

Ohio State University Extension On-Farm Energy Demand Monitoring Project

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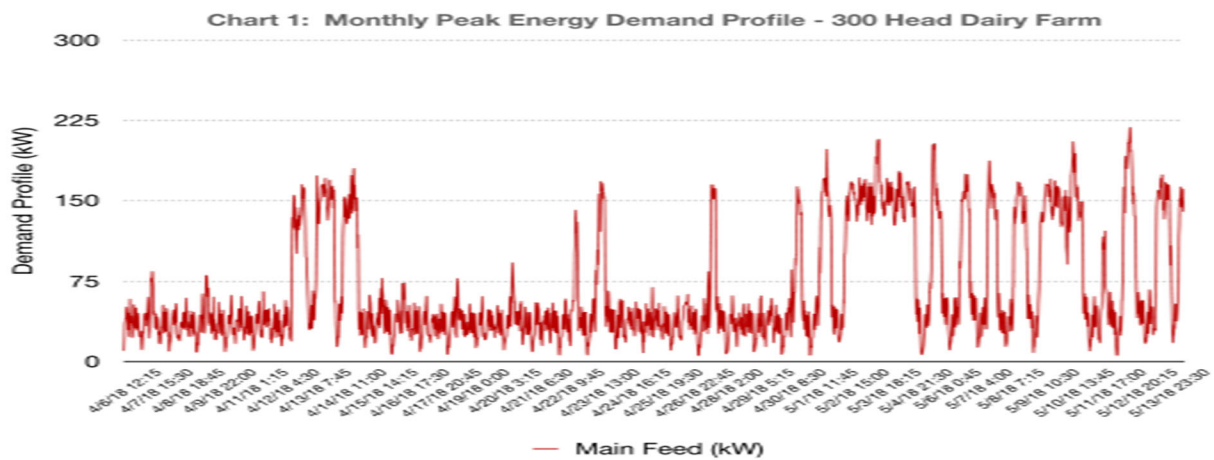
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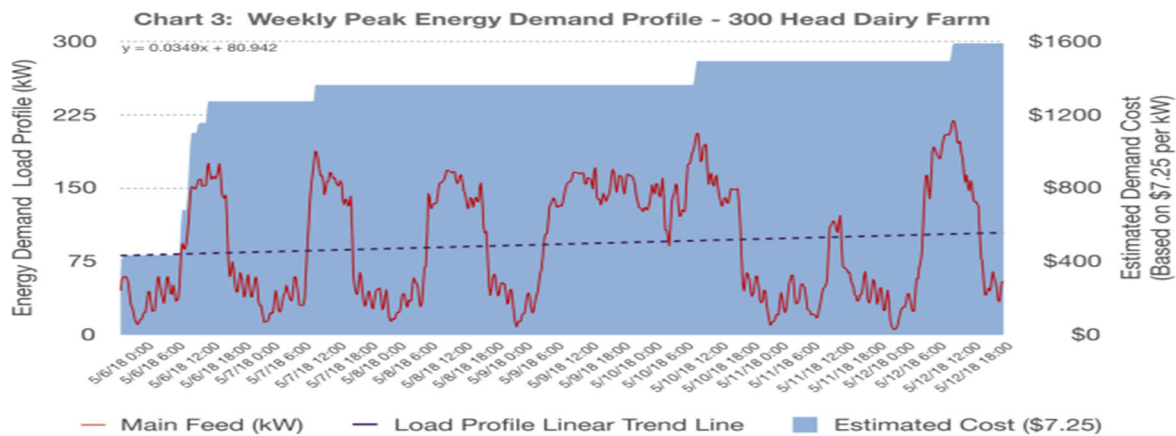
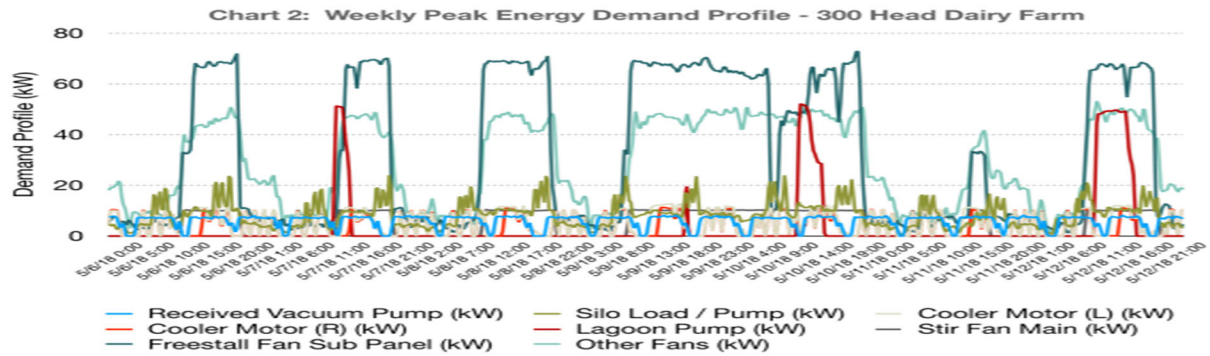
Greater automation on farms has resulted in an increase in energy consumption on many farms. Due to increased electrical usage, many farms are now billed on a commercial rate structure. Unlike residential rates, which are based primarily on total energy usage measured in kilowatt hours (kWh), commercial accounts are also charged for the highest peak demand usage spike over a short time period measured in kilowatts (kW).

Ohio State University Extension secured grant funding to investigate how peak energy demand affects livestock facilities and, in turn, the manner by which farmers can implement energy management strategies, and make investments in equipment to minimize costs and promote long-term sustainability. We have equipment installed on six university and/or private swine and dairy farms across the state. Monitoring equipment installation was finalized earlier this year and we have begun collecting data from each cooperating farm. OSU Extension personnel involved in the project include Eric Romich, Tim Barnes, Rory Lewandowski, Eric Richer, Dale Ricker, and Chris Zoller.

While we have not collected enough data to make any specific recommendations, we have a few months of data collected that has provided us the opportunity to make sure our monitoring equipment is functioning properly. As data is collected, it is shared with faculty and students in the Ohio State University College of Computer and Electrical Engineering. Students and faculty in the college analyze the data to develop a model that will help us interpret the findings.

Below is a sample of data collected from a dairy farm participating in the on-farm research.





Observations

Many farmers are aware if they are on a demand rate. However, fewer farmers fully understand the details of how their demand charges are calculated including monthly measured demand formulas, power factor correction penalties, and if they are charged a minimum monthly demand based on seasonal spikes. These specific electric rate details greatly influence possible solution strategies.

Based on the preliminary data, there appears to be some motor loads that can be shifted (load shifting) to perform work during times when other critical motor loads are idle, thus reducing demand charges. Ultimately, energy management strategies to reduce demand cost will likely include a mixture of energy conservation, energy efficiency technologies, programmable logic controls and timers to preform load shifting, and possible on-site electric generation.

Summary

Obviously, farmers are interested in ways to reduce energy operational cost. However, before making investments in energy efficiency and renewable energy equipment, it is important to understand how you are charged for electricity. Some farms are still on residential electric rate tariffs and their bills are relatively easy to understand. However, because farms are using more electric, many farms are now on commercial electric rate tariffs that are more complex. Taking the time to investigate your rate tariff and analyze your consumption patterns will help you prioritize potential energy savings solutions, providing you the greatest return on your investment.