By Stewart Kasper, KRWA Energy Assessment Coordinator

How to Conduct an Energy Efficiency Assessment for a Utility

According to the US Bureau for Labor and Statistics, prices for electricity are 90.28 percent higher than 20 years ago in 2003. It's no wonder utilities are trying to do much more with tighter budgets than ever. Systems are often left with only a few options: 1) reduce production costs, and the other; 2) increase rates. No one wants to raise rates, much to the disbelief of customers that such is never the first goal. The costs of chemicals for treatment have increased, wages are increasing with the ever-present demand for great employees at what seems to be an all-time high in employee turnover – and the number of regulations and requirements placed on utilities have never been greater. So where can utilities save some money? One way is to reduce their energy costs. The best way to determine how to do that is by conducting an assessment of the utility's energy use.

Often, an energy assessment is a top-down approach. This is achieved by simply reviewing the energy bills for a given utility. Looking at an entire water or wastewater plant on one monthly statement does not provide a finite detail of what is going on with the system, but it does give a very broad idea of how that system is using the energy. Looking at several years of usage and graphing that data, trends become evident. For example, higher electrical usage could be expected in a water treatment plant during the summer months as the demand for water increases. More electrical use is typical in a wastewater plant in springtime when rainfall is at its highest. When utility operators and owners understand when the greatest amount of energy is being used, other aspects of the electrical billing can be reviewed. I've written an article on how to read an electrical bill. That article is printed in the November 2022 issue of *The Lifeline* at this link: https://krwa.net/portals/krwa/lifeline/2211/UnderstandingYourElectricBill.pdf

Start with low-hanging fruit

When KRWA begins an energy use assessment, the first step is usually completed offsite. It takes time to obtain the electrical utility billing and the billings interpreted. Typically, two to three years of energy bills is necessary to get a good baseline to start off with.

Once all the data is compiled, the next step is to conduct an onsite inspection of the utility. Don't worry; inspection is not a dirty word here. KRWA is not a regulatory agency. Suppose the energy assessment finds a major issue that poses a significant safety hazard. In that case, KRWA will advise the utility operators and owners and explain how important it is to remedy the issue – and why. The onsite inspection is typically completed with the lead operator or supervisor of the facility. At this time, we begin to get more details on how the water or wastewater system uses electricity.

Electrical lighting is a significant use of energy in many utilities. Lighting should be reviewed to make sure it is the most cost-efficient form. LED bulbs are more cost-efficient than

Understanding electrical "demand charges"

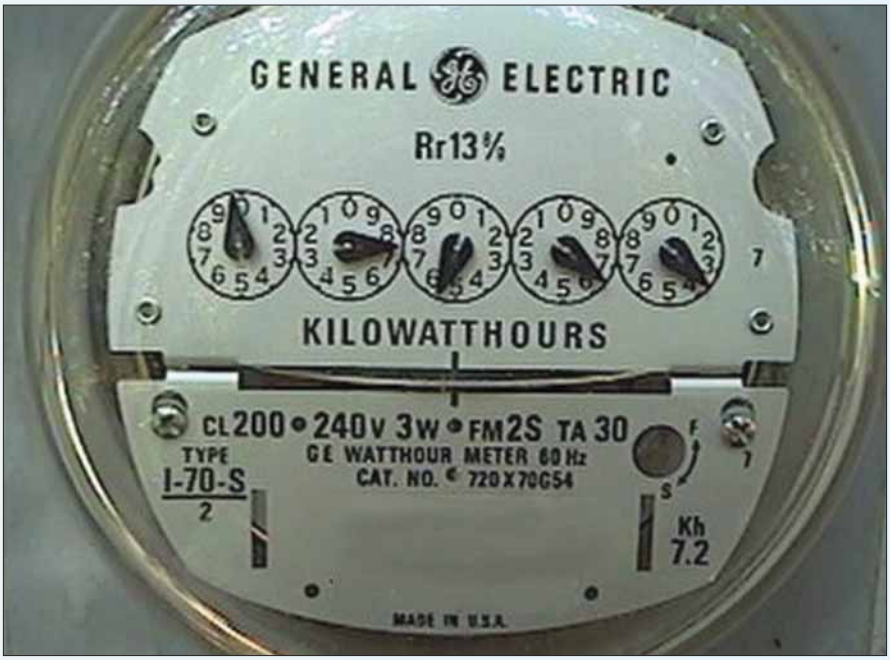
Most utilities are charged a demand fee by their power supplier. This charge is the electrical utility calculating the peak amount of electricity the customer used over a defined period of time. That time period is dependent on the electrical utility. This peak demand from a customer means that at a given time, the electrical utility must be able to provide electricity to all of its customers' peak load at any time. This charge helps to maintain contracts and utility infrastructure to deliver that amount of electrical supply. The demand charge also provides an incentive to customers to control their demand rate. This can be achieved in various ways.

