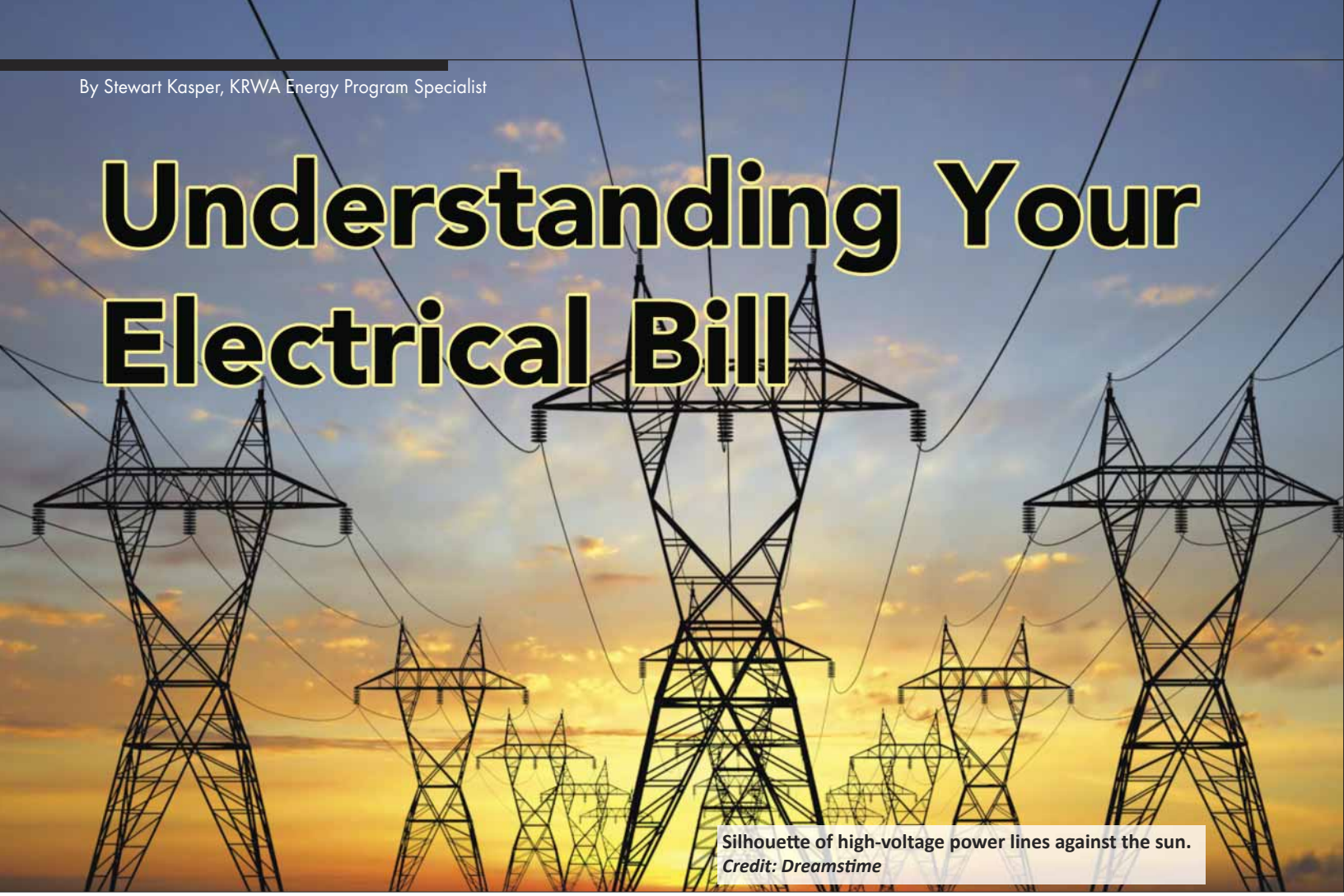
By Stewart Kasper, KRWA Energy Program Specialist

