Dairy Energy Efficiency: Dairy Cooperative Partnerships for Improved Energy Efficiency Program Adoption

According to the Midwest Dairy Association, Minnesota is the eighth largest milk-producing state in the United States, and dairy products are the fourth largest agricultural commodity in Minnesota. [1]A typical dairy farm uses between 400 and 1,700 kWh of electricity per cow annually, making dairy farms a significant opportunity for efficiency improvements. However, the myriad types and sizes of dairies, combined with the wide geographic distribution and limited time and resources of most farmers, has made it difficult for utility efficiency programming to access this specific population on a regular, formalized basis.

With funding from a CARD grant, the Minnesota Project[2] and GDS Associates tested an innovative programmatic approach to deliver energy saving measures to Minnesota's dairy community. They partnered with Hastings Cooperative Creamery Company to leverage the milk cooperative's network and gain direct access to producers in order to promote improved efficiency programming designed specifically for dairy operations and to collaborate with electric utilities, U.S. Department of Agriculture (USDA) agents, and equipment suppliers.

Figure 1: One of the dairy farms included in the study. (Photo courtesy of Fritz Ebinger at Clean Energy Resources Teams)

Hastings Creamery field staff and milk haulers voluntarily collected data from milk cooperative member dairies about on-farm energy practices and equipment in use through a dairy energy survey designed by the project team. Using the survey data, the project team selected 30 dairies with significant energy savings potential and conducted on-farm energy audits to pinpoint energy savings opportunities. Additionally, the project team developed a dairy energy benchmarking tool for Minnesota dairies statewide to compare their energy use with the industry standard.

The milk cooperative strategy was very effective at gathering relevant data to better target energy efficiency efforts for dairies. Partnering with Hastings Creamery facilitated access to cooperative member dairies that otherwise would have been difficult to achieve as "outsider" organizations. In particular, dairy cooperative field officer and milk hauler participation was advantageous because of the familiarity the Hastings Creamery staff members have with member dairy farms and their shared interests in profitable operations.

The geography of the milk cooperative partnership presented a challenge. Hastings Creamery dairy farms were spread across five electric utilities, six counties, and seven USDA service offices. Bringing together this number of entities and programs was a temporal and organizational challenge. Given the breadth of the geography, there was less peer-to-peer dairy farm communication than initially anticipated.

Nonetheless, the project identified a variety of recommendations (Table 1). The recommendation with the most aggressive payback, savings, and applicability were lighting upgrades/retrofits. Other good recommendations in terms of payback and applicability included water heater upgrades or retrofits, variable

speed drives on receiver jar pumps, and refrigeration heat recovery. Among other findings, the project team found many dairies were hesitant to upgrade equipment due to uncertainty about the dairy market, possible dairy expansion, and farm transition planning.

Table 1: Estimated Savings from Recommended Measures

Measure	**# Farms Applicable**	**Savings (kWh)**		**Payback (Years)**	
		Mean	**Median**	**Mean**	**Median**
Lighting Upgrades/ Retrofits	29	7,081	4,589	3.3	2.2
Water Heater Upgrades/ Retrofits	19	7,486	4,286	6.2	5.6
Variable Speed Drives on Receiver Jar Pump	10	5,111	4,866	6.6	6.8
Refrigeration					
Heat Recovery	11	3,571	0	7.8	8.5
Ventilation Upgrades/ Retrofits	4	3,339	2,335	9.5	6.2
Plate Cooler					
Installations	4	3,642	3,930	9.5	8.8
Variable Speed Drives on Vacuum Pumps	18	6,079	5,979	14.2	9.2
Scroll-Type Refrigeration Compressors	11	2,198	2,195	24.7	15.0

Overall, the milk cooperative strategy is an important first step in serving Minnesota's dairy industry. The strategy could see more success by limiting a campaign's scope to a specific electric utility territory and setting aside resources and training for milk cooperative field staff to discuss energy efficiency with utility staff in order to target dairies most in need of energy conservation. To the extent electric utility staff can coordinate directly with dairy cooperative staff to address upfront technology costs through conservation improvement program rebates or USDA program funding, electric utilities should see an increase in dairy farm participation in conservation improvement programming.

For more details on this project, download a copy of the final report "Dairy Energy Efficiency: Dairy Cooperative Partnerships for Improved Energy Efficiency Program Adoption" (pdf) The Dairy Energy Benchmarking Tool is available for download on the CERTs (Clean Energy Resource Teams) website. For more information, contact

project manager Laura Silver or CARD program administrator Mary Sue Lobenstein.

References

[1]Midwest Dairy Association, "Dairy in the Midwest", accessed March 10, 2016.

[2] The Minnesota Project is no longer in business. However, the Clean Energy Resource Teams (CERTs) has a Rural Energy Development Program that works with agricultural producers.