Inside FirstEnergy's

CENTER FOR ADVANCED ENERGY TECHNOLOGY

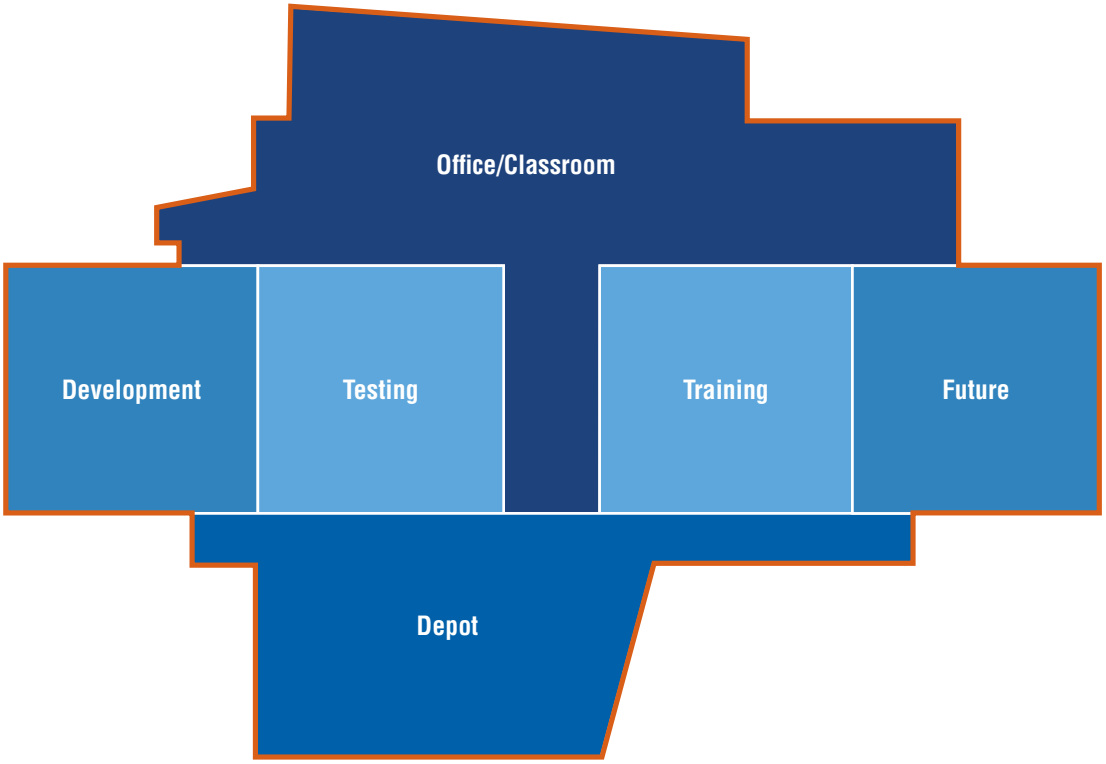
Energizing the FUTURE

FirstEnergy's **Center for Advanced Energy Technology (CAET)** opened its doors in April 2019, providing a leading-edge facility dedicated to evaluating and testing transmission technology as well as training staff on new grid solutions that can enhance service reliability for customers.

The 88,000-square-foot facility is one of the most comprehensive testing and training facilities of its kind in the country and supports FirstEnergy's efforts to modernize the grid across its six-state service area. It provides the company's transmission professionals with a centralized, hands-on setting for upgrading, maintaining and ensuring the security of the power grid by simulating real-world conditions on the electric transmission system. The Center also offers a central location for the evaluation and management of digital programmable devices in the field.

The CAET supports the following functions:

- Developing and evaluating new transmission technologies, protocols and applications for potential use in the field
- Validating the security of new, programmable devices to ensure compliance with industry standards
- Training participants on substation equipment under a variety of conditions, as well as how to test and commission programmable relays that are replacing older, mechanical devices across our system
- Providing a secure facility for the storage of spare relays and programmable devices, including electromagnetic interference protection measures



FirstEnergy undertakes these functions in four key areas of the facility:

DEVELOPMENT AREA (10,000 SQ. FT.)

The Development Area evaluates new applications for existing programmable devices and protocols, as well as analyzes new devices to determine if they can be effectively and securely placed into service. It provides a secure location to:

- Develop and test individual substation control devices
- Assess human performance factors that maximize safety and reliability
- Evaluate device interfaces and validate cyber hardening
- Develop security baseline document and relay test procedures for new devices
- Perform forensic analysis of substation control/programmable equipment that failed in the field

- Perform integration testing and disaster recovery testing for IT/OT equipment that needs to work together

A Real-Time Digital Simulator (RTDS) mimics real-world conditions to help staff evaluate the performance of connected devices.

