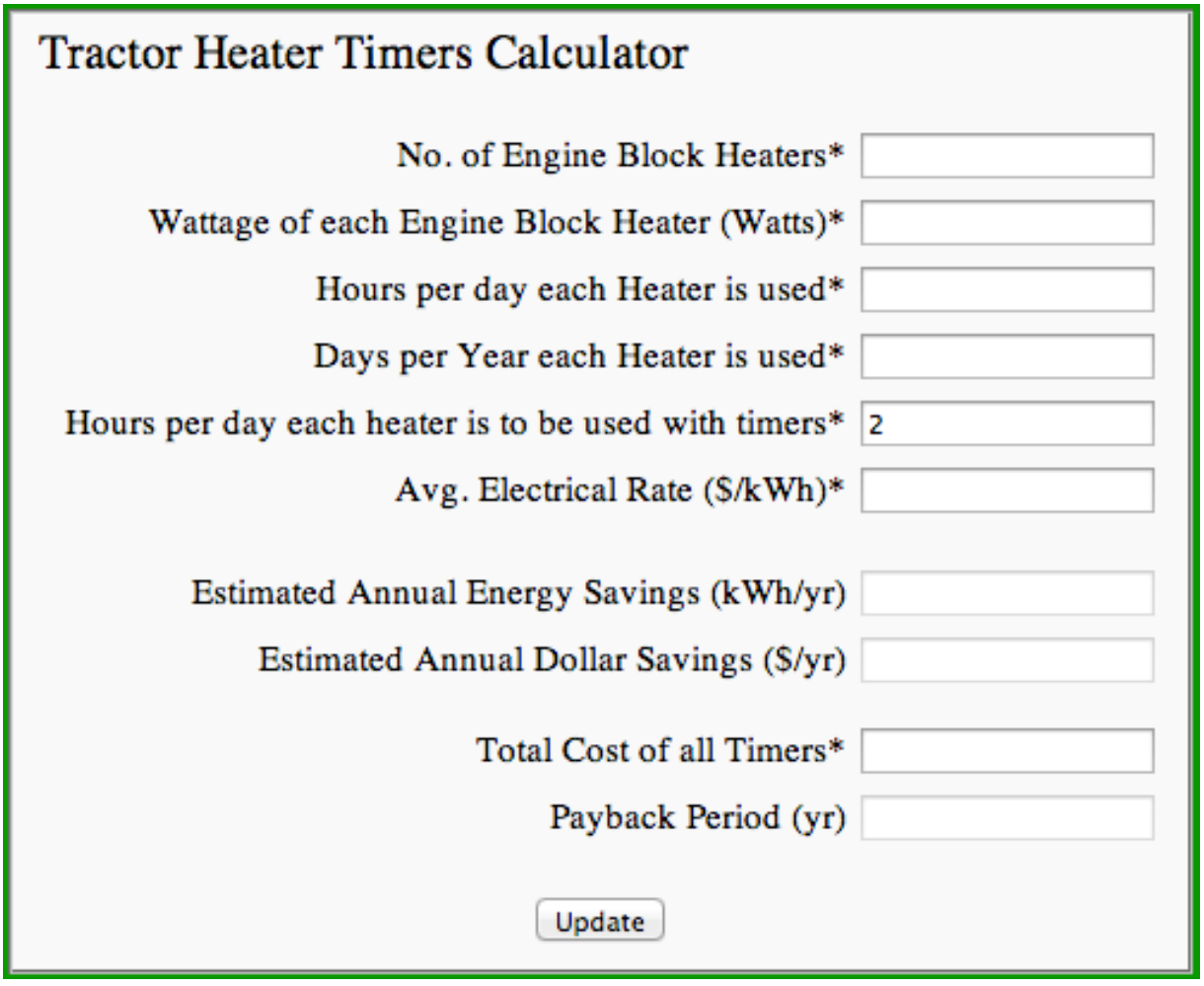


Tractor Heater Timers Calculator

The following calculator can be used to estimate the annual energy savings using tractor heater timers. It calculates the cost difference between using a timer and not using one. The calculator should only be used as a guide.

