

## How Does Electric Energy Get Delivered to Your Home or Business?

Your municipal electric utility, as a member of the Kansas Power Pool (KPP), has affordable and cost-competitive access to a variety of electric power generating resources. Sometimes, especially during times of power outage, people naturally wonder how energy is generated, transmitted, distributed and delivered for consumption. The very quick answer is that it is a collaborative effort. It is many generators injecting energy onto a vast and complex grid. The grid is a system of power transformers and both high and low voltage wires that ultimately terminate at your home or business. However, this quick answer may not be satisfactory. Let's take a harder look.

Sometimes people have held a fanciful notion that all their electricity comes from a power generating station inside their town or from a large power plant a few miles away. This is understandable – and entirely inaccurate. In fact, in our 14-state region known as the Southwest Power Pool\* (SPP), there are literally hundreds and hundreds of generators that are simultaneously injecting energy onto our grid which traverses the entire region.

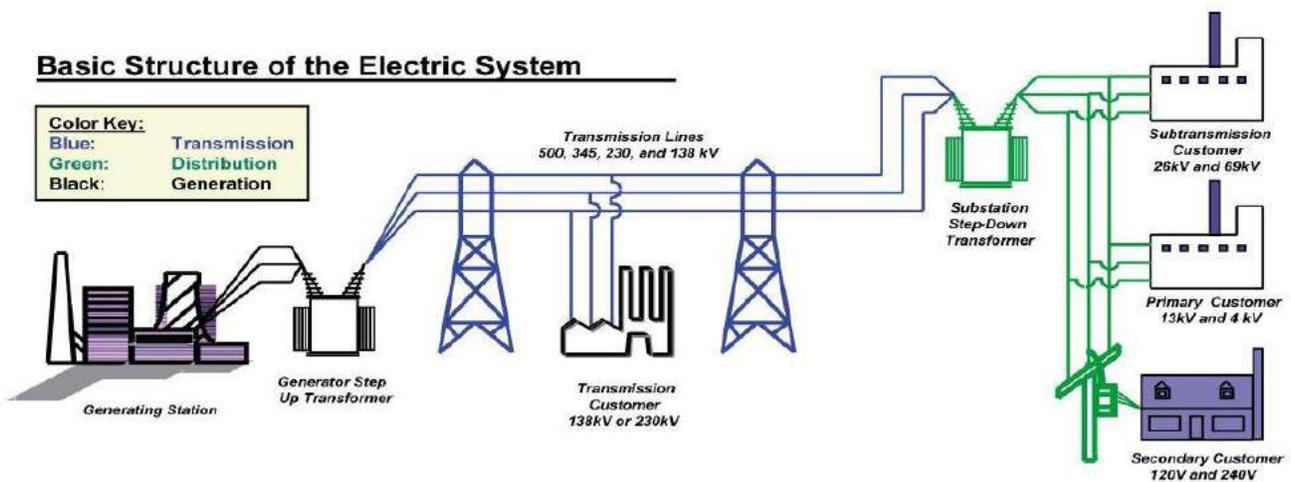




The rationale for many generators is simple. It provides reliability of service to everyone, everywhere. It also explains why outages are almost never caused by an insufficient amount of power being generated.

The particular entity who owns the generator(s) is irrelevant to the reliability of delivery. Expressed differently, the particular supplier of electricity is not the appropriate focus during a time of outage. All the energy from the various generators goes onto the grid and the energy flows to where it is needed according to the relevant laws of physics. So, it is the delivery system that needs the focus when understanding the cause of power outages.

Take a look at the image graphic shown below. You see the Substation Step-Down Transformer. In some cases, that substation is owned and operated by the municipal electric utility. In many cases, it is not. In almost every case, everything to the left of that substation is owned by an incumbent transmission system owner. In Kansas, that would typically be either Westar, Midwest Energy, Mid-Kansas Electric members or Sunflower Electric members. Everything to the right of the substation is typically owned and operated by your municipal electric utility.



So, what could cause a disruption to the delivery of energy to the home or business? Quite frankly, it could be literally dozens of things. Some of those are listed below:

Okay, so what might cause a outage?

Well, for one thing, anything that causes a breaker to open: Think of this: in your home there is a circuit breaker box that controls power flows to various places in your home. Similarly, circuits originating from the substation flow power to neighborhoods and business districts. If a **ground to line fault** occurs (typically a tree branch or some other obstruction) everyone on the circuit will be without power. Believe it or not many outages are caused by **an animal (snake or squirrel, etc)** getting near power infrastructure causing an arc or a fault. And of course there is the dreaded **ice storm** which may also cause an outage. Ice storms quite often cause wide spread outages requiring many hours or even a few days to get power restored to all customers. There are yet other causes including other weather elements (lightning, high winds) as well as equipment failure caused by age. Equipment can be weakened due to various disruption events.



\* The Southwest Power Pool is one of several federally mandated reliability transmission operators in the U.S. who oversee the bulk electric grid and wholesale power market. In the central United States, the SPP mission includes also the ensuring of reliable supply of power, adequate transmission infrastructure and competitive wholesale electricity prices.