

Fact Sheet: Evaluating the Need to Consolidate Farm Electric Services

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Introduction

Most farm operations grow over time. New equipment is added and new buildings are constructed to meet the increased needs and size of the operation. Each physical expansion usually results in an addition to the farm's electrical needs. In some cases, new buildings are serviced by extending the connections from the existing electrical system while in others, they are met by installation of an additional electrical service from the utility.

Each new service adds another meter and bill to the farm, in addition to the original service. If you feel that you have too many separate utility bills for your farm operation, or you contemplate the addition of on-site generation fueled by biogas from anaerobic digestion, it may be time to consider consolidating the electric services into one single large service.

What are the benefits of consolidating?

Service Charges - Each metered service has a basic service charge that utilities bill for that service. This charge is above and beyond the energy and delivery charges that are a function of use. If all the power goes through one meter, as a result of consolidation, there is only one service charge. For those with multiple meters, there are multiple service charges that can add up to a significant dollar amount over time.

Demand Charges - Another utility bill cost component is the demand charge. Many of today's farms are large users of electricity and utilities meter farms using a demand meter that measures the highest average kilowatt demand in a 15-minute period for a billing period. A farm with several demand-metered services will have monthly bills that show charges for the demand of each service. In a consolidated service, there would be a single demand charge. If two or three smaller demand metered services were combined into a single large service, there is a potential to save on the demand charges. This is mainly because of the way demand is measured on a time basis. As a simplistic example, if a farm were to have three motors with demands of 25-kW, 15-kW and 10-kW on three separate demand metered services and these motors operated at different times for a minimum period of 15 minutes each month, there would be demand charges of 25, 15, and 10-kW on the three bills, ...or a total of 50-kW for the three.

If those three motors were on one single large service and they were operated at different times during the same billing period as opposed to operating them all at the same time, the largest demand registered would be for the 25-kW motor. The demand charge would then be for 25-kW instead of 50-kW, and would yield a substantial savings of around \$250 per month. If they all operated at the same time, the farm would not see any savings, as the total demand would be 50-kW. Where possible, staggering of large loads connected to a single meter can help to reduce demand costs.

What is the downside to consolidating services?

In most cases, it's the cost of installing the new system. Large services are costly to install and require the use of professional electrical contractors. Electrical code requirements dictate what can and cannot be done. It's also difficult to overcome the "if it isn't broke...don't fix it" mentality that goes along with an existing system that is working fine. However, long-term savings, greater efficiency and improved electrical safety can offset the capital costs over time.

What limits the ability to consolidate services?

The biggest issue is the physical distance between the buildings being served. Electricity needs to reach the farthest ends of the distribution system at a voltage that will allow safe and efficient operation of the connected device, since low voltage can destroy equipment. A knowledgeable commercial electrical contractor can help with this determination.

A part of this evaluation may involve looking at three-phase power on the site, if it is available, as well as transitioning to a higher utilization voltage such as 277/480 volts compared to the standard 120/240 volts single-phase applications. The higher utilization voltage allows the electricity to travel longer distances without significant losses. Using three-phase power also allows for lower starting currents in large motors.

Some farms may be limited to the use of single-phase power due to the limitations of the existing power distribution grid in the area. If a farm has a definite interest in gaining three-phase power, it is advisable to discuss their interest and needs with their utility representative to determine if there are plans to extend three-phase power to their area and what costs might be involved.

Where it is not economically viable to use three-phase power, large single-phase services are a possibility, the limiting factors being the distances and size of the loads. A knowledgeable electrical contractor would be helpful in making a determination.

On-site Generation and Emergency Generation

- **Does on-site generation require consolidated service?**

While it is not a requirement of on-site generation (OSG), such as operating a biogas-fired engine-generator set, to have a consolidated service, farm utilization of the energy produced by the system is made much simpler. All of the power produced can be supplied to the connected loads and any excess power can flow back to the grid.

For instance, take a farm with 150-kW of load distributed equally between three services. If there is 150-kW of OSG generation connected to one of the services, 100-kW of the OSG energy will be necessary to send back to the grid. While the 100-kW will need to be purchased by the utility for use by the other two meters, the price will be less than the retail cost that will be paid by the farmer to the utility.

Additionally, if the OSG is net-metered, when the on-farm load drops below the output of the generation system, the energy delivered to the grid is banked for the customer and can be applied when the total farm use exceeds generation during a given month. This allows the energy to be returned to the farm at full retail value.

- **Emergency generation interconnection is simplified with a consolidated service**

While the utility grid supply is generally very reliable, storms and other causes can leave a farm without power for extended periods. Many farms have some form of emergency power to supply key loads such as milking equipment, water pumping, fans and milk cooling.

When the farm electrical service is supplied from a single source, emergency power during utility outages can be supplied easily to any part of the farm supplied by the service without resorting to unsafe practices. A double throw switch installed after the utility metering can safely and easily switch the system to the auxiliary source, whether it is permanently installed or portable.

The larger the dairy operation, the more critical it becomes to have an emergency power source available.

Conclusion

If you are considering a service consolidation and upgrade, some key steps to remember include:

- Collect and analyze service bills for services in consideration and determine total annual costs;
- Create a scaled plot plan that locates buildings, services and major electrical loads with approximate distances;
- Add in planned or possible additions (near-term) and future growth plans (long-term);
- Meet with one or more commercial electrical contractors to discuss the project and develop budgetary cost estimates;
- Meet with a utility representative to discuss available services/rates and any associated one-time costs to deliver them. Project annual operating costs with the new service; and
- Review all information and knowledge gained through the process to understand the overall costs and benefits to the farm operation and reach a decision on how to proceed.

No two farms will have the same answers because of the uniqueness of each farm and its operation. Decisions will be based on individual priorities and values returned.