Understanding Electric Bills

Introduction

Most businesses receive an electric bill, look at the total amount, wonder why it is so high, quickly glance at the line items without fully understanding them, look at the total again – pay it – and get on with the rest of the day. If this sounds familiar, you are not alone.
A recent survey showed that 79% of consumers in the United States do not understand their electric bill. This is unfortunate because electricity bills provide valuable information for energy management programs (e.g. how much energy a customer uses, how the local utility company calculates a customer's electricity charges, etc.). If you want to finally understand your company's electric bill and learn how to use it to improve your energy program, keep reading.

Seventy-nine percent of energy consumers in the U.S. do not understand their electric bill.

Understanding electricity bills can help with energy management and reducing energy costs.

Utility Landscape

Despite what you would expect, the first step to understanding one's electric bill does not actually begin with the bill. It starts with first understanding the utility landscape and knowing how utilities are regulated.

Kentucky is home to more than 30 utilities; two of which are Regional Transmission Organizations (RTO). RTOs are independent, membership-based, non-profit organizations that ensure reliability plus they optimize supply and demand for wholesale electric power. RTOs operate bulk electric power systems across much of North America and a significant portion of Kentucky.

Most utilities in Kentucky are regulated by the Kentucky Public Service Commission (KY PSC); the exceptions are the Tennessee Valley Authority (TVA) supplied cooperatives and municipalities. Utilities regulated by the KY PSC must file their tariffs to be reviewed and approved by the KY PSC. Tariffs for municipal utilities are approved by the local authority, such as a local board or commission.

Need Help...

- *establishing an energy program,*
- *training a team,*
- *or educating employees about energy bills?*

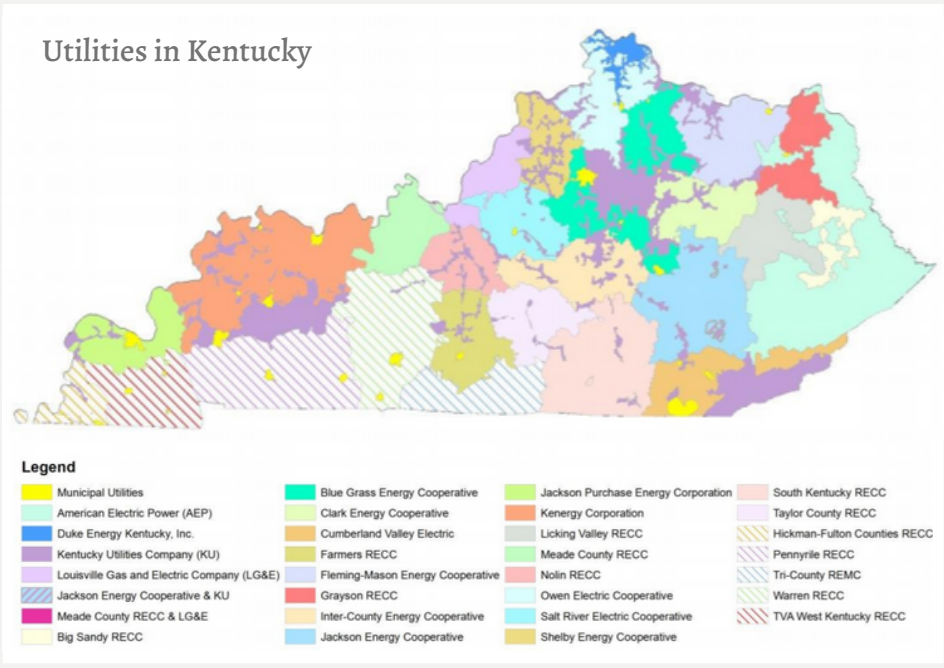
Contact the
Kentucky Pollution Prevention Center!

Website: www.kppc.org
Email: info@kppc.org
Phone: 502-852-0965

Tariffs

Simply put, a tariff is a pricing schedule that determines how your bill is calculated. Tariffs outline the service agreements between the customer and the utility. These service agreements include billing and payment information, as well as the rights and responsibilities of each party in the agreement. Utilities use tariffs to establish the pricing structure of the electricity, capacity, and services they can provide to their customers.