Understanding Your Electrical Bill



Silhouette of high-voltage power lines against the sun.
Credit: Dreamstime

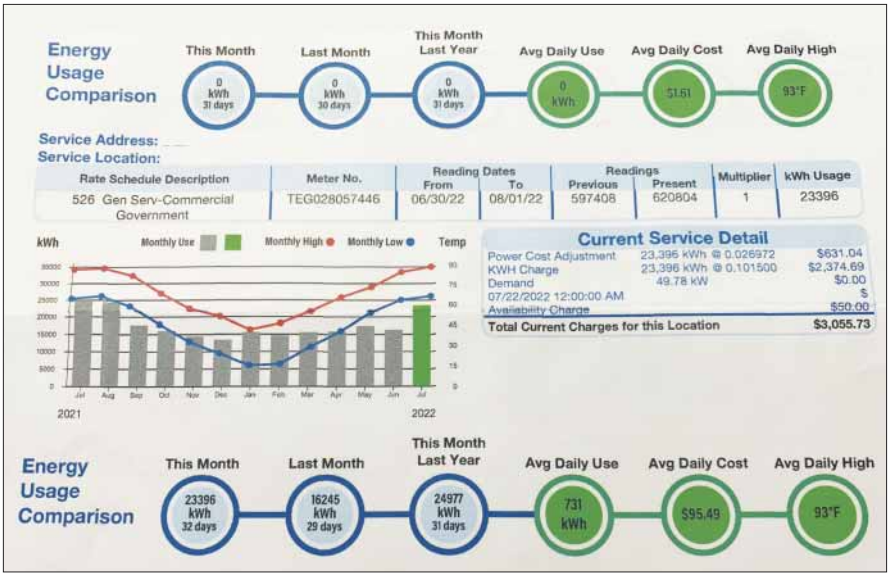
One of Ben Franklin's most famous quotes is: "Our new Constitution is now established; everything seems to promise it will be durable; but, in this world, nothing is certain except death and taxes." That was in a letter Franklin wrote in November 1789. So much has changed in the 233 years since. One other certainty besides death and taxes is a regular electricity bill. When we receive our bill at home, it's an inconvenience. We may look at the large number, and perhaps some of you are weird like me and compare the usage and charges to past bills but then pay them and move on. According to the EPA, 25 percent to 40 percent of a water system's operating budget is for wastewater treatment and 80 percent is for drinking water processing and distribution pumping. This seems high to me, but I'm not in the business of questioning EPA's data and will only report their findings. The far more important data point though is how much electricity your water and wastewater system use.

I have seen many electrical bills, and they are all different. Below are some of the line items from a typical power bill that this article is going to focus on:

- **kWh Charged:** The amount of energy used throughout the billing cycle, expressed in Kilowatt Hours. For example, 1 kWh will run a 100-watt light bulb for 10 hours, or one 5-hp motor running for 1 hour will use 3.73 kWh of energy.
- **Demand:** The highest amount of energy used over the billing cycle in a given time frame. Some entities charge for the highest amount of usage over 1 hour and some charge for the highest amount used over 15 minutes. This is often one of the more difficult charges to quantify during an energy assessment. Proper installation and operation of a variable frequency drive (VFD) on one of the largest electrical users in a water and wastewater system can achieve significant savings opportunities. Decreasing the amount of electricity

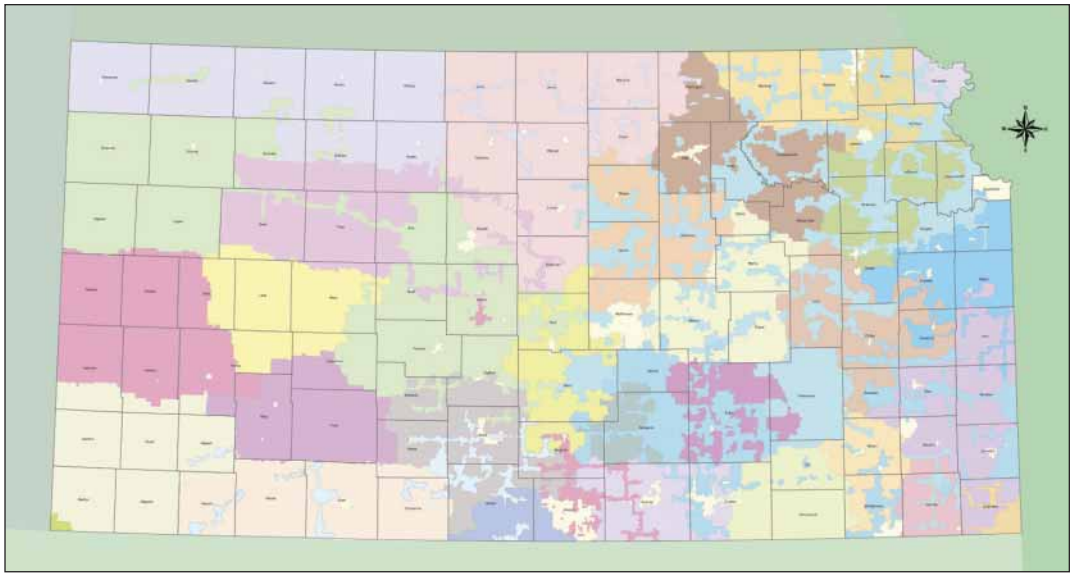
According to the EPA, 25 percent to 40 percent of a water system's operating budget is for wastewater treatment and 80 percent is for drinking water processing and distribution pumping.

