

FirstEnergy[®]

Transmission

FirstEnergy PMU Deployment *Industry Perspective*

NASPI Work Group Meeting

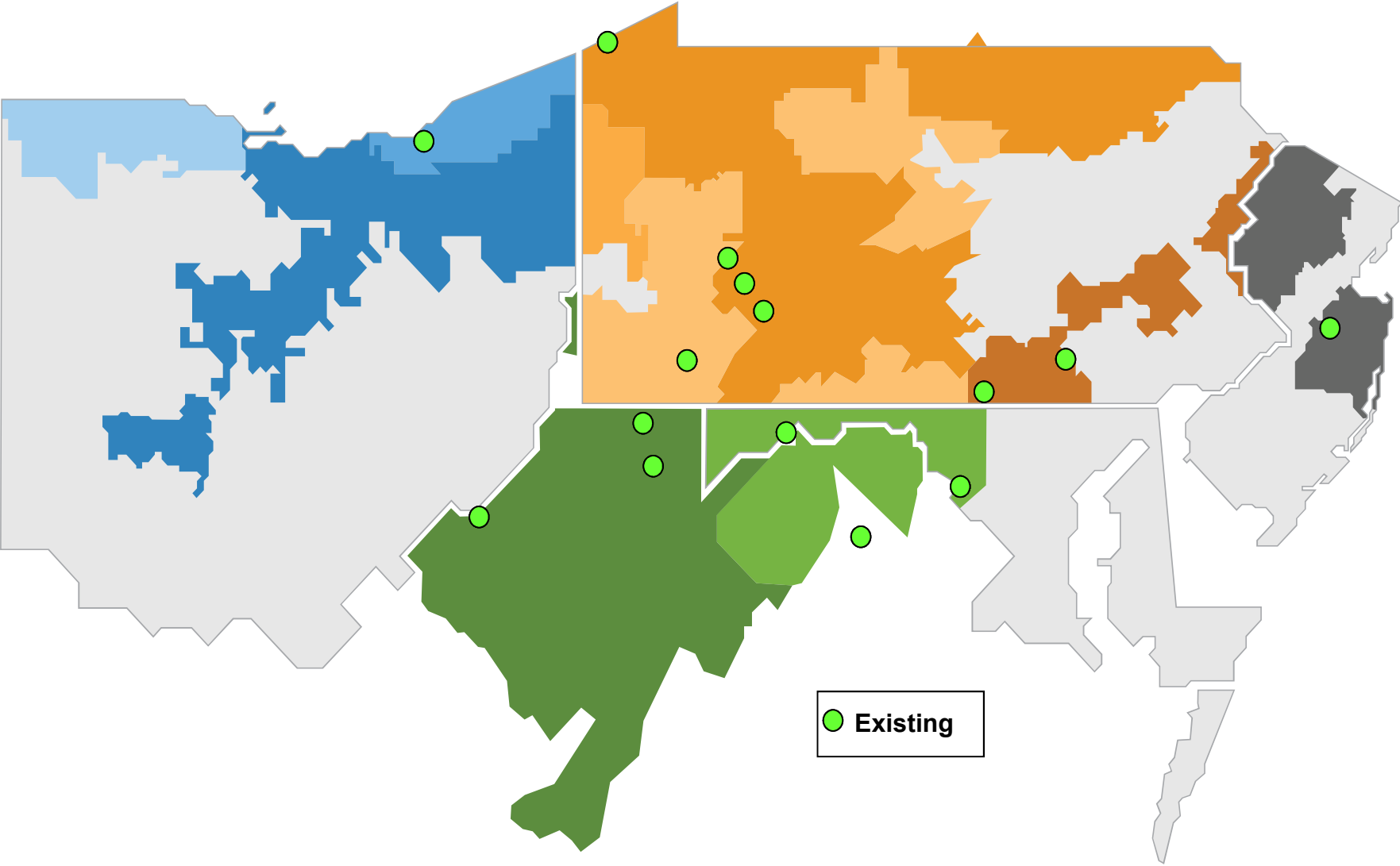
October 29, 2019



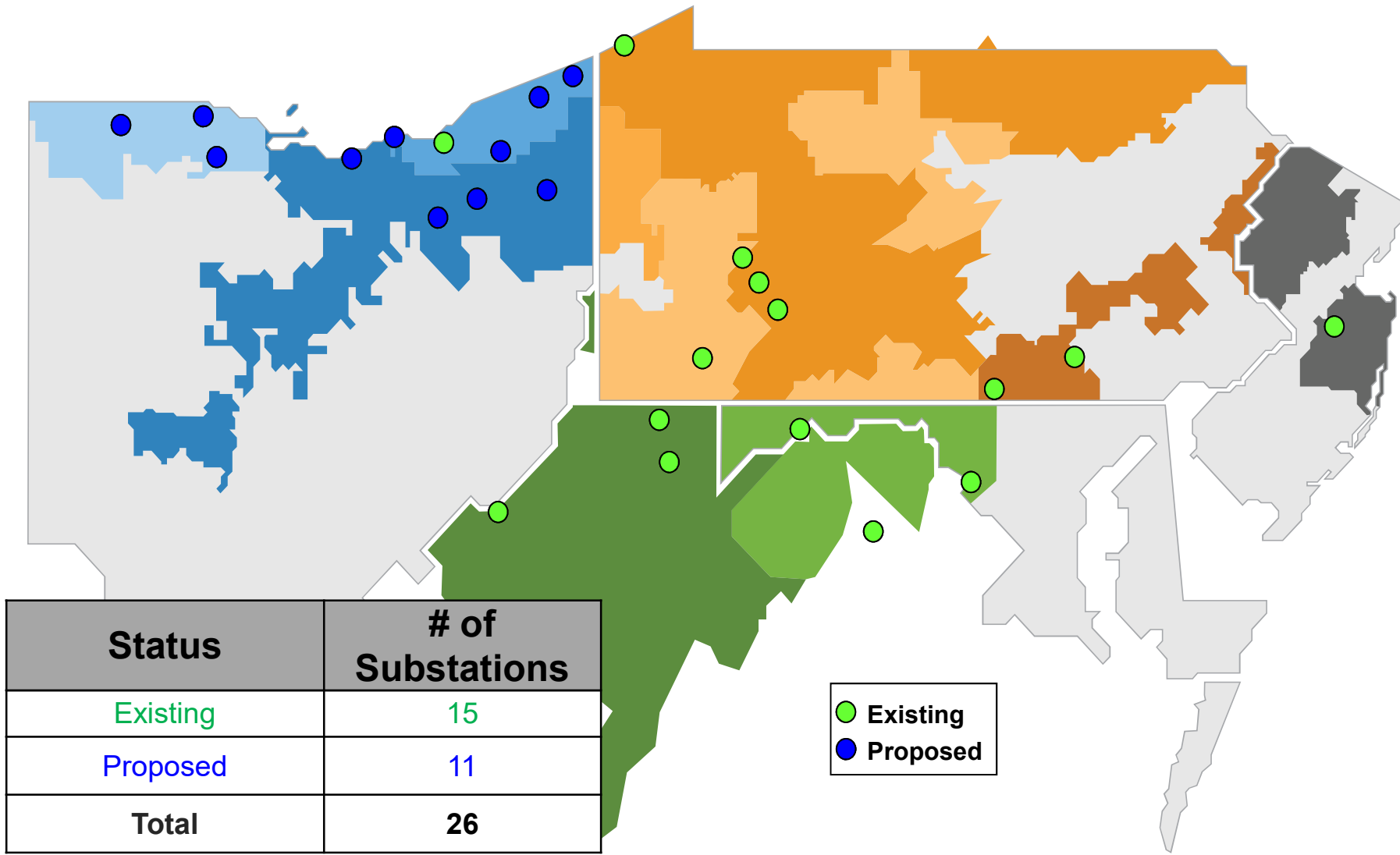
Agenda

- Existing PMU Locations
- Proposed PMU Locations
- PMU Implementation Project
- Location Selection Analysis
- Demonstrating Benefits/Value
- Challenges Concerning PMU Technology