Directions:

1. The Textboxes with a " * " are inputs.
2. The Textboxes without a " * " are outputs.
3. Only digits and decimals are allowed as inputs.
4. Click on the Update Button to complete the calculations.
5. % of full load is ideally 100%

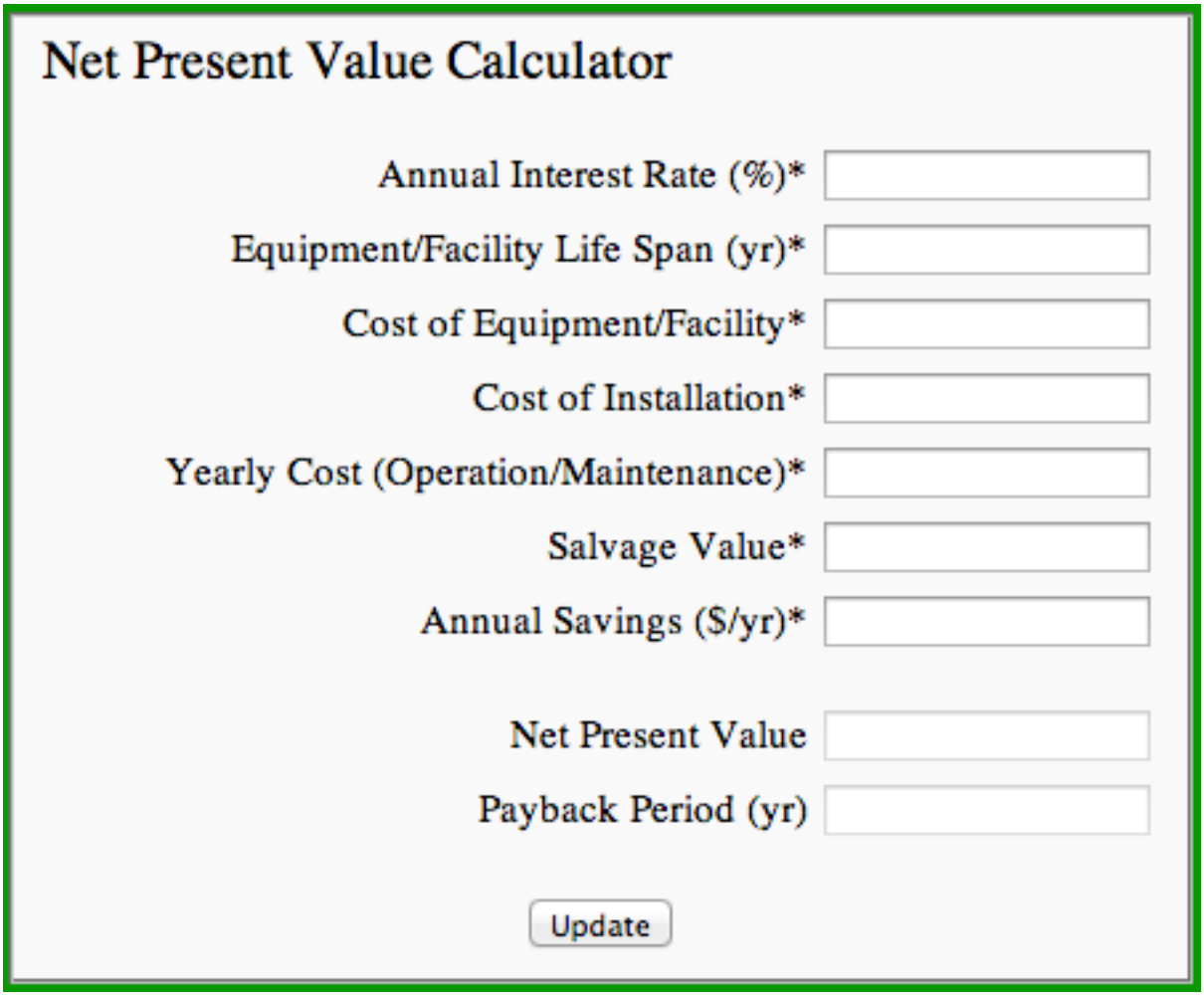


Net Present Value Calculator

The following calculator can be used to estimate the net present value of purchased equipment. The calculator should only be used as a guide.

Directions:

1. The Textboxes with a " * " are inputs.
2. The Textboxes without a " * " are outputs.
3. Only digits and decimals are allowed as inputs.
4. Click on the Update Button to complete the calculations.



