A Touchstone Energy® Cooperative

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TWIN VALLEY ELECTRIC CO-OP
NEWS

Beginner's Guide to the Electric Grid

Electricity plays an essential role in everyday life

It powers our homes, offices, hospitals and schools. We depend on it to keep us warm in the winter (and cool in the summer), charge our phones and binge our favorite TV shows. If the power goes out, even briefly, our lives can be disrupted.

The system that delivers your electricity is often described as the most complex machine in the world, and it's known as the electric grid.

What makes it so complex? We all use different amounts of electricity throughout the day, so the supply and demand for electricity is constantly changing. For example, we typically use more electricity in the mornings when we're starting our day, and in the evenings when we're cooking dinner and using appliances. Severe weather and other factors also impact how much electricity we need.

The challenge for electric providers is to plan for, produce and purchase enough electricity so it's available exactly when we need it. Too much or too little electricity in one place can cause problems. So, to make sure the whole system stays balanced, the electric grid must adjust in real time to changes and unforeseen events.

At its core, the electric grid is a network of power lines, transformers, substations, and other infrastructure that spans the entire country. But it's not just a singular system. It's divided into three major interconnected grids: the Eastern Interconnection, the Western Interconnection, and the Electric Reliability Council of Texas. These grids operate independently but are linked to allow electricity to be transferred between regions when backup support is required.

Within the three regions, seven balancing authorities known as independent system operators (ISOs) or regional transmission organizations (RTOs)

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INTERESTED IN SERVING ON THE BOARD OF TRUSTEES?

Twin Valley is beginning the search for board of trustees candidates this January. Board members represent the interests of the members in directing the business and affairs of the cooperative. They establish the strategic direction for the cooperative based on their members' needs, interests and desires.

If you are interested in serving the cooperative on the board, please contact memberservices@twinvalleyelectric.com or call our office at 866-784-5500 for information.

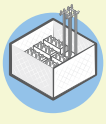
HOW *Electricity* GETS TO YOU

STEP 1 | Generation
Electricity is generated from various sources.

STEP 2 | Step-Up Transformer
Voltage is increased to push the electricity over long distances.

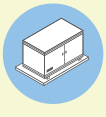
STEP 3 | Transmission Power Lines
Lines carry electricity over long distances.

STEP 4 | Transmission Substation
Voltage is lowered so electricity can travel across the local system.



STEP 5 | Distribution Substation
Voltage is lowered further for safe distribution.

STEP 6 | Distribution Power Lines
Electricity travels across these lines in your community.



STEP 7 | Final Stop
A transformer reduces voltage a final time, and electricity is sent to your home.

Beginner's Guide to the Electric Grid

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monitor the grid, signaling to power plants when more electricity is needed to maintain a balanced electrical flow. ISOs and RTOs are like traffic controllers for electricity.

THE JOURNEY OF ELECTRICITY BEGINS AT POWER PLANTS

Power plants can be thought of as factories that make electricity using various energy sources, like natural gas, solar, wind and nuclear energy. Across the U.S., more than 11,000 power plants deliver electricity to the grid.

Twin Valley Electric Cooperative receives power from our generation and transmission (G&T) co-op, Kansas Electric Power Cooperative (KEPCo). We work closely with KEPCo to provide electricity at the lowest cost possible. Being part of a G&T benefits members like you by placing ownership and control in the hands of your co-op, prioritizing affordability and reliability, supporting local economic development and fostering a sense of community.

To get the electricity from power plants to you, we need a transportation system.

High-voltage transmission lines act as the highways for electricity, transporting power over long distances. These lines are supported by massive towers and travel through vast landscapes, connecting power plants to electric substations.

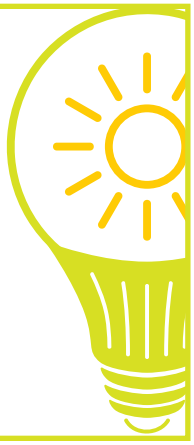
Substations are like pit stops along the highway, where the voltage of electricity is adjusted. They play a crucial role in managing power flow and ensuring that electricity is safe for use in homes and businesses.

