



Tucson Electric Power

Kino to DeMoss-Petrie Transmission Line Project

New Substation FAQs

Tucson Electric Power (TEP) is developing plans for the Kino to DeMoss-Petrie 138 Kilovolt (kV) transmission line to strengthen electric reliability for customers in central Tucson and help satisfy growing energy needs in our community. The new line would interconnect with the planned UA North Substation, located near North Vine Avenue and East Lee Street.

Substations change the voltage of electric current for transmission and delivery of electric service to area customers. Interconnecting UA North will help expand electric capacity to provide several benefits including:

- Prevention of power outages and inadequate voltage by avoiding overload conditions that can damage equipment, causing outages or low voltage for residential and other customers.
- Service for growing energy needs, including increased peak energy demands.
- Improved electric reliability by adding redundancy, allowing TEP to deliver energy from more than one direction.
- Replacement of aging infrastructure, including substation equipment scheduled for replacement within five years.
- Support for the University of Arizona and Banner - University Medical Center Tucson.

TEP plans to design and construct UA North as a gas-insulated substation (GIS).

What are GIS substations and why build them?

TEP typically builds open-air substations on 5-7 acres near energy load demands where it can efficiently serve customers' energy needs, considering proximity to existing infrastructure, geography, and other factors.

Electric utilities in the United States and other countries build GIS substations when challenged by space constraints. GIS substations use a nonflammable, nontoxic gas to insulate electrical equipment in sealed conduit, which prevents emissions. These substations require a smaller physical footprint and offer improved safety because circuit breakers and other equipment are enclosed.

What type of gas will be used as a dielectric insulator in the substation?

Sulfur hexafluoride (SF₆) is a heavy, inert, nontoxic and incombustible gas. It's among the most stable gaseous chemicals with an inertia similar to that of nitrogen gas. SF₆ has excellent electric insulating and arc-quenching capacity. It has been used extensively by electric utilities in electrical transmission systems and electrical distributing devices.¹

Does TEP currently have any GIS substations?

Yes. TEP's Tucson Substation located just north of downtown is a GIS substation. In over 10 years of operation, TEP has recorded no leaks at the facility. TEP also operates and maintains multiple pieces of equipment throughout its service territory that require SF₆.

¹ Overview of SF₆ Emissions Sources and Reduction Options in Electric Power Systems. EPA 430-R-18-004. <https://www.epa.gov/f-gas-partnership-programs/electric-power-systems-partnership>. August 2018.

Are there any potential health or safety concerns regarding SF6?

Sulfur hexafluoride is physiologically harmless to humans and animals. Although SF6 displaces oxygen, it generally does not present a concern in open areas. If an arc occurs inside the hermetically sealed interrupting chamber, the byproduct is considered harmful. However, this harmful byproduct would be contained within the sealed interrupting chamber inside the substation. TEP crews are specially trained to monitor for the byproduct, and to properly clean and dispose of it if an arc occurs.

What does TEP do to prevent SF6 gas from being released into the atmosphere?

Although SF6 is a potent greenhouse gas, it is used in an enclosed system that prevents the gas' escape into the atmosphere.

TEP's Tucson Substation uses closed-pressure equipment. Although documentation from the GIS manufacturer describes the SF6 leakage rate as less than half of one percent each per year, continual field testing indicates that Tucson Substation GIS equipment has experienced no leaks since being placed into service in 2010.

To ensure that SF6 emissions are minimized during operation of the Tucson Substation GIS equipment, TEP follows several safety and maintenance processes that include:

- Conducting major substation inspections every 4 months, including checks for leaks.
- Equipping breakers with alarms that are monitored 24/7 by TEP's System Control office in the event of a change in gas levels.
- Closely tracking gas levels. If gas needs to be added more than twice a year, field crews would schedule maintenance and perform leak detection with a special SF6 camera.
- Enacting several safety measures if issues with purity, moisture, or arc byproduct are detected, including taking the breaker out of service and sending gas to a specialized contractor for destruction if it doesn't pass testing.



At TEP's Tucson Substation, circuit breakers and other electrical equipment are enclosed in conduit.

These safety and maintenance processes align with the EPA's *Reducing SF6 Emissions in Electric Power Systems: Best Industry Practices*.²

Do any government agencies perform oversight of SF6 use?

SF6 emissions are reported to the Environmental Protection Agency's Greenhouse Gas Reporting Program (GHGRP).

Are there alternatives to using SF6?

At this time, no reliable, commercially viable alternatives are available for high-voltage operations. Oil-filled circuit breakers are no longer an option because they are no longer manufactured. Studies suggest vacuum interrupters are not well-suited to higher voltages. Alternative gases are being studied. TEP currently is participating in a technical working group evaluating environmentally friendly alternatives to SF6.

– Updated 2/25/20

² Reducing SF6 Emissions in Electric Power Systems: Best Industry Practices. EPA. 2018. <https://www.epa.gov/f-gas-partnership-programs/reducing-sf6-emissions-electric-power-systems-best-industry-practices>