SMART WIRES

REIMAGINE THE GRID

Advanced Power Flow Control

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The new era of power flow control (PFC)

Fixed/slow PFC

Series Reactors, Series Capacitors, PSTs

First gen of dynamic PFC

UPFC, CSC

Advanced PFC

Modular SSSC

Photo sources: BTW, T&D World, Smart Wires

The rise in uptake of advanced power flow control (APFC)

3.5 GW
from 159 MW

of capacity unlocked

$1.6 Bn
from $11 M

customer savings

1.9 GVAr
from 22 MVAr

commissioned or in delivery phase

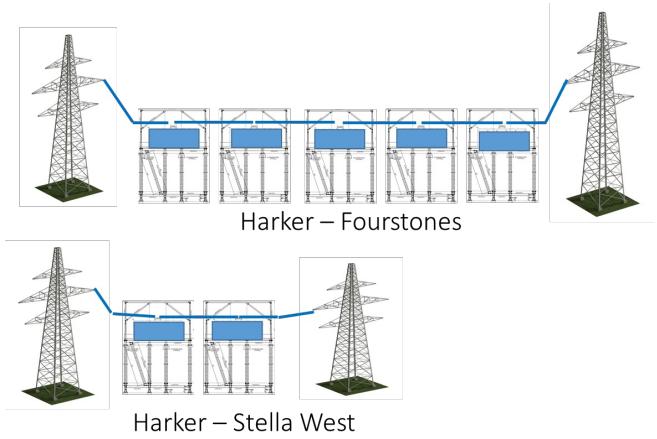
>3,200
from 1,700

device-years of operation

= SmartValve™ deployment
Red = Oct 2023
Blue = Oct 2019

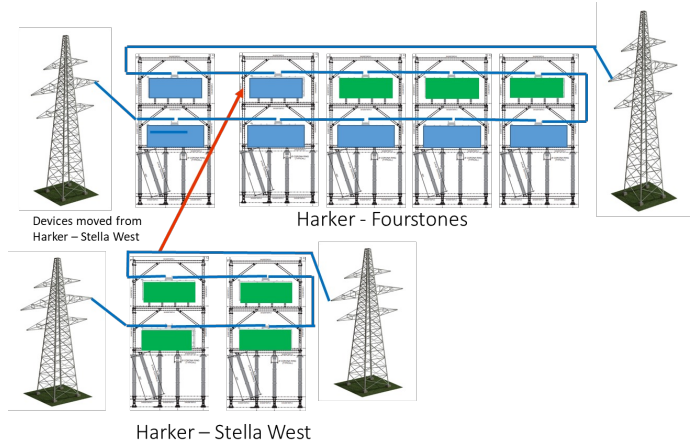
Unlocking capacity quicker than alternative options in the U.K.