Some electrical utilities vary their rate based on the time of day (time of use charges), usually charging higher rates during peak time. **Consequently, for water and wastewater systems, the peak time for electricity often coincides with the peak time for the water and wastewater system.** That time is typically in the late afternoon, after 3:00 p.m. until 7:00 p.m. Often, the best way to avoid the high rates of peak demand is to utilize storage capacity in the water and wastewater system and try to have storage tanks full and wastewater lift station wells empty before the peak demand charges kick in.

standard incandescent lights. However, if the lights in a particular room are only turned on for an hour or two a day, the replacement cost of a good working bulb does not compute with the savings associated with that replacement.

Stop heating water in the clarifier room

The energy assessment will also review the heating and cooling in structures. When rooms or buildings are not continuously occupied, then there is no need to keep that room at a constant and comfortable temperature year-round. I especially find this true in water treatment filter rooms in the winter, when water constantly flows through the room at a brisk 40-degree Fahrenheit, then that heater must continuously run if the goal is to maintain a 65-degree space. Turn the thermostat down so nothing in the room will freeze. Operators should just wear a jacket in that part of the facility. That one change can reduce electrical charges by thousands of dollars annually.



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Energy Efficiency Program
Fact Sheet

General Information

KRWA's Energy Efficiency Technical Assistance Program is designed to promote energy efficient practices in small water and wastewater systems. Funded through a grant from the U.S. Department of Agriculture Rural Utilities Service and a contract administered through the National Rural Water Association to KRWA, the program performs energy assessments, recommends energy efficient practices and technologies, and provides support in following recommendations. Technical support includes assisting with presentations to cities, rural water districts and others to access financing, training, and developing documentation. KRWA has partnered with Energy Solutions Professionals, Overland Park, Kansas, to provide the most credible energy use assessments possible.

What does an Energy Efficiency Assessment Include?

EEA identifies opportunities to improve efficiency of equipment and operations that could result in cost savings. Things we look at on-site include, but are not limited to the following:

- Equipment age and efficiency
- Energy billing
- Building insulation, HVAC, thermostats, and lighting
- Operational changes

How to Get Started

Are you ready to see how your utility can start saving money? Contact Stewart Kasper, KRWA's Energy Assessment Coordinator for more information or to request your Energy Efficiency Assessment.

Contact KRWA

Email Stewart at stewart@krwa.net or call him at 913/731-4004 or also contact the KRWA office at 785/336-3760.

KANSAS RURAL WATER *association*
quality water, quality life

Motors and pumps or blowers, are typically a water or wastewater system's largest energy use. When equipped without a variable frequency drive (VFD), they have a high amp start-up requirement, drastically increasing the wattage required to pass through the meter. This can significantly impact the water or wastewater system's demand rate, along with its energy rate. Installing a drive on a motor and pump and slowing down that pump will decrease the amount of electricity required to operate that pump by the "cube" (turning a VFD down to 80 percent, cube law says 0.8 * 0.8 * 0.8 = 0.512 or 51.2 percent while decreasing the flow by the square 0.8 * 0.8 = 0.64 or 64 percent.) Turning the drive down to 80 percent or 48 hz will only require 51.2 percent of the power and only decrease the flow to 64 percent of the original flow. A problem is that the pumping curve does not work on most pumps and will not pump under 45 hz. Additional pumping time will be required. But the VFD operation works well for pumping units with a relatively short cycle, meaning they turn on and then off in a short amount of time. This decreases the demand for the electric utility by 51.2 percent. Remember though, just because a VFD is installed, the demand rate may be on the energy bill for up to twelve more months.

We focus our attention on these large energy users primarily, as they provide the most energy savings capabilities. By focusing attention on the largest energy users, an energy assessment explains to the utility where significant savings can be achieved and provide the highest possible return on any investment in improvements. The best and most straightforward way to implement change at a utility is by making small operational changes. These changes do not require upfront capital costs. They are simple changes like filling the water storage tanks before the time of use charge increases or if there are VFDs in place by turning them down. It's no more complicated than most of us were instructed by our parents and an instruction I still try to live by. It simply is, "Turn the lights off when you leave the room!"

Once the onsite inspection is completed, the assessment compiles the data into one report. Merging the data collection with information gained onsite is formatted into an easy-to-follow, focus-driven report to provide the best use of the system's resources.

KRWA annually provides "no-cost" energy assessments to 30 water or wastewater systems. To those utilities that are interested, send an email to me at Stewart@krwa.net or contact the KRWA office and we will begin the effort to review your water or wastewater utility's electrical use and then try to determine if there are possible savings that your city or RWD or other utility may be able to achieve.

Stewart Kasper joined KRWA staff in August 2020 as Technical Assistant/ Trainer. He holds a Class IV operator certification for water and Class IV operator certification for wastewater in Kansas. Prior to joining KRWA, he was water plant operator at Rural Water District No. 2, Miami County.