Reducing your Electric Bill, Part I

Use less energy, make the best use of the energy you buy

As the electrical power and distribution industry is deregulated over the next decade, some feed milling operations could benefit from the increased competition. Utilities will target industrial customers as preferred customers because of the volume of power that they use. Many may offer loss leaders and special incentives to switch suppliers.

Different states are at different stages in the deregulation process, and in many states, it's still in the talking stages. However, you don't have to wait another 10 years to reduce your energy costs. There are a variety of things you can do to take control of your electric bill today.

A typical bill you receive every month from your electric utility has three components:

- **Energy cost:** the price of the actual kilowatt hours of electricity that you used.
- **Demand cost:** a charge that covers energy usages in quantities and at times less than convenient for the electrical utility.
- **Power factor:** a surcharge added by power companies to cover the cost of having the infrastructure in place to provide uncorrected inductive loads.

Energy costs

In many ways, the energy cost is the easiest portion of your bill to understand and get a handle on. However, it still takes some effort and expense. Here are some ways to reduce that cost:

1) Use high-efficiency motors. The tradeoff here is between higher initial cost and a reduced power bill over the long run. Remember, when you switch on a high-efficiency motor, it has a higher inrush current, which could affect existing starters, heaters, fuses, and circuit breakers. High-efficiency motors are most likely to pay off in situations when the motor is relatively heavily loaded and is used regularly. It is likely to become a standard choice as this motor design becomes more accepted and the cost drops over time.

2) Consider Design E motors. The latest development in premium high-efficiency motors, these units may require you to install a larger starter and possibly a larger wire. The National Electric Code requires a starter serving a Design E motor to be rated specifically for that design or to be sized for a motor horsepower up to 1.4 times the motor's rating. The same tradeoff exists for high initial cost vs. long-term energy savings.

3) Install solid-state starters. These provide a good tradeoff versus reduced voltage autotransformer starters on large motors. Some models may have limited available torque. Solid-state starters provide a smooth acceleration ramp, with reduced stress on the driven machine. They have no moving or arching parts to wear out or replace. Some models have circuitry originally developed by NASA for the space program that reduce power required when operating under light load. Technical assistance may be required for satisfactory installation.

4) Variable-frequency drives. These allow machines to operate their optimum speed for peak efficiency and for continuous adjustment of speed by automatic control systems. The latest designs must be properly installed to avoid premature motor failure, and proper installation usually requires some accessories. Variable-frequency drives may introduce harmonic currents that could be harmful to the rest of the plant; accessories are available to control this. These drives also are susceptible to voltage surges, and some sort of surge protection is required.

5) Install energy-efficient lighting. High-pressure sodium lights provide the most light per unit of electricity. Their golden color, however, makes colors inside the plant harder to identify, they have long lamp life and relatively high tolerance for vibration.

Metal halide lamps are a slightly less efficient light source than high-pressure sodium and have a slightly shorter life. However, they give off a white light that does not distort color.

With fluorescent lighting, you'll get the most savings from using T8 lamps with electronic ballast. However, these are not very practical for use in hazardous areas.

Demand costs

Controlling the demand charges on your electric bill isn't a matter so much of the equipment you select but how you schedule its usage. For example, starting a pellet mill takes a big surge of energy, but that's not as important as how hard you work the machine over any given period of time that the electrical utility uses to measure your overall use.

For example, say you have the capacity to produce 120 tons of feed per day. You could produce the feed over a single 1-hour shift or over a 24-hour period. However, the electrical demand cost of producing the feed in a single shift is more than three times the cost of producing it round the clock, the tradeoff - the cost of running three shifts versus one shift.

This article is the first in a series based on a presentation by Darrel Ramhorst, P.E. It appeared in the May /June issue of GJ (Grain Journal) and is reprinted here with permission from the publisher.

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