

# Grid-Enhancing Technologies

The electric grid is experiencing a rapid transformation both in terms of the unprecedented growth it must meet and the challenges that come with a changing generation portfolio to more renewable resources. **Grid-enhancing Technologies (GETs)** play a part in delivering on Dominion Energy’s commitment to meeting our customers’ energy needs and enable more clean energy.

GETs are a wide classification that can almost encompass any advancement deployed on the grid. The current application of the term means a group of technologies that offer a variety of benefits that provide operational flexibility and potentially improve grid performance which can come in the form of both software or hardware solutions. The most beneficial use of these technologies depends on the specific needs of the grid. What is clear is that the grid is becoming more complex, more digital and continuously integrating GETs where there is opportunity has layered benefits.

Dominion Energy has significantly invested in GETs and believes they have an important role in advancing the grid of the future but are limited in their ability to serve load growth in isolation. Software solutions are a valuable tech-forward supplement to the grid but are not a substitute for firm transmission capacity needed

to serve substantial growth in customer demand. GETs are an optimizing tool that can help this network run more efficiently. And when it comes to adding renewables to the system, GETs play an influential role in their deliverability.

Dominion Energy Electric Transmission continues to explore, pilot, and integrate GETs innovations in a deliberate and systematic approach to enhancing reliability and enabling the clean energy transition. Dominion Energy is an industry leader in deploying GETs with many technologies already in service with plans to increase use-case pilots across our system.

Beyond GETs, we are deploying innovations in all that we do - employing novel construction methods to execute more projects, faster to realize needed capacity and operational benefits.

## Examples of the spectrum of current GETs application in use across the Dominion Energy Virginia footprint:



Aluminum Conductor Steel Supported (ACSS)

**Advanced Conductors** have been used on our system since the 1970s where we began pioneering new conductor technologies beyond the standards used at the time. In 2019 we took yet another step standardizing our use of a high temperature conductor, including trapezoidal advanced low sag designs, on all our 230 kV reconductor and new build projects - adding or replacing 800 miles as of the end of 2023. This type of advanced conductor has provided us a **50% increase in capacity** over our legacy lines. We have found we can achieve high power transfer ratings while taking advantage of the maturity in supply chain, standard practices for installation, standard ancillary equipment needs and less lead times for repairs - all of which allows us to execute more projects, more swiftly, with added capacity benefits.



Fixed Series Capacitor Bank



STATCOM

**Flexible AC Transmission System (FACTS)** devices strengthen and support the transmission grid in much the same way as conventional generation resources. As conventional generation resources have retired, FACTS devices have helped fill the need for system services such as voltage support. Dominion Energy currently has several types of FACTS Devices connected to our transmission system, including eight stationary and three mobile Static Synchronous Compensators (STATCOMs) and three Static VAR Compensators (SVCs.) STATCOMs and SVCs automatically regulate grid voltage, manage power quality and help operators with system restoration.

**Fixed Series Capacitor Banks (FSC)** have multiple use cases from reducing line losses to enhancing electrical angular coordination to prevent generator instability during faults. Dominion Energy has deployed FSCs to ensure stable operation of the world’s largest pump storage facility at maximum output. FSC’s are an advanced technology that unlocks transmission capacity by canceling line impedance which allows more seamless integration of future renewable generation.

## Dominion Energy is one of the first utilities to be awarded a Grid Resilience and Innovations Partnership (GRIP) grant made available through the Infrastructure Investment and Jobs Act (IIJA) for our Analytics and Control for Driving Capital (ACDC) project.

This funding opportunity allows customers to reap the benefits of GETs through pilot programs that will improve visibility and understanding of grid operations and power flows. Lessons learned from these projects will be used to implement technologies in the future that will help us better understand and adapt to increasingly dynamic grid operations.

### Technologies Piloted Through the ACDC Project:

#### Dynamic Line Rating (DLR)

Environmental and weather conditions affect the thermal capacity of electric lines. DLR determines the maximum thermal capacity that can be fed and maximizes efficiency.

- The project would install, calibrate, and operationalize the advanced line rating systems primarily within the Northern Virginia region of the Dominion Energy Virginia transmission network, about 27 lines. This will be among the **first largest deployment of DLR in the US.**
- Improves short-term system flexibility for switching for industrial customers
- Achieves operational expertise needed for territory-wide expansion to enable more renewable energy interconnections

#### Dynamic Performance Monitoring (DPM)

is a data collection and analysis process that will help us improve the operation of an evolving energy grid. High-tech sensors added onto the grid at substation and other strategic locations will track and collect frequency data. This data will be sent to an analysis platform, and our grid operators will be able to better understand how different components added to the grid are impacting its function. That understanding will lead to better grid operation decisions and maximize the availability of renewable resources.

- Achieves coverage of key transmission and generation assets with 1 kHz telemetry

#### Grid Forming Inverter (GFI)

This pilot tests a new technology that would stabilize the grid at large-scale Distributed Energy Resources interconnections and potentially allow renewable generation to have blackstart capabilities.

- First open-source grid forming software ever developed for utility-use
- First installed 2 to 4MW renewable microgrid for islanded rural community
- Insights for GFI Dominion Energy Virginia-wide rollout and PJM/FERC rulemaking process

#### Grid Edge Visibility (GEV)

The increasing number of residential Distributed Energy Resources has created congestion risk due to the inability to locate where and how much distributed load is being fed. GEV increases the visibility and operability of the distribution grid in order to better plan for Distributed Energy Resources intermittency and mitigate adverse grid impacts.

- Improves grid operations and grid planning with access to more Distributed Energy Resources data from GEV devices
- Supports significant projected increase in Distributed Energy Resources penetration behind 88 devices
- Provides 24k customers with direct visibility and restoration potential from investment

GETs have a role to play in the grid of the future. GETs are not a substitute for new transmission facilities needed to serve new firm-load.

**Dominion Energy has deployed and is testing advancements in GETs as part of its comprehensive approach to ensure reliability and enable the clean energy transition.**

For details about Dominion Energy's electric transmission projects, visit [DominionEnergy.com/Powerline](https://www.dominionenergy.com/powerline)