Olney Town Center Microgrid Control System R&D

Project Background

When the Montgomery County Council adopted the Olney Master Plan, it recognized Olney Town Center as an area that "serves as the focal point of the community's civic life." Located less than 20 miles from the nation's capital, Olney Town Center contains many facilities and services that are critical to the community's safety, health, and economic vitality. The 1 square-mile area includes a hospital and police station, as well as multiple grocery stores, gas stations, pharmacies, and other retail shops. Additionally, public library and school buildings serve as emergency shelters, and two nearby fire stations protect the community.

Pepco has taken many steps to harden the grid, but the company also recognizes the value of supplying power to critical loads locally during rare times when a grid outage is extended. A resilient microgrid at Olney Town Center would provide safety and security advantages by ensuring the community's ability to provide vital services during an outage event.

In November 2014, the U.S. Department of Energy awarded a $1.2 million research and development grant to a Microgrid Institute team, with utility partner Pepco, to support the design, simulation, and testing of a resilient microgrid system for Olney Town Center.

- **DOE/NETL Project:** $1.2 million to research, develop, model, and test a community microgrid control system designed for Olney Town Center (Montgomery County, Md.)
- **Design Objectives:**
  - Improve reliability to SAIDI* <2 min.
  - Increase efficiency by >20%
  - Reduce CO_2 footprint by 20%+
  - Improve community resiliency
- **Team**: Microgrid Institute (*prime contractor and project manager*), Pepco, Green Energy Corp., Schneider Electric, and N.C. State Univ.
- **Project Phases:**
  1. Research, Design, and Modeling
  2. Laboratory Testing and Validation
  3. Engineering and Deployment†

*SAIDI = system average interruption duration index (standard reliability metric)
† Current DOE/NETL award for Phases 1 and 2 only

An advanced microgrid control system combined with reconfigured distribution circuits will allow the Olney Town Center Microgrid to maintain resilient and clean energy supplies for the community. Serving vital facilities during outages will require about 1,800 kW of distributed photovoltaics, 730 kW of battery energy storage, 3,500 kW of highly efficient gas-fired combined heat and power units, and 150 kW of gas-fired gensets, installed in several zones.

Making it Work

- *Intelligent control system*
- *Distributed PV, battery storage, CHP (cogeneration), and gas-fired gensets*
- *Four primary zones and two satellite systems (fire stations), each to island during outage*
- *All zones operate as a portfolio during normal operations, enabling economic and environmental optimization*

Multi-zone microgrid avoids vulnerable overhead lines

Achieving highly resilient community energy supply requires avoiding use of overhead lines that are vulnerable to weather events, such as ice storms and high winds that cause trees to fall. This need, as well as the relative dispersion of critical community facilities across the Olney Town Center area, led the project team to design a multi-zone system, with several microgrid zones capable of maintaining resilient energy service.

Efficiency and renewables reduce climate footprint

Like communities across Maryland, Olney faces the challenge of reducing its climate footprint. Designing a microgrid to help achieve this goal requires an intelligent control system that is capable of maximizing efficiency and integrating substantial amounts of non-polluting renewable energy.

Leveraging local energy for community resilience

Also like many Mid-Atlantic communities, Olney is experiencing steady growth in population, and also growth in distributed photovoltaics (PV) and electric vehicles (EV). This creates both challenges and opportunities – challenges to serve a growing community with new energy needs, and opportunities to leverage local energy resources to support community resiliency.

Intelligent control system optimizes use of resources

The Olney Town Center Microgrid uses the GreenBus distributed energy control platform to enable dynamic control of energy and customer loads in a multi-zone microgrid. This approach to control technology and system architecture ensures high efficiency, low emissions, and resilience for critical services across the Olney Town Center area.

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