

## City of Painesville, Ohio Vanadium Redox Battery Demonstration Program

### Project Description

The City of Painesville, Ohio and its partners will demonstrate vanadium redox battery storage capacity at the 32 megawatt (MW), coal-fired Painesville Municipal Electric Plant (PMEP). Using stored power enables the facility to attain the same daily output requirement, more efficiently and with a lower carbon footprint. When the project is fully implemented, the plant will operate at a constant 26 MW, 80 percent of rated capacity. The long-term goal is to scale the battery system in stages, ultimately upgrading the facility to 10 MW of capacity with up to 80 MW hours of storage. In the first phase, 1 MW of power with 6 to 8 hours of storage will be installed. This capacity is sufficient for Painesville to evaluate the benefits of energy storage, assess its uses in optimizing power generation efficiency, and facilitate American Municipal Power with leveling the peak demands of the system. A bi-directional four quadrant inverter, with a rated capacity of 1.0MW and 1,440 amps at 480 VAC, will be used to provide AC/DC and voltage conversions. The battery will be constructed with two parallel electrolyte flow systems providing the total net electrical capacity of 1.0 MW. Each subsystem will be comprised of 64, 10kW stacks. The subsystems will be arranged in parallel to supply peak operating loads. Each stack subsystem will have their electrolyte flow into two 15,000 gallon polymer tanks, at rates ranging between 500 and 1500 gallons per minute. The battery components will be produced in the United States and the stacks will be assembled in Painesville before being installed at the PMEPE Battery Building.

### Goals/Objectives

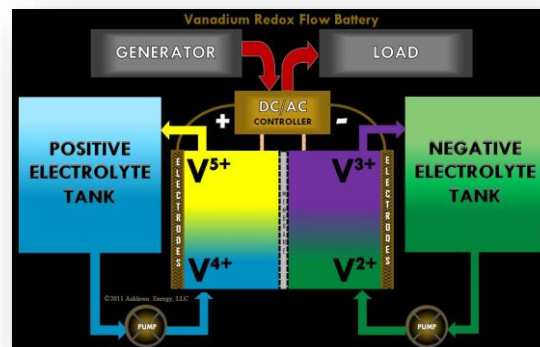
- Demonstrate power storage to provide spinning reserves in a grid environment with expansion to a larger scale
- Establish a template that can be introduced throughout the United States
- Provide data on the active use of storage to manage peak requirements in the most efficient manner

### Key Milestones

- Battery Building Construction Complete (June 2012)
- Production design finalized (June 2013)
- Begin production of demonstration battery system (January 2016)
- Battery commissioning (September 2016)
- Demonstration Period Completed (September 2018)

### Benefits

- Initially, 29 jobs will be created, with an additional 212 created by 2016
- Energy costs will be reduced
- Power quality will be improved
- Carbon emissions will be reduced by 24,000 metric tons



### CONTACTS

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### PARTNERS

Painesville Municipal Power  
Ashlawn Energy LLC  
Concurrent Technologies Corporation  
American Municipal Power (AMP)  
GPD Group Inc.  
PJM Interconnection

### PROJECT DURATION

3/1/2010–1/31/2016

### BUDGET

**Total Project Value**  
\$9,462,623

**DOE/Non-DOE Share**  
\$4,243,570/\$5,219,053

### EQUIPMENT

Power Conversion System  
Battery Control System  
Redox Battery Stacks  
Storage Tanks  
Electrolyte Circulation System

### DEMONSTRATION STATES

Ohio

CID: OE0000233

Managed by the National Energy Technology Laboratory for the Office of Electricity Delivery and Energy Reliability