Once the electricity is reduced to the proper voltage, it travels through distribution power lines, like the ones you typically see on the side of the road. Distribution lines carry electricity from substations to homes, schools and businesses. Distribution transformers, which look like metal buckets on the tops of power poles or large green boxes on the ground, further reduce the voltage to levels suitable for household appliances and electronic devices.

After traveling through transformers, electricity reaches you — to power everyday life.

We're proud to be your local, trusted energy provider. From the time it's created to the time it's used; electricity travels great distances to be available at the flip of a switch. That's what makes the electric grid our nation's most complex machine — and one of our nation's greatest achievements.

ENERGY EFFICIENCY Tip of the Month



During winter months, ensure your home is well sealed and properly insulated to reduce the need for excessive heating. Seal air leaks around your home and add insulation where needed to save up to 10% on annual energy bills.

Install weatherstripping on exterior doors and apply caulk around windows. Check attic insulation levels and hire a qualified contractor if additional insulation is needed. **SOURCE: WWW.ENERGY.GOV**

Report Suspicious Activity Near Electrical Equipment

Substations are part of the electrical generation, transmission and distribution system. Transformers are contained inside many of them, and their job is to transform voltage from high to low or vice versa, depending on their location within the distribution path.

Besides transformers, substations usually house switches, protective devices and control equipment. In large substations, circuit breakers are used to interrupt any short circuits or overloads that may occur.

No one should approach a substation, touch the fence or enter the gate unless they are authorized to do so.

Paying attention to individuals and activity around substations and other utility equipment helps keep everyone safe. Here are some things to look for:

- Take notice of individuals in street clothes working near or on utility equipment; if you see this, please report it immediately.
- Notice whether individuals are dressed in proper personal protective equipment or have utility identification badges.
- Check vehicles or work trucks in the area for utility branded logos or information.
- Report suspicious behavior you see, including non-utility employees tampering with utility poles, meters, pad-mounted transformers, or other equipment.
- If you notice anything unusual at a substation, please report it to the utility. Examples include the following:
  - An open or unlocked gate.
  - A damaged fence.
  - Obvious damage to equipment inside the fence.
- Call 911 and then the electric co-op if you see the following:
  - Smoke or fire.
  - Non-utility workers inside the substation fence.

Never try to address an issue yourself. Please report any suspicious activity or damage to the police or Twin Valley Electric Cooperative.

FIRST RESPONDER SAFETY

First responders should always wait for the go-ahead from the electric utility before addressing a fire or vandalism at a substation, power plant or solar farm. First responders should also communicate with and wait for the utility before approaching a downed power line or damaged pad-mounted transformer.

GENERAL SUBSTATION SAFETY

Twin Valley Electric Cooperative and Safe Electricity remind you to:

- Never go near a substation.
- Teach children to never go near a substation or climb its fence to retrieve a ball or pet. Let them know they should always stay away and tell a parent or adult.
- Teach children about the dangers of electricity from an early age.
- Never try to extinguish a transformer that is on fire since water and electricity do not mix. Call 911 to report the fire.
- If you see an issue with or notice something unusual about a substation, transformer, or power line, contact your electric co-op. Never try to address a problem yourself.

TYPES OF TRANSMISSION SUBSTATIONS

There are three types of transmission substations: step-up, step-down and distribution:

- A step-up substation receives electric power from a nearby generating facility and uses a large power transformer to increase its voltage so it can travel to distant locations.
- Step-down transmission substations are located at switching points on an electrical grid and connect various parts of the electrical system.
- Finally, distribution substations are located near end-users (homes, multi-family units and businesses) and reduce voltage to power homes and businesses.

For more information about electrical safety, visit www.SafeElectricity.org.

