Cool Concepts

For Industrial Refrigeration Systems

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Energy Savings — The Big Secret

One of the more interesting predicaments to solve with refrigeration systems is the subject of energy management. There are multiple considerations to ponder.

Some of these concerns are related to the actual refrigeration system operation and use. Others are concerned with energy costs and the frustration of trying to determine the actual charges you are responsible for.

The electric bills usually have all sorts of interesting line items and descriptions for various charges such as On-Peak, Off-Peak, Energy, Demand, Load Factor, transformer charges, taxes, etc. The way you are charged for electricity is based on a *rate sheet* called a tariff.

Wikipedia defines a tariff as, *a schedule of prices or terms of how a product is sold, as in an electricity tariff published by an electric utility or electricity retailer. This would typically list the prices (or rates) for various services or components of the service such as: the service charge, time of use energy (kWh) charges and, for demand, (kW) charges.*

These tariffs are available from your local utility and can be obtained by simply requesting a copy of the applicable sheets.

In order to understand energy savings you first have to consider how you are paying for the electricity to power your refrigeration system.

"The way you are charged for electricity is based on a *rate sheet* called a tariff."

And, somewhat just as important is, *how are you using your system?*

These should be the first steps to understand before undertaking any modification to the system or simply adding control systems.

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By trying to decipher the tariffs, you will find that you may be charged higher costs for electricity use during the day, rather than the evening hours.

This may be advantageous to a cold storage facility as they may be able to shut off the refrigeration system during the daytime (*on-peak*) hours.

This would then permit the operation of the system in the *off-peak* period where less expensive energy is available.

Learn how your energy is being used. Look for these specific items:

- Energy use (kWh)
- Demand charges (kW)
- Load factors (%)
- Power factor (%)
- On-peak & Off-peak time (hours)
- Weather variation between On-peak & Off-peak hours
- Facility use (production or storage)
- Specific rate tariff in effect for your facility
- Capability to shift loads to Off-peak hours
- Basic refrigeration system operation

A secondary consideration is the difference in weather conditions during the evening off-peak hours.

The wet bulb temperatures are generally a few degrees lower in the evening hours. This could allow the discharge pressure to be lowered during this time to save additional demand charges (kW).

Conversely, if the facility is used for production cooling/freezing operations then the electricity costs will be determined by the time-of-use (*on-peak* or *off-peak*).

In other words, a production facility is constrained by the requirement to meet the cooling/freezing demand when required.

How are you using your system? is a question that has two meanings. One relates to how the facility is used; cold storage or production? The second meaning is conceptually different and is intended to question how efficiently you use electricity.

Systems that require much higher demand (kW) and less energy (kWh) are typically less efficient than a system using lower demand and higher amounts of energy.

Energy savings is a compound and complex subject. We not only have to understand how to reduce the input power required by the refrigeration system, but also how the power is billed to you.

A coordinated effort in both areas can produce positive results.