Tariffs filed with the KY PSC are approved if the tariff is deemed to be fair, just, and reasonable to consumers. Tariffs approved by the KY PSC are posted on their website. Many utilities will include links to their tariffs on the rates section of their website.



Find your tariff online in Kentucky Public Service Commission's Tariff Library!

Website: https://www.psc.ky.gov/Home/Library?type=Tariffs

Rate Plans

It is important to understand tariffs because the pricing structure used to calculate a customer's electric bill are directly linked to a specific tariff. Pricing structures differ across utilities and are calculated depending on the customer's *rate plan*. Rate plans specify the rules for how customers' bills are calculated. Utilities typically offer multiple types of rate plans. Common rate structures include:

- *General Service Rates* represent rates that are based simply on energy usage ($/kWh).
- *Power Service Rates* represent rates that are based on a facility's electric demand ($/kW or kVA) as well as it's usage ($/kWh). Power Service Rates typically apply to customers whose demand is greater than 50 kW.
- *Time of Day or Time of Use Rates* represent charges based on the time of day. Flexibility in scheduling is key here. You can schedule activities to take place during a specific time of day (i.e. when rates are low).

Depending on electricity usage patterns, customers may pay more or less for the same amount of electricity under different plans. Review the available rate plans to see if you fit the criteria for a plan with a lower pricing structure. A new rate plan may be more cost effective, depending upon your situation. For example, your location may have previously been used as a large manufacturing building but now it is a warehouse. In this such a case, you may be on an old rate plan with a flat rate charge for high demand (i.e. a demand that is higher than what is currently used as a warehouse). Contact your utility company to discuss/change your current rate plan.

Using Electric Bills To Improve Energy Management

Bill Breakdown

An electric bill is comprised of many things, some of which are linked to a specific tariff. Bills are often broken down into sections. The names and contents of each section can differ depending on the utility. Below are some common items.

General Information:

- *Account Number:* This is the number that references the particular billing account.
- *Meter Number:* This is the number of the meter that is collecting the electricity information. An account may have one or multiple meters.
- *Billing Period:* Time period of the billed electric usage in days. Typically a starting and ending date is included in the billing period.

Electric Usage:

- *Energy Usage (kWh):* Measure of the total energy used over a specific period of time (i.e. billing period).
- *Meter Multiplier:* Electric usage can be too high for the meter to record. In this case, the number recorded by the meter is multiplied by the meter multiplier to get a measurement.
- *Demand (kW or kVA):* The rate at which you consume electricity or the amount needed to power your facility at any point in time.

Electric Charges:

- *Service/Customer Charge*: This is a flat charge per billing period or day that is set by the tariff.
- *Energy Charge ($/kWh)*: This is a charge per kWh set by the tariff.
- *Demand Charge*: This is a charge per kW or kVA. This is based on your tariff. Some tariffs include a demand charge, while others do not.

Potential Monthly Adjustments:

- *Demand Side Management (DSM)*: Electric demand side management charges are added to the customer's bill to support the utility's energy conservation programs.
- *Environmental Surcharge*: Typically, a percent of service/customer charge, energy charge, and demand charge to support approved environmental projects.
- *Fuel Adjustment*: Based on fluctuating prices for natural gas, coal, or other fuels. This may result in a credit instead of a charge.

Taxes and Fees: This includes any state and/or local taxes that may apply as well as miscellaneous fees.

Unmetered Charges: These are charges that are applied independently from what is recorded by the meter. An example is a charge for a pole with a light that is owned by the utility.

Units Matter

Depending upon location, a facility's electric bill can come bundled among other municipal bills. Check the units to make sure you know what you are looking at. A water bill is measured in gallons while natural gas is measured in British Thermal Units (BTUs), Therms or hundreds cubic feet (ccf). Electric charges typically have two metered components: energy and demand. Energy is the amount of electricity consumed over a period of time and is recorded in kilowatt hours (kWh). While demand is the rate at which electricity is being consumed at a given time and is recorded in kilowatts (kW) or kilovolt-amperes (kVA). Units of measurement should serve as an easy indicator of where your electric bill ends, and other bills begin.

