



UPDATES

Welcome to our bi-annual Installation Energy and Water newsletter, where we provide periodic updates about new information and products available from the Installation Energy and Water Program Area.

Enhanced Energy Resilience Through Integration of Microgrid Control Systems and Energy Storage

The Department of Defense (DoD) operates over 500,000 buildings and structures with diverse inventory encompassing barracks, commissaries, data centers, office buildings, laboratories, and maintenance depots, among others. Most of these bases are largely dependent on a commercial power grid that is vulnerable to disruption from cyber-attacks, aging infrastructure, weather-related events, and direct attack. To ensure mission assurance, DoD adopted an energy strategy¹ focused on security and resiliency for fixed installations to reduce energy costs, increase security, and improve energy resilience. In line with this strategy, the Environmental Security Technology Certification Program (ESTCP) has invested in a microgrid project, [EW-201350 Portsmouth Naval Shipyard Microgrid and Ancillary Services](#), that demonstrated integration of a Microgrid Control System (MCS) capable of Fast Load Shed (FLS) and Battery Energy Storage Systems (BESS) for back-up power, to manage loads and distributed generation to meet economic, performance, and security objectives while ensuring reliable operation.

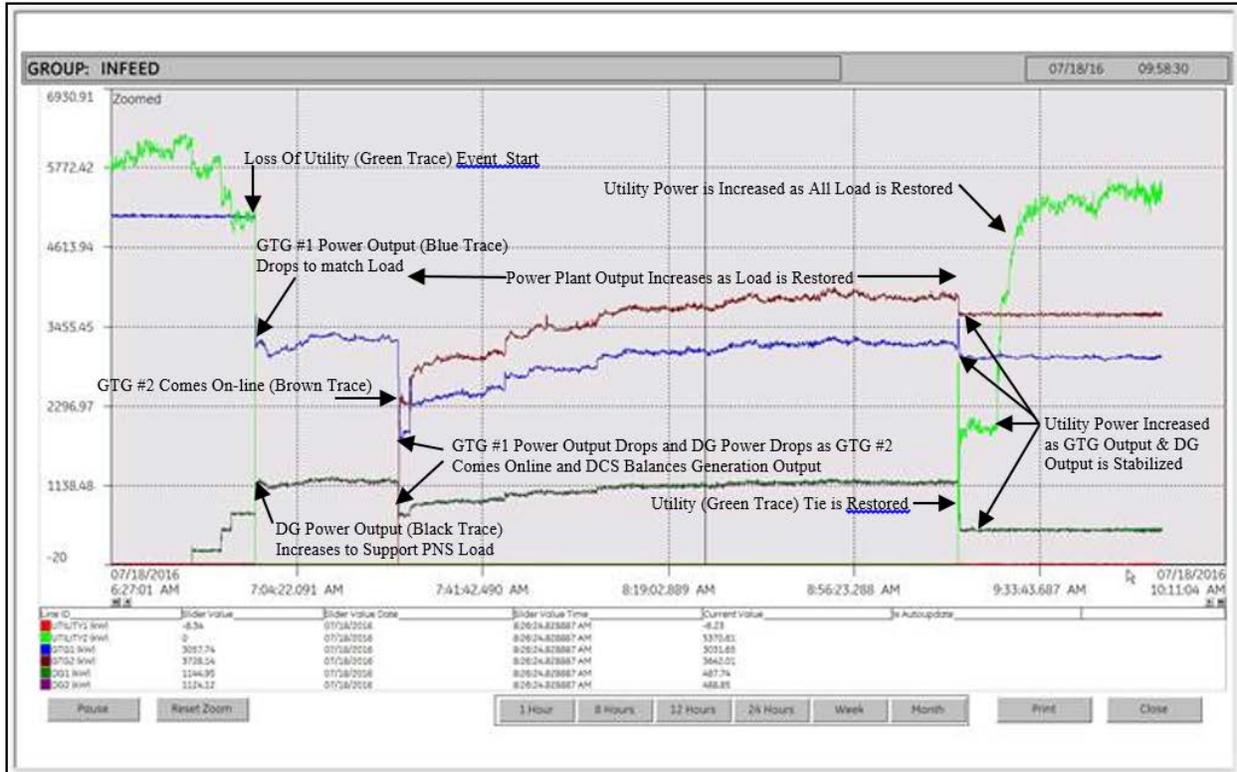
The objective of this project was to demonstrate that an FLS-capable MCS and BESS can be integrated with onsite generation at military bases to enhance the security and reliability of electric service to the base, provide ancillary services to the electric grid Independent System Operator (ISO), and generate cost savings. The demonstration was conducted at the Portsmouth Naval Shipyard (PNS) in Maine, where they typically experience two to three outages per year, resulting in disruption of Shipyard operations.

