



## Farming and Energy Use Series

# Energy Efficiency on the Dairy Farm

Are you looking for ways to cut your energy bill and keep your dairy operation competitive in today's markets? Read on for six energy-saving ideas!

### 1. Use a variable frequency drive for vacuum pumps.

Typically, the vacuum pump goes on at milking or cleaning time, and a regulator allows air into the system to lower the vacuum to the amount that's best for the milking process. This wastes a significant amount of the energy the vacuum pump is producing.

Switch to a variable frequency drive, controlled by a sensor in the vacuum line. When more vacuum is needed, the VFD speeds up the pump; when less vacuum is needed, it slows the pump. **This can cut the energy use of the vacuum system in half.**

### 2. Use a heat exchanger to cool milk.

If you have a water well, you have an energy efficiency opportunity! Well water is typically about 50° F, and milk is typically nearly 100° F. Since you want the well water warmer and the milk cooler, a heat exchanger lets you use some of the heat in the milk to temper your water. **The water is warmed, and the milk is cooled, with no energy expenditure!**

### 3. Modernize and right-size electric motors.

Most motors need to run at least 2,000 hours annually before early replacement is cost-effective. Otherwise, replace motors at the end of their useful life.

When it's time to replace a motor, don't arbitrarily go bigger. Especially for motors that operate thousands of hours per year, consider replacement with a high-efficiency motor certified by the National Electric Manufacturer's Association.

Another tip: Lubricate motors if you can and keep them clean. Built-up grime causes a motor to run warmer than it should.



*Heat exchanger for well water precooling of milk. Photo courtesy of Penn State Extension.*

#### Want more energy efficiency ideas?

For tips on solar panels, fans, lighting, funding options, and more, visit:

[www.dep.pa.gov/agricultureenergy](http://www.dep.pa.gov/agricultureenergy)

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## 4. Efficient ways to cool milk.

Scroll compressors are more efficient than traditional reciprocating compressors. Consider scroll compressors for your milk refrigeration.

Another possibility is heat recovery from your milk cooler compressors. Refrigeration systems pull heat out of the milk and release that heat to the outside air, as waste heat. Consider diverting that wasted heat to your hot water heater through a refrigeration heat recovery (RHR) unit.

## 5. Consider solar power for water pumping and electric fencing.

As solar technology gets better, the prices are decreasing every year and solar has become a viable option for both livestock waterers and electric fencing. A solar-powered water pump is a normal pump with an electric motor. Electricity for the motor is generated on-site through a solar panel which converts solar energy to direct current (DC) electricity. A DC well pump (or AC, alternating current, well pump with an inverter) can then be used to supply water to your livestock waterers. A solar-powered electric fence charger can be used on remote areas of your property to power your fence lines without the need for AC electric outlets.

## 6. What about renewable energy for dairy farms?

Biogas is a form of renewable energy. Anaerobic digesters are used to convert liquid manure into biogas (methane) and electricity. An anaerobic digester is an expensive capital investment, and payback can take several years and will generally only be cost effective for large herds of livestock. The U.S. Environmental Protection Agency's AgSTAR website is filled with information on anaerobic digestion.

<https://www.epa.gov/agstar>



*Anaerobic digester, Snyder County*

## Did You Know?

U.S. Dairy launched a Net Zero Initiative in 2020 to help U.S. dairy farms of all sizes and geographies use new technologies and adopt economically viable practices. This on-farm effort focuses on feed production, manure handling, nutrient management, cow care and efficiency, and on-farm energy efficiency and renewable energy use.

Learn more: <https://www.usdairy.com/sustainability/environmental-sustainability>

## Consider an energy audit

Because every farm is unique, an energy audit or assessment is often the best place to start before making any changes to your operation.

To learn what an energy audit or assessment entails, and how you can get one, see our handout "Farming and Energy Use: Finding Hidden Opportunities for Energy Savings," found on our website: [www.dep.pa.gov/agricultureenergy](http://www.dep.pa.gov/agricultureenergy)

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