FirstEnergy also has the capability to evaluate security devices including radio/communications, video, thermal imaging and swipe cards, as well as to assess threats to the grid, such as electromagnetic interference (EMI) and geomagnetic disturbances (GMDs).

TESTING AREA (10,000 SQ. FT.)

The Testing Area applies security hardening and device configurations for cyber assets to be deployed in transmission substations. This function enables FirstEnergy to comply with evolving standards, which require complex Security Baseline Documents that specify password, patching, firmware and security configurations for every device in the field.

- Currently required for FirstEnergy's critical transmission substations
- Expanding to all additional transmission substations

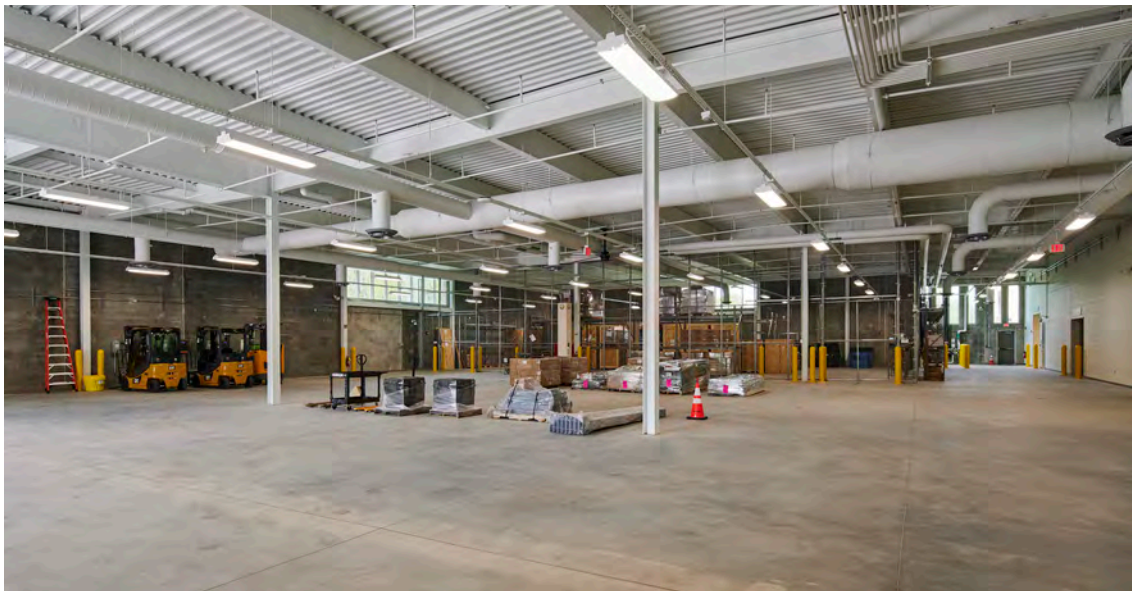
Work in this area also anticipates a forthcoming supply chain requirement, requiring utilities to certify that programmable devices bound for a transmission substation do not have malicious code hidden in them prior to being placed into service.

TRAINING AREA (10,000 SQ. FT.)

The Training Area provides classroom space and equipment to build and retain a highly skilled workforce focused on safe work practices, enhanced productivity and the application of new communication and line technologies. The work area features two transmission substation control rooms to simulate real-world conditions for technicians and engineers as they undergo transmission training.

DEPOT/SHIPPING AREA (20,000 SQ. FT.)

The Depot consolidates storage of all spare programmable devices and equipment from other company locations into one centralized, highly secure facility. The shipping operation enables FirstEnergy to securely receive programmable devices from vendors and ship them to transmission substations in compliance with evolving standards.



ANTICIPATING FUTURE NEEDS AND APPLICATIONS

The CAET supports FirstEnergy's efforts to modernize its transmission system, while creating opportunities to advance best practices across the industry. The company is currently exploring opportunities for industry collaboration with peer utilities, research institutes as well as key stakeholders – device manufacturers, municipal utilities, co-ops and other large transmission customers – to potentially utilize this state-of-the-art facility.

May 2019
COMM8842-05-19-CV-DP
Produced by FirstEnergy's Communications and Branding Department

FirstEnergy®