usage per hour by a motor can make a drastic reduction in the system's demand charge. However, sometimes bad things happen at the wrong times. Leaks or primary pump failures often require an operator to set the VFD at 100 percent. Done at the wrong time of day or year can have a detrimental impact on the all of the hard work by the operator to keep the demand charge down. Most electrical companies charge a demand rate on a per-year basis, so the peak demand in July or August is still seen on an energy bill in January and February. Reacting quickly to water leaks, and having the ability to isolate leaks, so that the water plant does not have to run motors at 100 percent to maintain pressure is a vital aspect of reducing energy costs for the entire system.



With so much data condensed into fine print, it is often lost in the shadow of the larger overall total amount. The fine print is where the majority of useful information is held, when looking for ways to conserve energy. In the fine print we see: the PCA, the kWh, and availability charge. You also see that the energy company is starting to track demand, a sign of things to come.

- **Time of Use:** This will surely make any electric bill seem confusing with multiple readings and multiple rate structures. It all comes down to certain times of the day carrying a different cost than others. It's generally less costly to use electricity at 4:00 a.m. than it is at 4:00 p.m. Often when working with a system that is charged by time of use, I try to work with the electrical provider to acquire the fee schedule and time changes for those different rates. When energy costs increase at 3:00 p.m., I try to work with the water plant operators to see if it is even possible to have storage tanks filled before 3:00 p.m. The goal is to not activate motors until later in the evening as energy costs decrease. This also works well in the home by having a programmable thermostat if your energy provider changes the rate structure based on the time of day. Adjusting the thermostat to minimize the HVAC system during those peak hours can save a lot of money.
- **Power Cost Adjustment:** I've also seen this called a "fuel adjustment". This is an adjustable-rate charge that fluctuates with the price of wholesale electric rates. The power cost adjustment fee often comes with large fluctuations in the electric market. Routine maintenance at a generation station that takes a generator offline or up a high-voltage transmission line can create "congestion". Just like water mains, electrical transmission lines have a maximum load they can carry. So, when one of these large generators or transmission lines is taken out of service, electricity has to be diverted from other stations and through different lines that can handle the increased energy flow, and in doing so can have a drastic impact on the cost of



This map illustrates the patchwork of electric power companies and distribution across Kansas. The United States has an integrated electrical grid, meaning the whole country is essentially tied together with electrical lines. This allows cities that own their electric utility to purchase power generated by surrounding systems on the electrical grid. ***Image source: Kansas Corporation Commission.***

electricity. Earlier this year when brownouts were a major concern across the United States, the electricity demand was exponentially greater than expected, and the supply just wasn't there. This led to huge power cost adjustments for almost every energy provider and customer.

- **Meter or Availability Charge:** Some electrical providers have a separate line item for this charge, and some have it built in with the first block of kWh charges. This is just a base rate charge to have the meter onsite and an available flow of electricity.
- **Transmission:** This is a distribution fee charge to move the power from generation stations to an customer's master meter. In the United States, we work with an integrated electrical grid, meaning the entire country is essentially tied together with electrical lines. This allows cities that own their electric utility the option to purchase power produced by surrounding systems on the electrical grid. This returns pricing control to the individual systems and not the large regional corporations. A system can buy steady power (usually a coal or nuclear facility) from a station in Oklahoma while also purchasing renewable fluctuating power from a wind farm in Kansas. To get that electricity from the wind farm or coal plant, electrical customers rely rely on the transmission lines of the surrounding corporations and thus pays them a nominal fee. This is the general makeup of the transmission fee.

If you would like more information about your particular energy costs or help to understand your city's or RWD's energy bill, I would be happy to come and meet with you to discuss it. Of course, if you would like a full energy assessment to help find ways to save money on electrical costs, I am available to assist you with that as well. Through KRWA's "no-cost" energy assesment program.

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.