2020 - 2021



Increased network need is confirmed in 2021

2022 - 2023



2-year

lead-time

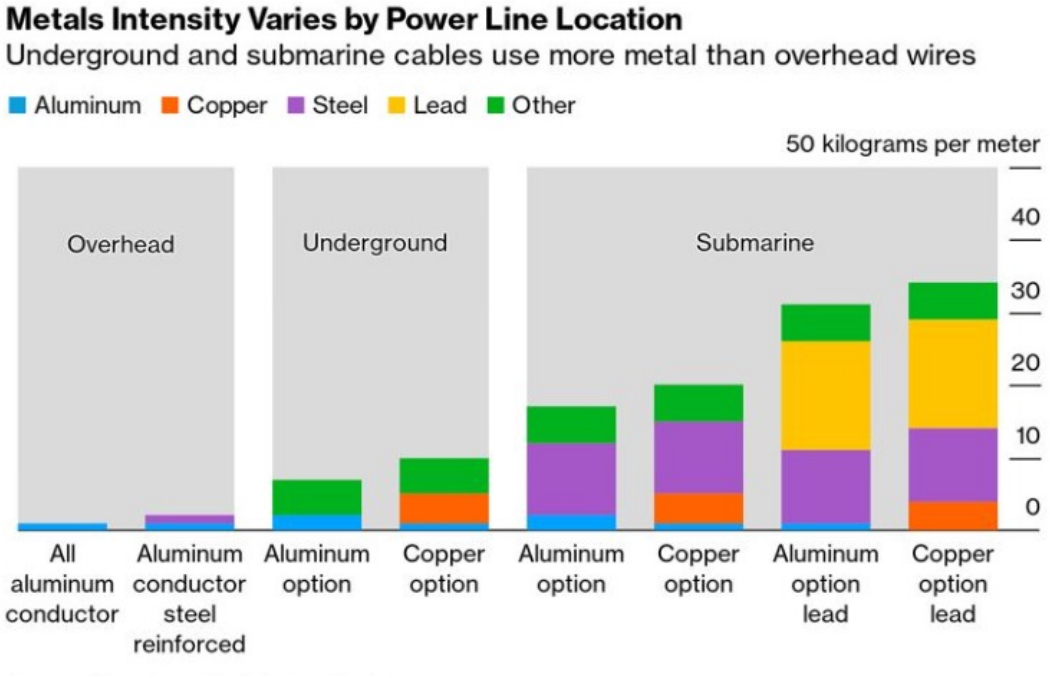
2 GW

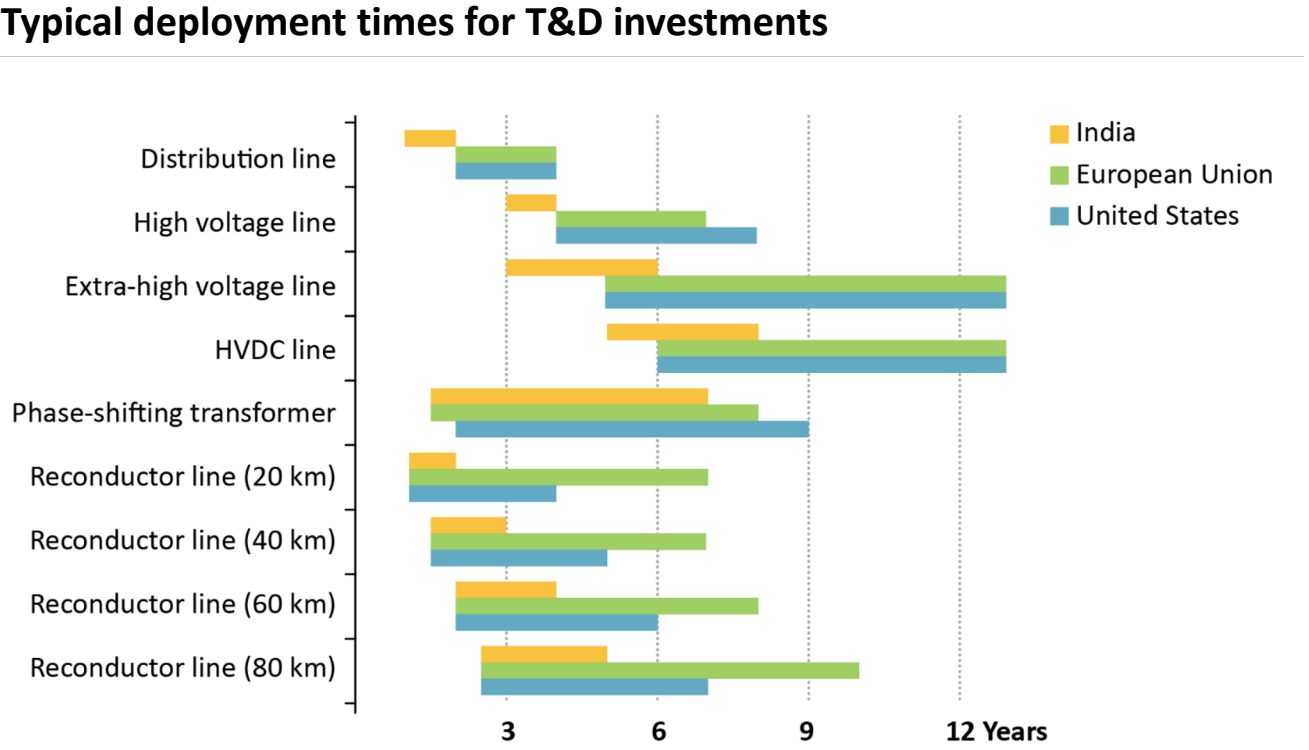
extra capacity unlocked on the existing network

2.5x

higher NPV than alternate solutions

The case for rapid deployment of GETs





Sources: IEA, BNEF and Smart Wires

U.S. federal regulatory and funding support for APFC

Order 2023

FERC

Generator and Transmission Study Process

Mandate that utilities consider Alternative Transmission Technologies during the study process

Alternative Transmission Technologies:

- static synchronous compensators (StatCom)
- static VAR compensators (SVC)
- advanced power flow control devices (APFC)
- transmission switching
- synchronous condensers
- voltage source converters
- advanced conductors
- tower lifting

Grid Deployment Office

GDO GRID DEPLOYMENT OFFICE

FACT SHEET

GRID RESILIENCE AND INNOVATION PARTNERSHIPS PROGRAM

Established by the Bipartisan Infrastructure Law, the U.S. Department of Energy's Grid Deployment Office is administering a historic $16.5 billion investment via the Grid Resilience and Innovation Partnerships (GRIP) program to enhance grid flexibility, improve the resilience of the power system against growing threats of extreme weather and climate change, and ensure American communities have access to affordable, reliable, clean electricity when and where they need it.