DO'S and DON'TS *Around Electricity*

Start discussions about electrical equipment and safety when children are young.

Here are some great safety lessons to teach:

DO'S

- Do stay inside after a storm in case there are downed power lines.
- Do place a cellphone on the bedside table, not on bedding or under a pillow.
- Do find another tree to climb if an overhead power line is nearby.
- Do fly kites, drones or other remote-controlled toys in an open area away from overhead power lines.

DON'TS

- Do not go near a downed power line.
- Do not use or set plugged-in items near water, including a sink, pool or bathtub.
- Do not go near or enter a substation to retrieve a toy or pet.
- Do not try to free an object that is stuck in a power line.

SOURCE: SAFE ELECTRICITY

Winter Prep? Think Safety First.

BY PAT MELGARES, K-STATE RESEARCH AND EXTENSION NEWS SERVICE

K-State climatologist says knowing weather forecasts can help reduce risk during winter weather

If there's a buzzword for winter that Chip Redmond subscribes to, it would certainly be safety.

As a climatologist and manager of the Kansas Mesonet at Kansas State University, Redmond understands the many risks of winter weather.

"The most obvious may be the cold," Redmond said. "It's definitely a time to start pulling out the warmer stuff; the thermals, the overalls ... we really need to become conscious about how many layers we put on in anticipation that the weather can change pretty rapidly this time of year."

Morning temperatures, he said, can be quite chilly, but temperatures in the Midwest and other parts of the country often can warm nicely in the afternoon, before cooling again at sunset. Layering helps to protect during daily weather variations, Redmond said.

He also suggests a warm hat or stocking cap; mittens or gloves; and footwear that provides warmth and traction.

"There is usually an increase in slides or falling accidents this time of year when we get snow," he said. "I suggest minimizing your outside time during slippery periods, or at least have the proper footwear and avoid areas where ice might build up. Sometimes it's easier to walk on grass than the sidewalk." Redmond offers additional safety tips as winter weather approaches.

REMOVING SNOW

"As much as I don't want to admit it, I'm not as young as I was yesterday," Redmond said. "It takes a toll when we put our bodies under the stress of shoveling snow, especially wet, heavy snow that can be very physically demanding. That has been a leading cause of injuries and even death due to heart attacks. Be vigilant in what your body is capable of."

Redmond suggests asking friends, family and neighbors for help; removing snow in a way that doesn't require picking it up and throwing it; or using a snowblower.

WINTER TRAVEL

"Travel can be a challenge any time of year, but it becomes much more of a challenge in winter because conditions change quickly over short distances," Redmond said.

He advises travelers to always check weather forecasts for their current location, their destination — and points in between.

"There are some apps available that will give you weather by the road [you're traveling]," said Redmond, who suggests the U.S. government website, www.weather.gov, for reliable, up-to-date forecasts across the country.

In Kansas, the Kansas Department of Transportation maintains a website, www.kandrive.org, that includes forecasts, road conditions, live cameras, road closures, and more.

Redmond said if a car's tires are worn, get new ones put on immediately. And, he says, keep a winter preparedness kit in the car that includes such items as blankets, flashlight, cellphone charger, water, radio, dry food and other items to help you weather the elements in case of a breakdown.

When storms are imminent, "don't travel," he said. "Make the smart decision to not go out there."

STAY OFF FROZEN WATERWAYS

"A lot of people in Kansas think that frozen ponds are pretty and they're fun to walk on," Redmond said. "But there's very rarely ever a pond or a lake that's truly safe to walk on. To support a person's weight, you need a lot of ice. To keep that ice frozen, we rarely see those weather conditions align because we still get warmer temperatures in the winter, and enough sun to melt the ice during the afternoon."

Redmond spoke in depth about winter preparedness and safety on the weekly radio program, Sound Living, produced by K-State Research and Extension. Listen to the full program online at www.soundlivingpodcast.net.