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Manure Management Program

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PRO-DAIRY

Fact Sheet: Understanding Metered Demand in New York State

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Introduction

When dairy farms were small, most farmers did not know what a demand charge was. Today, modern dairy farms are larger users of electricity and as such, they have now become subject to demand charges on their utility bills. Demand charges in electric utility bills can be substantial, motivating dairy farm owners to understand what it is and how best to manage it.

What is demand?

A commercial customer's bill, as compared to a residential customer, is separated into *consumption charges* and *demand charges*. The consumption charge is related to how much electricity the dairy farm used during the billing period, or kilowatt-hours (kWh). The demand charge is a function of the cost to supply the peak amount of power to the dairy farm, in kilowatts (kW).

Demand charges cover the cost of a utility's extra equipment and capacity built into the generation, transmission and distribution systems to supply the peak power needs of each commercial and industrial customer, in this case, each dairy farm. Because of the fact that electricity cannot be easily stored, utilities need to have enough extra capacity in their generators, transmission lines, substations, distribution lines and transformers to handle the call for extra power when you turn on a 25 hp motor or any large device.

When does a utility measure demand?

Demand billing for a dairy farm usually begins when the customer has exceeded a certain threshold of use in kWh for several consecutive billing periods. Many utilities set this threshold at 2,000-kWh during a month although this can vary amongst utilities. For instance, one utility will install a demand meter for any customer whose energy use exceeds 2,000-kWh for four consecutive months. When a new service is installed and the known loads are expected to consume more than 2,000-kWh/month, a demand meter and billing will be required from the onset.

Once the dairy farm has a demand meter, they will be subject to a demand charge until their energy use drops below 2,000-kWh for a period of 12 consecutive months. Temporarily terminating a service will not eliminate the demand billing.

Why does a utility measure demand?

As previously mentioned, the demand charge exists to compensate a utility for the extra capacity it builds into the system to supply the occasional needs of their customers. If every utility customer had a consistent electrical load, the utility would be able to precisely design its system for that amount of load. Unfortunately, this is not the case.

The electric needs on a dairy farm vary by the hour each day as it does with most other large customers. As a result, the utility has to make sure it builds big enough power line capacities to carry the average loads as well as to have ample reserve to supply any amount of power needed at the moment anyone flicks a switch or pushes a button.

When you pay your demand charge you are compensating the utility for that extra investment. The demand charge that is spread amongst all commercial and industrial customers helps to pay for the convenience of having the power you need whenever you want it.

How is demand measured?

Once the utility determines that a dairy farm requires demand metering, it will replace the standard kWh meter with one that will measure both kWh as well as the kW demand. The demand portion of the new meter will measure the highest average kW required during a 15-minute interval. This average will remain as the highest demand for the billing period until such time that a higher demand occurs. The new reading then remains until it is exceeded by an even higher peak. When the meter is read at the end of the billing period, this peak power will be recorded for the bill and the demand will be reset to zero. The cycle will repeat itself in the next billing period.

As an example, imagine a dairy farm that has several large electric motors that are used periodically for various purposes. Additionally, the dairy farm has a fairly constant load of about 40-kW for milk cooling, lighting, vacuum pumps etc. During the month, the 40-kW will register as the base demand. Now, if there are two large motors of 15-kW and 25-kW that are run from time to time for at least fifteen minutes, their load would add to the baseline. If the two motors ran at different times, the 25-kW motor would raise the demand from 40-kW to 65-kW even when the 15-kW motor ran many times during the month.

When the 15-kW motor operated, it raised the demand from 40-kW to 55-kW and set the new peak. However, once the 25-kW motor came on line for 15 minutes, it pushed the demand beyond 55-kW setting the new high at 65-kW. As long as both motors don't operate during the same 15-minute period the demand will only be 65-kW. If for some reason, both motors ran during the same 15-minute interval, the peak demand would reach 80-kW (40-kW + 15-kW + 25-kW = 80-kW). Remember: a demand peak needs to occur only once during the month for you to be billed for it!

How does demand affect your electric bill?

The demand charge is computed each month based on the maximum peak power used during the month. On average, the demand charge per kW for utilities in upstate NY is approximately $10/kW (Check with your local utility for your rate). In our example given above, when the dairy farm has a demand of 55-kW, they will pay a demand charge of $550. When it is 60-kW, $600. When it is 80-kW, $800. Demand charges can add up quickly: an average monthly demand of 80-kW will cost approximately $9,600 each year. Demand charges are <u>in addition</u> to the energy consumed during the same billing period.

Can on-site generation (OSG) eliminate your demand charge?

Probably not, but it can most likely lower your total demand. Having anaerobic digester fueled OSG can offset some or most of the dairy farm's power demand. However, if the generation system is halted for maintenance or goes off-line for any reason, the dairy operation will continue to need power. It is during these times that the peak demand for the month will be set.

A dairy farm can minimize this impact by planning OSG maintenance during light load periods. Also, when the generation system is off line, minimize the use of any large loads where possible. Unplanned outages can be a challenge.

Can the customer mange their demand?

Yes, to a certain extent. Understanding how demand charges work helps owners in managing the impact on their dairy farm's electric bill.

Every dairy farm has its own unique energy use pattern that is based on how you run your operation. The base load reflects the equipment that operates pretty much constantly each day. Other things operate for certain durations at specific times during the day adding to these base loads. Large occasional loads that may not operate daily can add to a peak.

Here is a suggested way to minimize your peak demand:

1. Create a list of all the equipment and respective loads, used to support your dairy operation (this includes lighting, fans, water heaters, compressors, vacuum pumps, etc);
- Determine which loads you consider baseline loads, which are intermittent but regularly used and which are irregularly used for special operations;
- For baseline loads be sure that these devices are energy efficient; always replace failed equipment with high efficiency replacements;
- For intermittent loads, determine the operating periods and when they operate; which ones operate during the same time interval?
- Once intermittent loads are known, consider if they can be staggered to operate when other large intermittent loads are not operating and change the pattern of operation.
- For large special loads used only from time to time, consider operating these at low load periods when other large loads are not operational.
- Consider interlocking controls for equipment that does not need to operate at the same time to only allow one piece of equipment to operate at a given time.

Demand charges, if they are well understood and managed, can be reduced so that dairy farmers end up potentially paying less than previously planned.