Usage Profiles

Usage profiles are visual representations of how much electricity one consumes. Such profiles can show total consumption for each month over the past year or daily usage over the past month. Usage profiles can also compare the current usage to that of the past. Utilities often provide a usage profile in the bill, however you can create your own by graphing the energy and/or demand data provided in your electric bills.

Take time to verify the data used in your usage profile is accurate. Review your rate plan and tariffs to ensure your usage is correctly calculated. Also make sure you are measuring/assessing your usage on the same period of time that you are billed on. For most, this will be monthly billing.

Recordkeeping and Tools

An essential component of any energy management program is a continuing account of energy use and cost. Use data from your electric bill to keep up-to-date records of monthly energy consumption and associated costs. This data can be used to help create a baseline to which energy savings measures can be evaluated. When utility bills are received, record the energy use and costs for ongoing monitoring. One potential tool for doing this is Portfolio Manager which was developed and maintained by EPA's ENERGY STAR© program. ENERGY STAR© also designed a tool specifically for industry to track energy use, cost and intensity (energy per unit of production). This tool is called the Energy Tracking Tool and is setup to use Microsoft Excel.

Data Analysis

Analyzing your data will facilitate data-driven decision-making. The level of analysis required will depend on the detail of the data collected. A few basic analysis techniques include:

- Looking for patterns and trends in your data.
- Comparing current data against a baseline.
- Using an energy modeling tool to evaluate a facility's energy performance versus potential performance.
- Comparing current usage data to a benchmark.

Recognition Opportunity...

Kentucky Excellence in Environmental Leadership (KY EXCEL) is a program that recognizes environmental achievements throughout Kentucky.

*For details, contact **KY EXCEL!***

***Email**: envhelp@ky.gov*
***Phone**: 502-782-6189*

Implementing Change

After analyzing your data, develop and implement an action plan. One way to achieve this is by using a team approach. The team approach can be one team per facility or a network of teams. A team approach assists with buy-in from all levels of the organization. Full management support is key for success. If workers feel that management is disrespectful to their efforts, there will be a reluctance to continue which will ultimately derail the objective.

Recognize Achievements

Also make sure to internally recognize the contributions of teams and individuals. Even simple acts of recognition will encourage greater improvement and maintain motivation. Note: External recognition from a third party will provide additional validation for energy management endeavors, provide satisfaction to those who earned the award and enhance the company's public image.

Additional Resources

ENERGY STAR©
Portfolio Manager

- *https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager*

Energy Tracking Tool

- *https://www.energystar.gov/buildings/tools-and-resources/energy-tracking-tool*

Kentucky Public Service Commission

- *https://psc.ky.gov/*
- *psc.consumer.inquiry@ky.gov*
- *1-800-772-4636*

Kentucky Pollution Prevention Center

- *www.kppc.org*
- *info@kppc.org*
- *502-852-0965*

TEAM KENTUCKY
ENERGY AND ENVIRONMENT CABINET

Kentucky Energy and Environment Cabinet
300 Sower Boulevard, Frankfort, KY 40601
Assistance Hotline: envhelp@ky.gov | 502-782-6189

Energy Management Ideas

Strong energy management is a strategic asset that creates a competitive edge by reducing energy costs. Understanding one's electric bill is vital. Below are a few addtional ideas.

Facility Energy Assessments

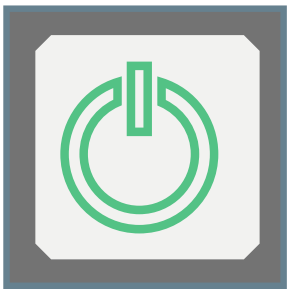
Organize facility walk-throughs to assess energy use and find energy saving opportunities. Assessments are powerful tools for involving employees and encouraging buy-in. These events are also opportunities for hands-on learning and to see best practices in action. After an assessment, an in-depth report should be written and a summary circulated internally.

Sub-Metering Devices

In order to reduce energy, one must know how much energy is being used at specific points throughout the process. Sub-metering can be an expensive investment, but there are simple, in-line, manual sub-meters available that are relatively inexpensive when compared to the digital, PLC based models. Sub-metering helps a facility develop a more accurate understanding of where energy is being consumed for a particular process or equipment.