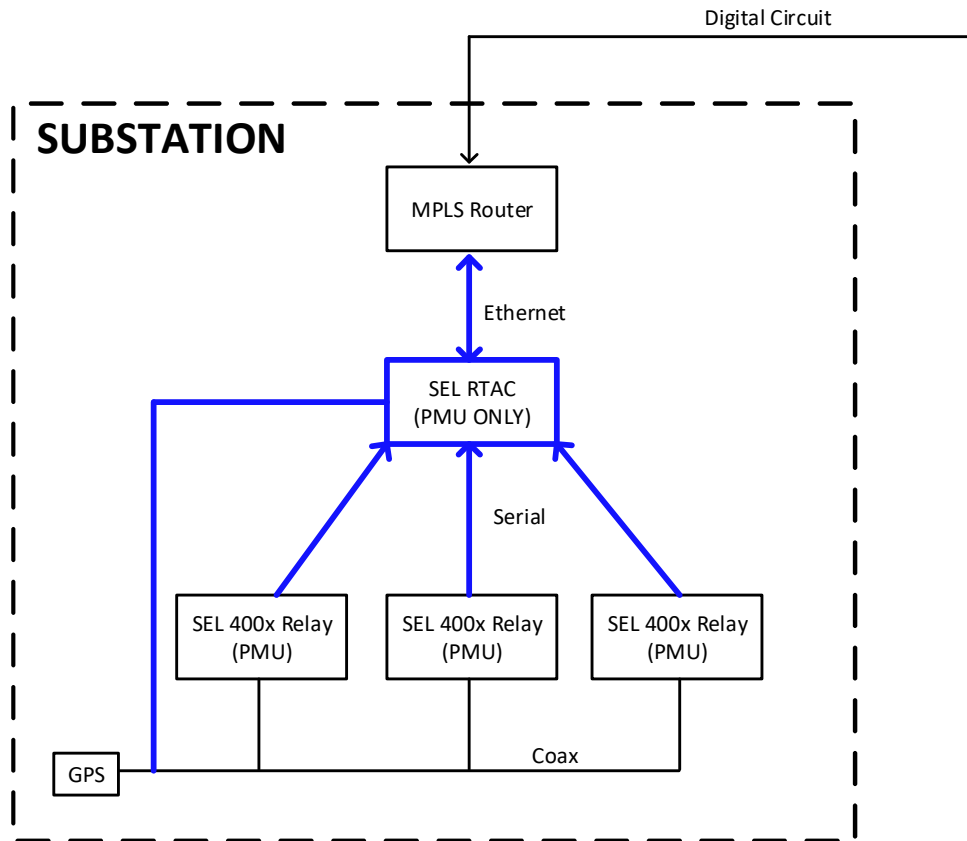
Existing PMU Locations



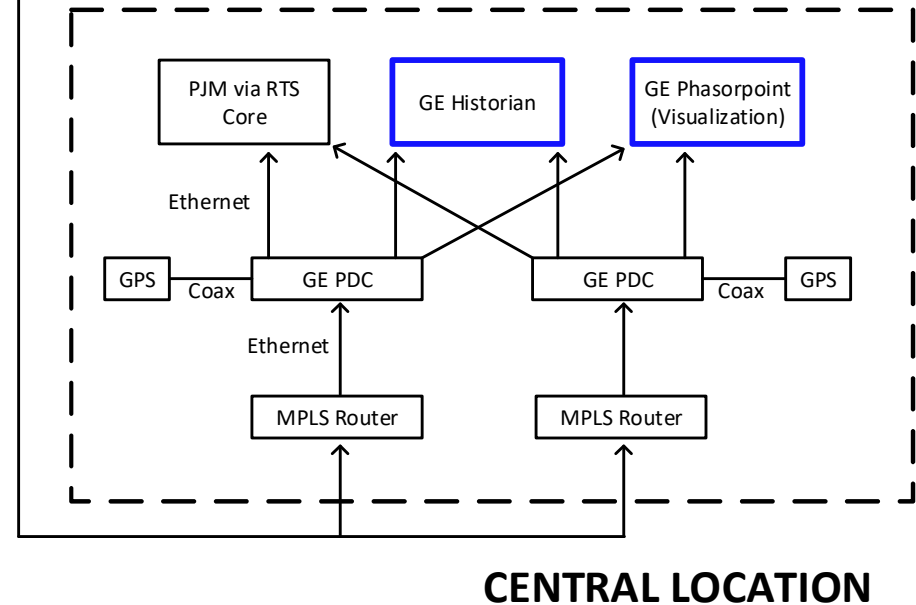
Existing and Proposed PMU Locations



PMU Implementation Plan