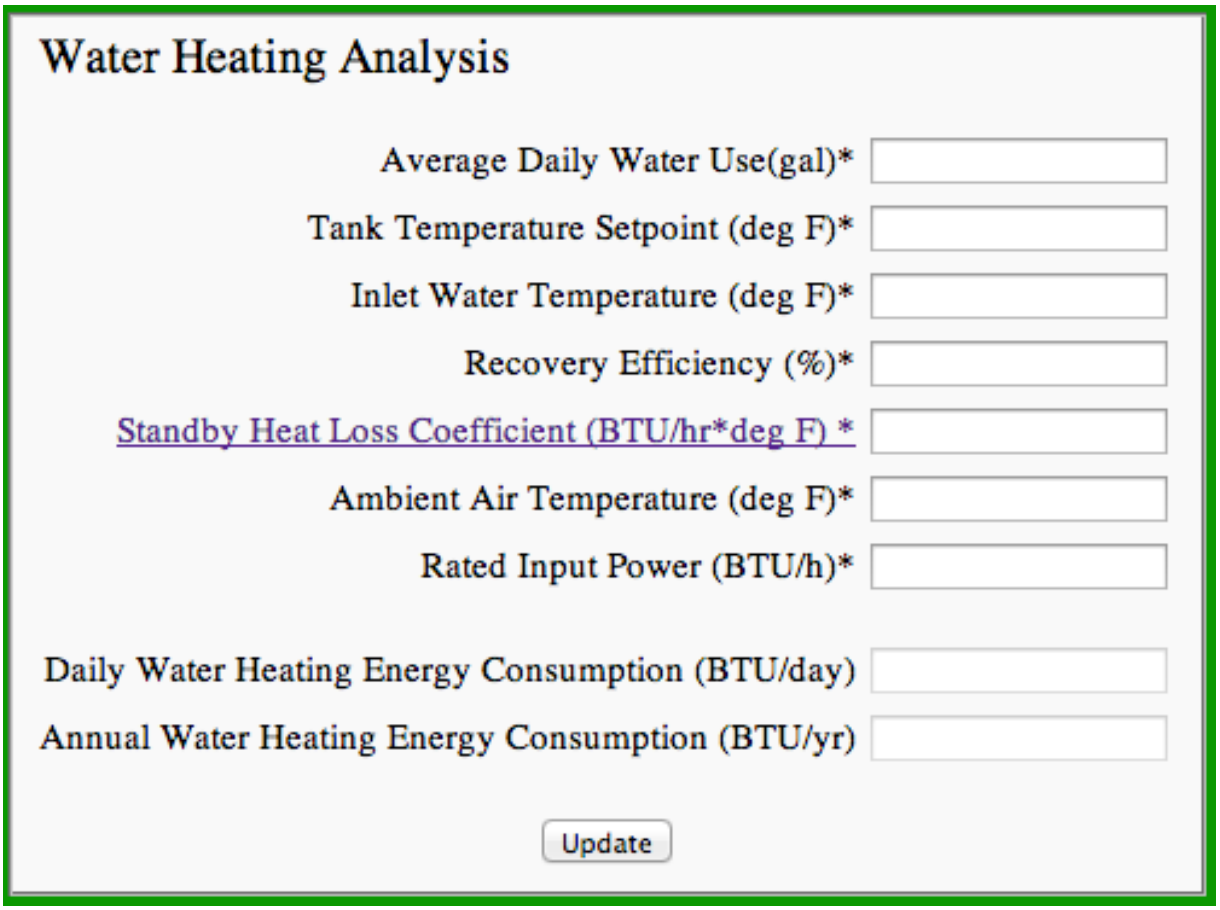
Water Heater Analysis Calculator

The following calculator can be used to estimate the daily energy consumption using in water heater. It calculates the cost difference between using a timer and not using one. The calculator should only be used as a guide.

Directions:

1. The Textboxes with a " * " are inputs.
2. The Textboxes without a " * " are outputs.
3. Only digits and decimals are allowed as inputs.
4. Click on the Update Button to complete the calculations.

Much of the information for the calculator can be found on the name plate.

