

News Release. 8th July 2010

US Department of Energy Smart Grid Program Award for Demonstration of V-Fuel Vanadium Battery Technology in the USA.

In November 2009, the US Department of Energy National Energy Technology Laboratory, announced the award of a US\$3,743,570 grant to the City of Painesville Ohio, under Recovery Act – Smart Grid Demonstrations **Funding Opportunity Number: DE-FOA-0000036**, to install and demonstrate a 1 MW / 8 MWh vanadium redox battery using V-Fuel's technology at their Municipal Power Plant. The purpose of the Smart Grid program is to further the electrical storage technology in support of the power grid in the United States of America through demonstration projects.

Painesville Municipal Power (PMP) is a municipal coal generating plant, rated at 32 megawatts of power, owned and operated by the City of Painesville in Lake County, Ohio. PMP provides electrical power to the City and its surrounding area. The plant currently follows demand, operating in a daily cyclical manner to start up and shut down boiler operations, operating at up to the full 32 MW capacity during the day, and reducing production output at night to 10-12 MWs. Demand for power in Painesville may reach over 50 MWs on some days, and normally exceeds the rated capacity. When the demand exceeds the facility's output or can be purchased more economically than through its own generation, Painesville relies upon purchased power delivered to PMP system through purchase agreements with American Municipal Power, Inc. (AMP, Columbus, Ohio).

As a coal fired generating facility, PMP strives to reduce plant emissions. These emissions are measured continuously so as to provide information updates required to reduce the release of carbon dioxide as well as other regulated emissions. Should proposed "cap and trade" legislation be enacted through Congress, Painesville's estimated financial impact could range between \$2 and \$6 million per year, depending on provisions of the final version of the bill enacted.

In order to meet future emissions targets, the City of Painesville wishes to pursue a demonstration project utilizing V-Fuel's vanadium redox battery technology to provide peak power management for its facility. The long-term goal of the project will be to scale the battery system in stages and finally upgrade its facility to a 100% storage capability. The vanadium redox battery technology, at full deployment, will provide Painesville the opportunity to operate the PMP facility at a constant 26-27 MW output. It is estimated that the efficiency and cost of operating the facility would greatly be enhanced while emissions substantially reduced. Significantly, purchased power costs, peak power needs and costs, maintenance, and other potential cost offsets could also be reduced if the facility is enabled to operate at greater efficiency. Energy storage provided by the vanadium redox battery technology potentially offers Painesville the opportunity to realize these improvements.

A multi-step approach has been proposed to allow Painesville to proceed with the technology in a systematic, phased manner to incorporate lessons learned and adjust for improvements that will undoubtedly arise through project scaling. The first of these steps, or phases, is the incorporation of a 1 MW / 8 MWh pilot system that will provide an opportunity for:

- the local battery manufacturer to identify and implement improvements,
- PMP to implement the management systems and controls to incorporate the battery system into its production management, and
- the opportunity for AMP to integrate the technology into its day-to-day power management operation.

The two-year data collection period and system monitoring program will provide significant insight to the City of Painesville for its future decisions as to how best to proceed with scaling up the battery system to benefit full scale plant operations.

Licence Agreement with Ashlawn Energy, LLC, for the USA.

Local U.S. company, Ashlawn Energy LLC has been contracted by the City of Painesville to provide the battery for this pilot demonstration project. Ashlawn Energy has licensed V-Fuel's vanadium redox battery technology, under which the 1 MW / 8 MWh vanadium battery demonstration system will be manufactured, installed and integrated by Ashlawn Energy with technical support from V-Fuel. Under the US Recovery Act, DOE Smart Grid grants are awarded to create local jobs in the USA. Ashlawn Energy has committed to creating local jobs through installation and manufacturing of stacks and all major components in the U.S., working in collaboration with the V-Fuel technical team that includes the inventor of the technology, Dr. Maria Skyllas-Kazacos, Professor of Chemical Engineering at the University of New South Wales (USNW) Australia, and co-founder of V-Fuel Pty Ltd.

Also under the V-Fuel Licence Agreement, Ashlawn has received a contract from Cascade County, Montana to install a 50kW six-hour vanadium redox battery in conjunction with an existing 50kW wind turbine to demonstrate the power leveling capability for energy storage for wind projects in the local Montana area.

For the proposed efforts under the license, Ashlawn will produce battery and system components in the United States, stacks will be assembled in the Painesville area, and then installed locally. Ashlawn Energy expects to create thousands of jobs and will boost the local economy in Northeast Ohio that has been heavily stricken by the loss of good manufacturing jobs as in all of Ohio. In anticipation of the required job training effort, V-Fuel will also assist Ashlawn in the development of specific job training programs for the vanadium redox battery technology.

Key component suppliers for the vanadium battery are located in nearby Parma, OH and Lake County, OH. GrafTech of Parma, OH is currently the largest U.S. manufacturer of graphite plates for the hydrogen fuel cell industry and has qualified these products for the vanadium redox battery. The power electronics module, originally developed in Austria, will be supplied by American Superconductor, Milwaukee, WI. Power integration will be performed by Flanders Electric of Evansville, IN.

Painesville Municipal Power and its highly qualified team partners are ready and committed to the challenge of demonstrating and scaling V-Fuel's vanadium redox battery technology to megawatt scale and to employing its world class talents and local and regional resources to assure the success of this demonstration project and to create new technology, highly-paid green collar jobs in the Northeastern Ohio region. With the assistance of V-Fuel, this team stands ready to take on the challenge of providing the vanadium redox energy storage system to do its part in assuring America's energy security and independence.

DOE Announcement - City of Painesville

Painesville Municipal Power Vanadium Redox Battery Demonstration Program -Demonstrate 1 MW vanadium redox battery (VRB) storage system at the 32 MW municipal coal fired power plant in Painesville. The project will provide operating data and experience to help the plant maintain its daily power output requirement more efficiently while reducing its carbon footprint.

Painesville, OH; Johnstown, PA; Alexandria, VA; Evansville, IN; Devens, MA; and Parma, OH Recovery Act Funding \$3,743,570 Total Project Value Including Cost Share \$7,487,153

<http://www.energy.gov/news2009/8305.htm>

V-Fuel Team Visit to Painesville Power Plant

In October 2009, members of the V-Fuel team met with Ms Rita McMahon, Painesville City Manager, Ms Cathy Bieterman, Painesville Director of Development, and Norma Byron and Hal Muller from Ashlawn Energy, and visited the Painesville Municipal Power Plant in Ohio to discuss the DOE Smart Grid proposal.



From left to right: Ms Rita McMahon, Painesville City Manager, Ms Cathy Bieterman, Painesville Director of Development, and Norma Byron from Ashlawn Energy during V-Fuel's visit to Painesville Municipal Power Plant, Ohio in October 2009.