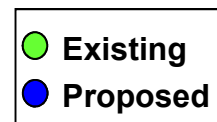
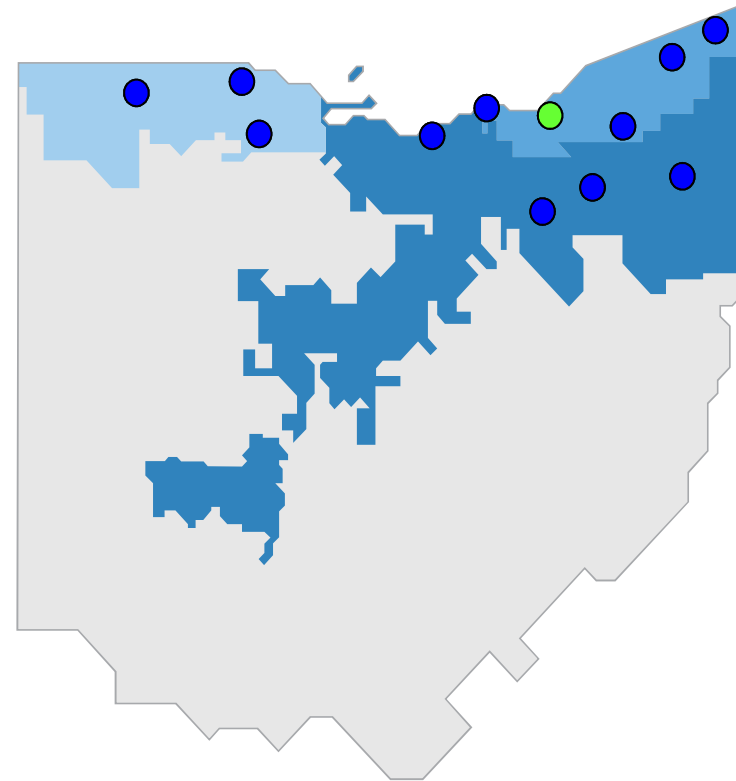
- Upgrade the GE Phasorpoint solution to include more PMU licenses, storage and applications for visualization