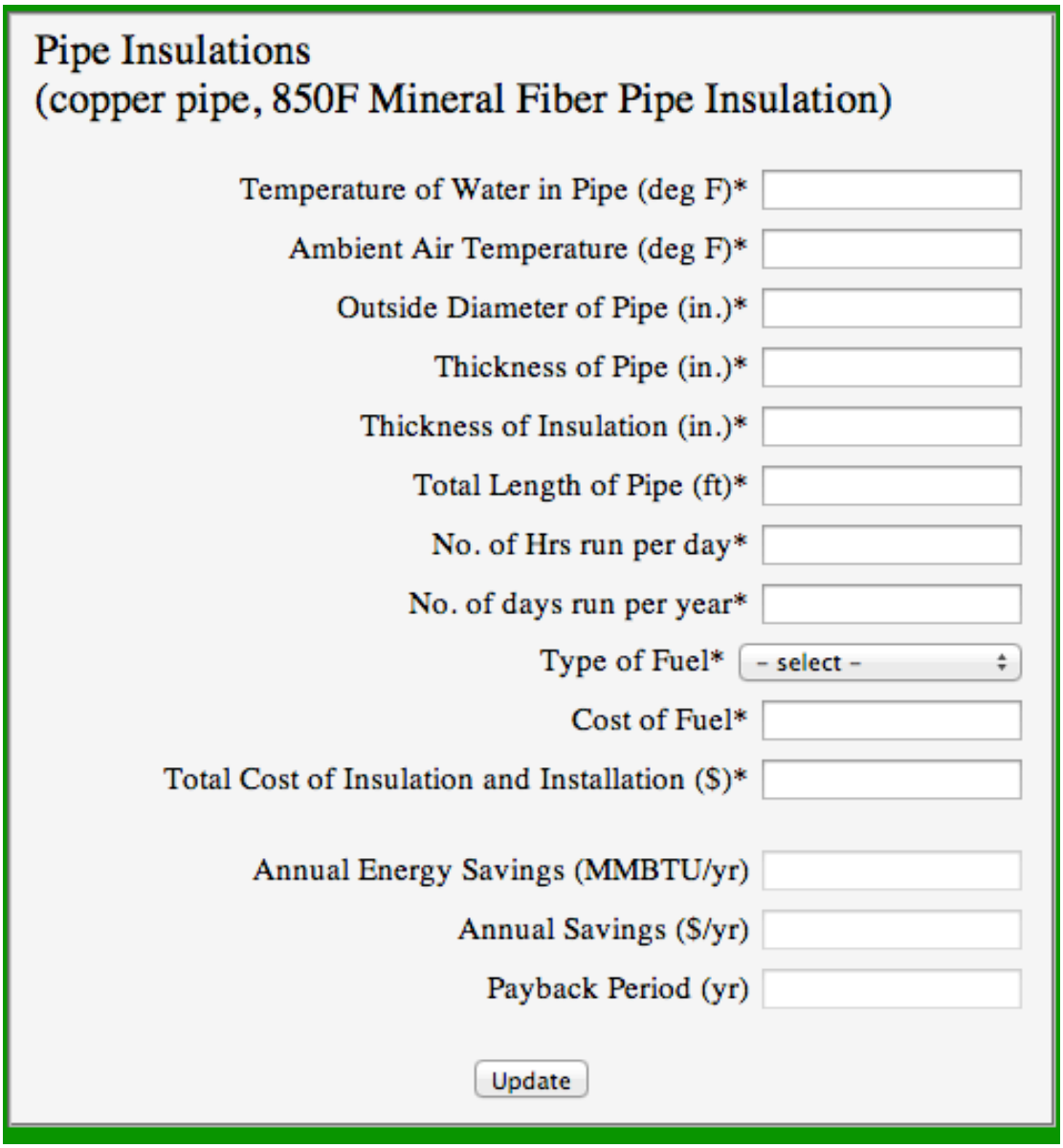


Hot Water Pipe Insulation Calculator

The following calculator can be used to estimate the savings to be achieved by insulating hot water. The calculator should only be used as a guide.

Directions:

1. The Textboxes with a " * " are inputs.
2. The Textboxes without a " * " are outputs.
3. Only digits and decimals are allowed as inputs.
4. Click on the Update Button to complete the calculations.
5. Take special notes of the units for fuel type and associated cost



Tractor Fuel Use Calculator

The following calculator can be used to estimate the amount of fuel used by tractors in PTO operations (manure pumping, irrigation, etc.). The calculator should only be used as a guide.

Directions:

1. The Textboxes with a " * " are inputs.
2. The Textboxes without a " * " are outputs.
3. Only digits and decimals are allowed as inputs.
4. Click on the Update Button to complete the calculations.