INL/MIS-22-68843-Revision-0

Transmission Optimization with Grid Enhancing Technologies Fact Sheet

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Changing the World's Energy Future

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Prepared for the
U.S. Department of Energy
Under DOE Idaho Operations Office
Contract DE-AC07-05ID14517

Transmission Optimization with Grid-Enhancing Technologies Overview

Exploring challenges with grid enhancing technologies to ease the transition to a cleaner, more robust electric system

The transmission system is critical to ensuring electricity security for our nation. INL is exploring how grid-enhancing technologies can modernize and improve transmission operation.

The Transmission Optimization with Grid Enhancing Technologies (TOGETs) project will guide future research to fill in gaps on publicly available knowledge of Grid Enhancing Technologies (GETs) and conduct a full scale, multi-faceted field exercise. Ultimately the project aims to test, verify and validate deployed GETs in a transmission system.

GRID CHALLENGES

The U.S electrical grid is facing many challenges over the coming decades. Aging infrastructure needs to be replaced, demand for power continues to increase and climate change is driving a push for clean and sustainable energy. Combined, these challenges mean our existing transmission system struggles to provide reliable power to homes, schools and hospitals. Upgrades to the transmission system can be costly and time-consuming, which has created a backlog of transmission projects across the nation. GETs are technological solutions that can help by providing operational support while larger upgrades are completed en route to a transmission system that reliably integrates new power sources.

Getting a better understanding of how various GETs can work together will allow regulatory bodies and utility providers to evaluate the benefits and risks of these devices and techniques. The combination of this will ultimately lead to improving

GETs have the potential to help address challenges like transmission congestion and rapidly changing weather conditions, which in turn will support more renewables coming online.

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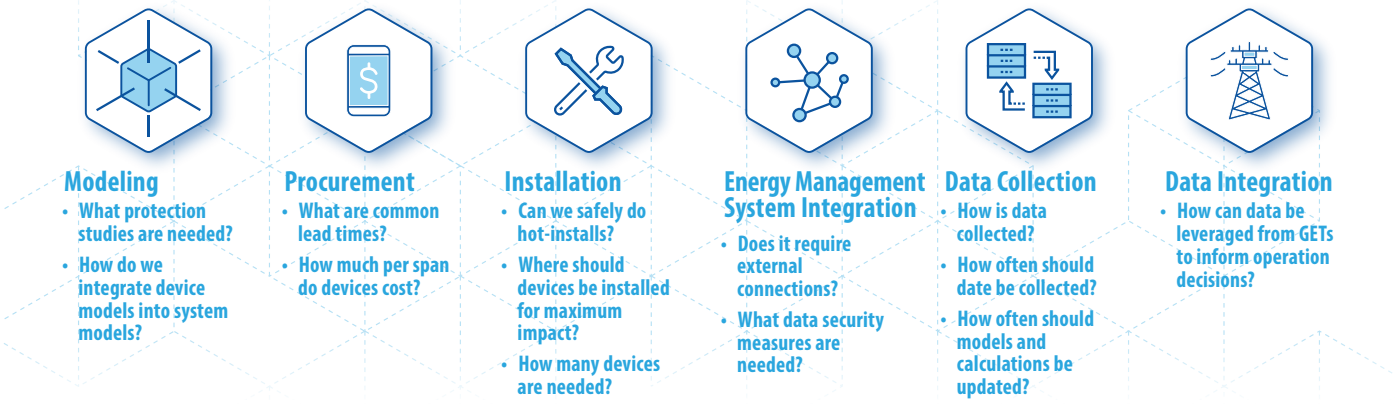
Key Topics and Questions Addressed by TOGETs



the utilization of existing transmission lines, supporting transmission upgrades as they occur, maximizing power transfer and reducing lost revenue due to congestion and inefficiency.

TWO PARTS, ONE GOAL

The first part of the project consists of compiling information on cost, data, and outcomes from previous studies. These are vital to understanding the use of GETs devices and allow all entities to leverage lessons learned from earlier efforts to streamline future investments. The study of existing resources will collect these lessons learned into a centralized repository and identify gaps in the publicly available literature. This will allow the TOGETs team to focus on filling these gaps.

The second part of the TOGETs program is a full-scale demonstration of GETs using INL's full-scale Power Grid Test Bed. Specifically, it will use Dynamic Line Rating (DLR) and Power Flow Controllers (PFCs) to clarify and answer unaddressed concerns such as integration challenges, cyber security and data management. The data collected will be made publicly available to make implementation and operation of GETs more transparent to future users.

GETs	Grid Enhancing Technologies: devices or techniques that enhance existing grid hardware to prolong useful life or increase capacity.
DLR	Dynamic Line Rating: Using weather conditions such as wind speed, direction, ambient air temperature, or other measurements to determine the true temperature of a conductor and consequently the maximum power that can safely flow on a transmission line at a given time. This is often greater than the static rating normally assigned to a transmission line.
PFC	Power Flow Controller: A device which can actively push and pull power by changing the reactance in the lines. This is useful for redistributing power flow in a mesh network to relieve congestion.
Other GETs	Other GETs exist other than those being studied in this project such as Topology Optimization, which uses geological space and placement to improve infrastructure systems and Dynamic Transformer Ratings, which is comparable to DLR, but for transformers instead of transmission lines.

FOR MORE INFORMATION

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