Plug Load Management

Conduct an assessment of non-essential items being left plugged in during times of non-use or shutdowns (i.e. nights and weekends). Electrical power consumed by electronic appliances while switched off or in standby mode is called phantom load. Approximately 1-3% of the company's annual plug load usage is due to phantom load. Take inventory of non-essential equipment left plugged in and address these items with the appropriate department teams.



Equipment Shutdown/Load Strategy

Investigate equipment being left on during temporary shutdowns, longer shutdowns, and times of non-use. Once equipment is identified, develop a policy to turn off or reduce the load on select equipment. By turning off process equipment when not in use, the company can reduce their energy usage and demand load. Identify the equipment that is critical to the production process first, and then consider ways to reduce the load from other equipment.

Demand Reduction Strategies

High demand charges can result from a high rate of energy usage for even a short period of time. Plant production schedules and the economics of each situation should be considered. One possible solution may be to distribute the facility's electrical usage over alternate shifts. Another possibility is to schedule the operation of high demand electrical equipment to when overall demand is lower. Coordinating these times could reduce the amount of equipment operating at any one time, thus decreasing the billing period's maximum demand.

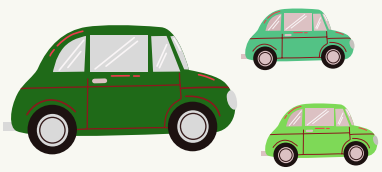
300 Sower Boulevard, Frankfort, KY 40601
Assistance Hotline: envhelp@ky.gov | 502-782-6189

Energy Vs. Demand

To manage electricity, one must understand energy and demand. Energy is kilowatt-hours (kWh) while demand can be measured in kilowatts (kW) or kilovolt-amperes (kVA). For simplicity, demand is addressed as kW below.

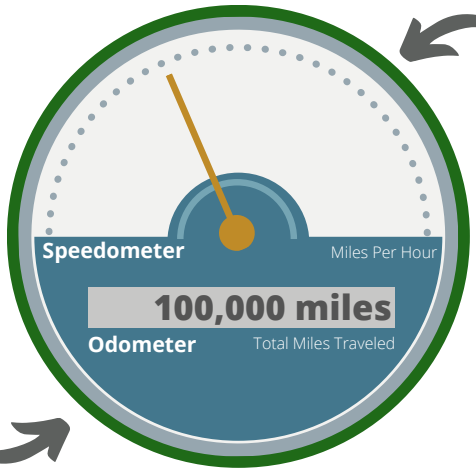
ANALOGY

A car analogy can be used to help understand the relationship of energy and demand. Think of a car's dashboard; specifically the odometer and speedometer. An odometer records the total distance traveled (i.e. energy) while a car's speed (i.e. demand) is recorded by the speedometer.



Energy (kWh)

The total distance traveled by a car over a period of time is recorded by the odometer. Instead of distance traveled, energy is the amount of electricity consumed over a period of time.



Demand (kW)

A car's speedometer records speed (i.e. how fast it is traveling at a given time). Similar to speed, demand is amount of electricity which is being used at a given time. Demand depends on how much electricity-consuming equipment a customer runs simultaneously.

If the car is moving, the odometer is turning and the speed can change moment to moment. The higher the speed, the faster the odometer turns. You glance at the speedometer while driving. Each time you look, the needle points to your current speed or actual demand. You may have gone different speeds during your trip, but when it was over, imagine the needle moving to the highest speed traveled. This highest speed would be the trip's maximum demand.

REAL WORLD

Consider a customer has ten 100-watt light bulbs and all ten are turned on at the same time for two hours.

ENERGY

10 x 100 Watts x 2 hours = 2,000 Watt-hours or 2 kWh

DEMAND

10 x 100 Watts = 1,000 Watts or 1 kW

However, if the customer assured that only 5 of the 10 lights were on at any one time during a two hour period.

5 x 100 Watts x 2 hours = 1,000 Watt-hours or 1 kWh

5 x 100 Watts = 500 Watts or 0.5 kW

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