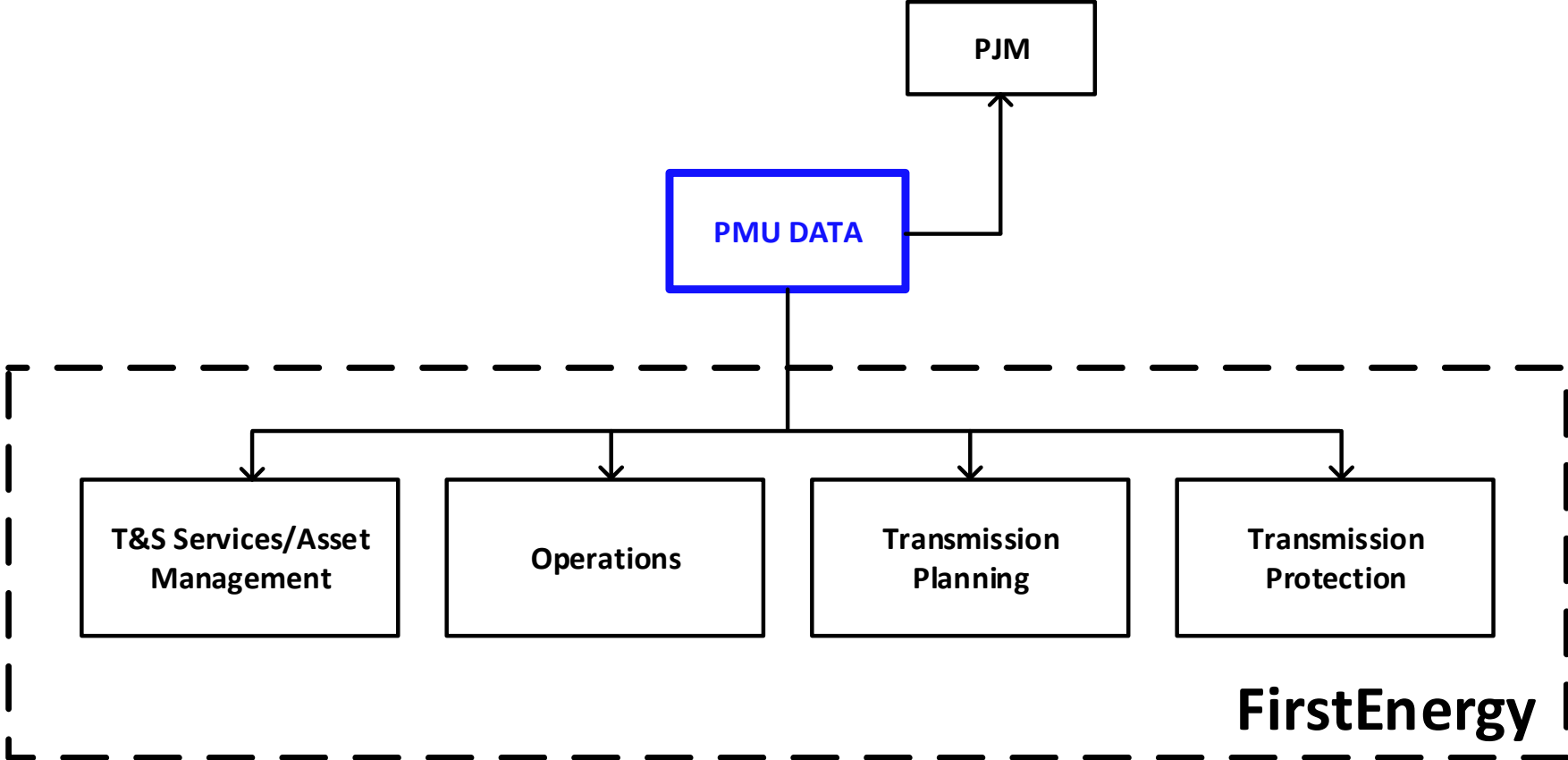
- Replace relays (if required)
- Add substation data concentrator
- Add serial cables between relays and data concentrator

Location Selection Analysis

- **Across FE Footprint**
- **Selected 345 and 138 kV substations based on prioritized benefits**
 - Linear State Estimation
 - System Monitoring
 - Model Validation
 - Other
- **Prioritized benefits weighted for additional analysis**



Benefits/Value



Challenges Concerning PMU Technology

- **Defining use cases for PMU data**
- **Quantifying impact on system operations**
- **Developing and building applications utilizing PMU data**
- **Technical support and management of PMU program**
- **Competing priorities/limited resources**

Thank You

The letters 'QA' are rendered in a large, bold, blue sans-serif font. The 'Q' is positioned to the left of the 'A', and they are both slightly overlapping.