



Energy Conservation in Agriculture

Low-Cost Energy Conservation: Heating Hot Water

Scott Sanford

The following is a list of actions that could reduce energy consumption, depending on your farm operation. Refer to the references at the end for more information.

Hot water energy conservation

1. **Tune up the milking system's washing system.** This ensures that cleaning is being done properly and can reduce the amount of hot water needed. Proper adjustment can reduce air injector air admissions that reduce water temperature.
2. **Oversized milk pipelines require more water to wash.** Increasing the milk pipeline size from 2" to 3" or from 3" to 4" doubles the water requirement to wash the milklines. This is a consideration when installing new or retrofitting an existing milking system
3. **Insulate water heater tanks.** A typical water heater tank has significant standby heat losses because of low R-value insulation and high temperature difference between heated water and ambient temperature. Add an insulation blanket around the tank to reduce the standby losses on water heaters with less than 2 inches of foam insulation. Insulation kits are available at most lumber and hardware stores.
4. **Install a heat trap above the water heater to prevent thermo siphoning.** Thermo buoyancy causes hot water to rise from the tank into the pipes, increasing standby losses; heat traps reduce the distance the water can travel.
5. **Insulate all water pipes.** Insulating hot water pipes with foam insulation reduces heat loss while the water moves from the water heater to the final destination. It also may reduce water use because the water in the pipe cools off more slowly and may be warm enough for the intended use for 15 to 20 minutes. Insulating cold water pipes reduces sweating of pipes that can cause water damage. In new construction it is recommended that the pipes that run in the walls or floors be insulated, too.
6. **Reduce water heater set point temperature.** In dairy applications, the critical requirement is to have a minimum detergent wash solution temperature of 120°F when the solution is dumped to drain. For example, if your system is dumping detergent wash water at 140°F water, you could save energy by reducing the water heater temperature by 15–20°F. As a rule of thumb, lowering the water heater thermostat by 10°F will typically save 3-5% in water heating costs.

7. **Pre-rinse water temperatures are recommended at 100–110°F.** Increasing it above these temperatures wastes energy and can cause milk solids to be deposited on pipe wall surfaces increasing detergent requirements.
8. **Use a cold acid rinse cycle.** The purpose of the acid wash cycle is to control mineral build up on the inside of the milk lines and leave the surface environment of the milk line hostile to bacterial growth. Acid is slower acting at lower temperatures but most milking systems have many hours between milkings for the acid to work.
9. **Repair leaky faucets.** A slow drip (once per second) can waste more than 48 gallons of water per week. If it's the hot water leaking, it also increases water heater standby losses.
10. **Install aerators on sink faucets.** They reduce water flow rate while maintaining water coverage.
11. **Replace electric water heaters with high efficiency gas or oil fired units that have an energy factor of 0.61 or higher.** This reduces the electrical demand and reduces the water heating costs because of the use of a lower cost primary fuel versus electricity—a secondary energy source.
12. **If using an electric water heater, use a large tank and low wattage element to reduce electrical demand while still supplying needed volume of hot water.** If the tank capacity is large enough, water heating can be moved off-peak with the addition of a timer to only allow operation during off-peak hours.
13. **Install a refrigeration heat recovery unit, if economical.** These units reduce water-heating costs by preheating well water from the heat rejected from the refrigeration system before it enters the water heater while at the same time, making the refrigeration system run more efficiently.
14. **Flush the water heater and refrigeration heat recovery tanks monthly** by draining 4 or 5 gallons of water from the drain cock to purge the tank of mineral deposits. Regular flushing will result in longer water heater life.
15. **Turn off water heaters if not being used for long periods of time.** This eliminates standby losses that can average 60%.

For additional information, refer to publication *Water Heating on Dairy Farms* (A3784-2), and *Refrigeration System Energy Conservation* (A3784-4), available on the Cooperative Extension Publishing web site: <http://cecommerce.uwex.edu/>.

For more information

Information on different technologies and energy conservation opportunities are contained in the *Energy Conservation in Agriculture* publication series, available from Cooperative Extension Publications at <http://cecommerce.uwex.edu>.



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