Gas Insulated Substation FAQs

A substation with Gas Insulated Switchgear (GIS Substation) is another design option that gives Dominion Energy flexibility when planning substations.

You may have questions about GIS technology. Here are answers to frequently asked questions.

1. WHAT IS A GIS SUBSTATION?

GIS is a type of electrical substation configuration that uses safe, tested, and effective technology. The major electrical equipment is enclosed in a sealed environment, and sulfur hexafluoride (SF6) gas is typically used as the insulating medium.

GIS technology typically requires less land than an air-insulated substation needs.

2. WHERE IS GIS TECHNOLOGY BEING USED?

Currently, Dominion Energy operates 19 GIS facilities across its footprint, and more are under construction. In northern Virginia, several GIS facilities are in operation, including the Brambleton Substation in Aldie; the North Alexandria Substation in Alexandria; and the Tysons Substation in Tysons.

3. WHEN IS GIS TECHNOLOGY BEING USED?

Dominion Energy considers using GIS facilities under several circumstances, including the following:

- To address extreme weather conditions (i.e., Mt. Storm)
- To mitigate contamination from salt air (i.e., Coastal Virginia Offshore Wind project)
- To site or expand substations when space is constrained or at a premium (i.e., urban areas, Vint Hill)

Generally, GIS requires one-third of the land required for traditional air-insulated substations.

4. WHAT DOES A GIS SUBSTATION INCLUDE?

Substations that use GIS technology have a building to enclose the components of the GIS system. These include circuit breakers, disconnect switches, voltage and current sensors, and busbars.

Outside the GIS building, the substation typically has transformers, capacitor banks, control enclosures and other equipment. In most cases, the substation also has poles, backbones, or other above-ground structures to connect the substation to the

transmission grid. Specially designed bushings are used to connect GIS equipment to transformers and transmission lines.

As an example, Dominion Energy's proposed Vint Hill substation includes two GIS buildings as well as transformers, backbones and other equipment. Please see the map below for additional information.

Note: the design of any substation, including acreage, layout, fencing and equipment inside, is based upon a variety of factors and subject to change pending public, engineering, and regulatory review.

5. WHAT DOES A GIS SUBSTATION LOOK LIKE FROM THE OUTSIDE?

Dominion Energy is committed to safeguarding substations and other infrastructure to help minimize the impact of potential natural and man-made threats to protect the system. GIS facilities, like other substations, are protected by reinforced perimeter barriers that are designed to defeat attempts to breach these facilities. GIS facilities are located behind these barriers in a standalone building.

In general, Dominion Energy's approach to security continues to evolve in light of emerging threats and the latest recommendations from law enforcement and other partners. Screening of the substation from nearby roads or residences, including trees, shrubs and other vegetation, is installed on a case-by-case basis in accordance with local requirements.

6. HOW DOES GIS WORK?

GIS uses sulfur hexafluoride (SF6) to insulate components and extinguish arcs during circuit breaker switching operations.

The equipment is fully enclosed in grounded housing, and all internal components—circuit breakers, disconnect switches, voltage and current sensors, and busbars—are insulated by SF6.

SF6 is widely considered to be the best medium to insulate electrical equipment, which helps to ensure safe and reliable operations of our equipment and the electric grid.

7. IS THE INSULATING GAS SAFE?

Yes. SF6 is a non-toxic and non-flammable gas. It is primarily used as an insulator in high-voltage electrical and distribution equipment, but also is used in many other industrial and medical applications. For example, the medical field uses SF6 to help treat retinal detachments, wherein the gas is injected into the eye to help hold the retina in place during healing.

When used in GIS facilities, SF6 is not released into the atmosphere during normal operations. The system is sealed, secure, safe and specifically engineered to limit emissions.

For example, if internal maintenance or repairs are needed, the gas is reclaimed from the GIS system, stored in cylinders and is not evacuated to the atmosphere.

Safety is the foundation of how our facilities are designed and built. Our GIS systems are constructed and maintained to meet the highest industry standards.

8. WHAT DOES DOMINION ENERGY DO TO PREVENT AND MITIGATE EMISSIONS?

As SF6 is a greenhouse gas, Dominion Energy builds, monitors, and maintains our GIS systems to the highest industry standards to prevent and mitigate releases of the gas.

Dominion Energy partners closely with trusted equipment suppliers to reduce the opportunity of leaks in GIS systems and other equipment that use SF6. GIS suppliers are required to guarantee a leak rate of less than 1 percent per year. SF6 emissions from Dominion Energy equipment typically come in well below this threshold.

Dominion Energy closely tracks any changes in gas levels in GIS systems. Field technicians are supplied with gas leak detection tools to identify any issues with equipment, and each substation has gas handling equipment in the unlikely event that a leak occurs.

Dominion Energy complies with all federal, state, and local regulations and laws. As part of this compliance, the company tracks all SF6 containing equipment in annual reports to the U.S. Environmental Protection Agency and in our corporate reporting about total GHG emissions, including emissions of SF6.

9. WHY IS GIS NOT ALWAYS THE BEST OPTION?

GIS has a higher upfront cost than an air-insulated substation, so it's only used where its benefits, or a smaller footprint, are truly needed. While each project is different, current general estimates show that a completed GIS substation costs approximately 2 to 3 times more than an air-insulated substation. Dominion Energy evaluates the use of GIS on a project-by-project basis, taking into account impacts to the area, resiliency, cost and other factors.

VINT HILL
Substation Project

Station Overhead

Viewing Direction: Northeast

2 Viewpoint Location

Vint Hill Substation

Substation Property Line

Future Planned Development

Dominion Energy

PROPOSED CONDITIONS

Photo renders are for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.