ENHANCING THE CLEAN ENERGY TRANSITION BY ENHANCING GRID STABILITY

Algonquin Power Fund America, Inc. plans to deploy SmartValve, an advanced power flow control technology that quickly solves grid issues by unlocking additional transfer capacity on existing transmission lines. The project aims to increase transmission transfer capacity of the existing grid, resolve stability issues, mitigate the risk of climate impacts, and be replicable at other

PROJECT DETAILS

- Project: Enabling the Clean Energy Transition by Enhancing Grid Stability Using SmartValve Technology
- Applicant/Selectee: Algonquin Power Fund America Inc.
- GRIP Program: Smart Grid Grants (Bipartisan Infrastructure Law, Section 40107)
- Federal cost share: $42,905,918
- Recipient cost share: $42,905,918
- Project Location: Illinois and Texas
- Project type: Grid Capacity and Renewables Integration

HELPFUL LINKS

- Grid Resilience and Innovation Partnerships Program
- About the Grid Deployment Office

Published October 2023. Fact sheet information is based on project applications at the time of publication and should not be considered final.

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INCREASING TRANSMISSION CAPACITY TO EXPAND RENEWABLE ENERGY INTEGRATION

The Electric Power Research Institute (EPRI) and Vermont Electric Power Company (VELCO) will install advanced power flow control (APFC), specifically modular static synchronous series sompensators (M-SSSC), at interregional tie lines to systematically increase the transfer capacity across regional borders. The project also includes a series of power system studies to assess the economic, operational, and reliability benefits of larger adoption of APFC in the system, and a comprehensive analysis of SmartValve technology and system impacts of APFC integration.

Anticipated Outcomes and Benefits

The enhanced transmission capacity will be vital to secure a reliable energy supply to the increasing demand in Vermont and will facilitate increased energy dispatch of renewable energy, thus allowing the state to achieve its renewable energy target. The APFC will also help optimize the cross-border flows with Vermont while reducing the maintenance and outage costs of the existing phase-shifting transformers on the border with New York. Due to VELCO's co-op style financial structure, the economic benefits derived from the reduced generation cost will directly lead to lower costs for consumers. These benefits include:

- Use of low-cost technology to increase the effective transmission capacity and operational transfer capacity between the New York–Vermont border.
- Improved system efficiency and reliability due to the dynamic and autonomous nature of the control.
- Reduced maintenance and outage costs to customers and reduced impact of prolonged outages due to maintenance and failures.
- Added technology will reduce generation costs to energy consumers.
- Eleven on-site tours for public schools, universities, labor committees, non-profits organization, utilities, and governmental departments.
- Comprehensive community benefits agreement negotiated with utility, local labor organizations, municipalities, environmental justice and economic development organizations, and universities.
- On-the-ground resources allocated to train the local workforce, both utility workers and subcontractors, on the installation, operations, and maintenance of SmartValve devices, including the advanced data management practices for digital grid operation.
- Expanded domestic manufacturing and jobs and diversified component supply chains from local and regional suppliers.

PROJECT DETAILS

- Project: Optimizing Interregional Transfer Capacity Using Advanced Power Flow Control
- Applicant/Selectee: Electric Power Research Institute Inc.
- GRIP Program: Smart Grid Grants (Bipartisan Infrastructure Law, Section 40107)
- Federal cost share: $18,017,358
- Recipient cost share: $18,017,358
- Project Location: Vermont
- Project type: Grid Capacity and Renewables Integration

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Addressing barriers to inclusion of APFC in planning and operations

- Collaborated with planning software vendors and utilities to co-develop modular SSSC models for **PowerFactory**, **INTEGRAL** and **Organon**
- Developed **user-defined models** for other planning platforms
- Actively working with other vendors to make modular SSSC models **natively available** in additional platforms.

Models readily available on request for:

- PowerFactory
- INTEGRAL
- Organon
- ASPEN
- MATLAB®/Simulink®
- PSCAD™/EMTDC
- PSLF
- PSS®E
- RSCAD/RTDS
- TSAT
- PowerWorld
- NEPLAN

If you would like to request models for any platform, reach out at info@smartwires.com

We've been here before…

- ESIG expanded from **wind integration** to **integrating energy systems**.

- **Overcoming barriers** to inclusion of GETs in network planning and operations is **no more technically challenging** than previous work.

- The **ESIG GETs User Group** positions ESIG to lead the resolution of technical issues in order to accelerate the adoption of GETs and **meet energy transition schedules**.