

CASE STUDY—VARIABLE SPEED DRIVE • SCROLL COMPRESSOR

Farm Energy Audit Program (FEAP)

U. S. Dairy Sustainability
Commitment



Quick Facts

- Scroll compressors deliver significant energy-use reductions — one study from the University of Vermont found that a 3-hp scroll compressor used 41 percent less electricity than a 3-hp reciprocating compressor. They also work well in cool weather and can start under any system load.

Source: EnSave, Inc.

- A milk pump variable speed drive can cut electricity usage up to 67 percent.

Source: EnSave, Inc.

- A typical energy audit includes a phone interview and a two-hour farm visit. The farm provides one year's worth of energy-use information prior to the audit and receives a detailed audit report and recommendations in six to eight weeks.

Tools and Resources

- Federal incentives may be available through the USDA's Renewable Energy & Energy Efficiency Program (Section 9006 of the Farm Bill), now called the Rural Energy for America Program. Visit www.rurdev.usda.gov/rbs/farmbill/index.html.
- Some audit programs offer reimbursements and energy savings incentives if recommendations are implemented. Check with EnSave about opportunities available in your area.

New York dairy farm continues 219-year history of leadership through energy upgrades.

Otsquago View Farms in Fort Plains, N.Y., has been in the same family since 1790. The operation has always taken a visionary approach to farming, leading the way with innovations that later became industry standards. It was among the first to install a harvester feeding system in the 1950s and convert to free-stall barns in the 1960s. So when owners Craig and Linda Stevens began to look at ways to operate more cost-effectively, they were open to new ideas. They also knew that some of their electrical systems were adequate but aging, making energy use an area where upgrades could make a big difference, economically and environmentally.

The Stevens worked with energy efficiency experts at EnSave, Inc., starting with an in-depth interview to determine their specific objectives and learn more about their farm. Then the EnSave team surveyed the entire operation — a 120-cow farm producing 1,825,000 pounds of fluid milk each year. They gathered information about energy usage at every point on the farm, including heating and cooling, water heating, compressors, lighting and ventilation systems.

The final energy audit report revealed areas where equipment upgrades would deliver a substantial energy savings and return on investment. The Stevens used the detailed information from the energy assessment to secure a New York energy program incentive administered by EnSave and short-term financing for two major upgrades.

Best practice: Install scroll compressors.

Refrigeration is one of the most energy-intensive systems on any dairy farm. Scroll compressors use dual spinning coils to compress refrigerant, providing continuous, pulse-free compressor operation without the need for mechanical valves. As a result, scroll compressors use less energy and operate more quietly than traditional reciprocating-type compressors. They also require fewer moving parts and have no metal-on-metal contact, increasing system life and reliability. The Stevens have seen a significant reduction in overall maintenance costs since installing the new system.

Best practice: Add a milking vacuum pump variable speed drive.

A variable speed drive allows the milking vacuum pump motor to run more efficiently based on actual (rather than maximum) vacuum requirements. More efficient motor operation may help extend equipment life, lowering repair and replacement costs over time. This improvement allowed the Stevens to dramatically increase the energy efficiency of their milking parlor with no loss of productivity. The on-demand vacuum flow also makes the cows much more comfortable.

Key Benefits

Energy savings — The combination of upgrades at Otsquago View Farms has produced energy savings of nearly \$1,600 per year, based on a reduction of 13,200 kWh of electricity use at a cost of \$0.12 per kWh. They also received a one-time incentive of \$4,100 for the installation of energy-efficient equipment through the New York Dairy Development Energy Program (administered by EnSave), in partnership with the Economic Development Program of Niagara Mohawk (a National Grid company).*

Payback — The farm will realize a complete payback in 8 years. This figure includes energy savings plus incentives listed above.

Greenhouse gas (GHG) reduction — The savings in electricity use from the improvements is equivalent to 10,127 pounds of CO₂ per year. This equals the amount of CO₂ emissions from 521 gallons of consumed gasoline. Sources: EPA Power Profiler (www.epa.gov/cleanenergy/energy-and-you/how-clean.html) and EPA Greenhouse Gas Equivalencies Calculator (<http://www.epa.gov/RDEE/energy-resources/calculator.html>).

Reduced maintenance and manpower costs — The combined upgrades have reduced maintenance costs by 65 percent to 75 percent, while also reducing the labor needed to maintain peak productivity.

Other benefits — The energy assessment revealed simple procedure changes to reduce utility costs. Specifically, the Stevens are now more aware of time-of-use electricity charges, and have made process adjustments to take advantage of lower costs at nonpeak energy-use times.

Energy audit provided smart options for energy and utility cost savings.

Challenge area: Balancing investment with payback.

The Stevens feel that information is key to helping American dairy producers stay viable by reducing operating costs and the environmental impact on their communities. The operation-specific data from the energy assessment helped them choose viable upgrades and update procedures for energy efficiency and cost savings. The energy audit report also helped them secure an incentive and the short-term financing they needed to cover up-front equipment upgrade costs.

Plant profile: Otsquago View Farms

Otsquago View Farms is a dairy farm located in Fort Plains, N.Y., with 120 cows producing 1,825,000 pounds of fluid milk annually. Owners Craig and Linda Stevens have been farming for more than 30 years, and the farm has been operating in the same family since 1790. The farm has a history of being “early adopters” of improvements that make the entire dairy industry more viable and sustainable.

Financial Information

Investment	\$16,700
System includes	Two scroll compressors • Milking vacuum pump variable speed drive
Offsetting incentives	\$4,100 New York Dairy Development Energy Program in partnership with the Economic Development Program of Niagara Mohawk (a National Grid company)**
Payback period	8 years, including incentives and annual energy savings of 13,200 kWh at an estimated cost of \$0.12/kWh
Additional savings	Reduced maintenance costs by 65 percent to 75 percent

*Energy cost savings were calculated at the time of project completion, based upon the regional cost of energy for the farm's location. Energy costs may fluctuate over time and by geographic region.

**State and federal incentives will vary by farm.

The Farm Energy Audit Program (FEAP) identifies effective agricultural energy efficiency programs, educates the dairy industry on the benefit of energy audits, and helps dairy producers access resources and incentives to complete an energy audit. FEAP is one of 12 projects identified by the Innovation Center for U.S. Dairy sustainability initiative that aims to help reduce greenhouse gas emissions and increase business value across the dairy industry.

This is one of a series of validated case studies that has been proven to be economically viable for dairy producers. Together, these case studies help identify energy efficiency opportunities and best management methods for improving efficiency and lowering costs. For more information about the program or to join our mailing list, e-mail innovationcenter@rosedmi.com.

The Innovation Center for U.S. Dairy aligns the collective resources of the dairy industry to offer consumers nutritious dairy products and ingredients, and promote the health of people, communities, the planet and the industry.