The demonstration included innovative technologies such as the BESS with a 580-kilowatt-hour (kWh) lithium ion battery, a 500-kW bi-directional inverter, and an MCS with FLS capability. The role of BESS was to provide on-demand power capacity during transitions from grid power to islanded microgrid power and ongoing voltage and frequency regulation to ISO-New England (ISO-NE). The MCS integrated the BESS and a variety of existing onsite generation assets to implement an FLS scheme and interfaced the PNS power system into the ISO-NE ancillary service power markets. The control system included new metering so the MCS can intelligently select the loads to shed to balance with available supply. The MCS used the metering data to adaptively calculate the steady-state generation load balance for changing power system conditions and select the prioritized loads to shed to maintain this balance following the detection of a utility outage.

¹ http://www.acq.osd.mil/eie/IE/FEP_index.html

Strategic Environmental Research and Development Program (SERDP) Environmental Security Technology Certification Program (ESTCP)
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HMI Trend Display – July 18, 2016 LoU Event

*GTG – Gas Turbine Generator, DG – Diesel Generator

The project successfully demonstrated islanding the facility during both simulated and live loss-of-utility events (see “HMI Trend Display” Figure). The MCS tripped sufficient load to maintain steady-state generation and correctly dispatched the BESS output for the transition to islanded microgrid mode. The FLS took less than 80 milliseconds to shed non-critical loads once the loss-of-utility event was detected. The demonstration was well received by PNS and the Principal Investigator is actively pursuing technology transfer opportunities across DoD. Additional details on the demonstration results can be found in the Final Report and the Cost and Performance report available for download on the project webpage. [MORE](#)

Recently Released Documents, Available for Download

- EW-201242 - “Zinc Bromide Flow Battery Installation for Islanding and Backup Power” - [Cost and Performance Report](#)
- EW-201246 - “Sodium-Metal-Halide Battery Energy Storage for DoD Installations” - [Final Report](#)
- EW-201338 - “Demonstration and Testing of an Energy Efficiency Ratio (EER) Optimizer System for DX Air-Conditioners” - [Final Report, and Cost & and Performance Report](#)
- EW-201350 - “Portsmouth Naval Shipyard Microgrid and Ancillary Services” - [Final Report, and Cost & and Performance Report](#)
- EW-201519 - “Utilization of Advanced Conservation Voltage Reduction (CVR) for Energy Reduction on DoD Installations” - [Final Report](#)

Key Events and Meetings

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November 27-29, 2018 - SERDP-ESTCP 2018 Symposium

The SERDP and ESTCP Symposium is a nationally recognized conference focusing on the DoD's priority environmental and installation energy issues. The 2018 Symposium will be held from November 27-29, 2018, at the Washington Hilton Hotel in Washington, D.C. Planning has begun, and this year's meeting is shaping up to be an excellent event. As in years' past, the 2018 Symposium will be centered on technical sessions that span the wide spectrum of SERDP and ESTCP investments.

The technical sessions will be complemented by two poster sessions that highlight SERDP- and ESTCP-funded efforts along with the relevant work of others in the community. As in previous years, a number of short courses will be offered that provide attendees the opportunity to dive deeper into different topics and earn continuing education credits.



The Symposium attracts members of the end-user and research communities along with DoD leadership and regulators. There will be a variety of networking opportunities for the more than 1,000 attendees from the military services; academic and research institutions; private sector technology and environmental firms; and Federal, state, and local regulatory and policy-making organizations. Additional details will be added to the [Symposium website](#) as the technical program is developed.

Upcoming Conferences

August 21-23, 2018 - Energy Exchange and Better Buildings Summit, Cleveland, OH

The Department of Energy (DOE) is bringing together the Energy Exchange and Better Buildings Summit, creating the largest DOE training, trade show, and peer event of the year. Check out several of the ESTCP Principal Investigators presenting on the projects at the technical sessions. [MORE](#)