FY 2021 Broad Agency Announcement: Topic B8 **January 7, 2020**

Environmental Security Technology Certification Program (ESTCP)

ENHANCED ENERGY RESILIENCY

OBJECTIVE

The Department of Defense (DoD) Installation Energy Test Bed seeks demonstration projects of innovative technologies and approaches to improve the energy resilience on military installations. As defined in 10 U.S.C. § 101(e), *energy resilience* means the ability to avoid, prepare for, minimize, adapt to, and recover from anticipated and unanticipated energy disruptions in order to ensure energy availability and reliability sufficient to provide for mission assurance and readiness, including mission essential operations related to readiness, and to execute or rapidly reestablish mission essential requirements.

Installations have a wide variety of energy systems that deliver electrical and thermal energy to power critical missions, fuel industrial processes and power and condition facilities. Most installations rely on the commercial electrical grid for primary power and building-level diesel generators and uninterruptable power supplies (UPS) for back-up power to serve critical loads. More frequent and stronger natural disasters and threats to the commercial electric grid require new solutions to improve energy resilience and meet the energy requirements for mission assurance. Microgrids can provide improved resiliency but multiple challenges still exist. ESTCP seeks demonstrations of innovative solutions to improving energy resilience that have broad application across military installations. Of particular interest are solutions that:

- Leverage existing solar power (predominantly photovoltaic [PV]) within the fence line of military installations to enhance energy resilience. Existing PV systems at installations offer the potential to support energy resiliency by providing power to critical loads during a grid outage. Yet many of these systems have not been designed with this as their primary goal.
- Address the interdependencies of energy, water and communications systems in support of ensuring mission execution. Failures in electric power are well recognized as having impacts on water and communication support for the mission. But failures in water and communication systems can also impact energy support for the mission.
- Provide cost effective approaches to characterize sub-building critical loads. Many loads do not require continuous uninterruptible power. Reduction in the required peak critical load leads to a direct reduction in the capital and O&M costs.
- Provide advanced load management approaches to support mission functions during a grid outage (i.e., when islanded) and provide additional revenue when grid tied. Load shedding decisions must be based on the priority of mission requirements as well as their anticipated impacts.
- Are informed by recent work performed by the Services in developing Installation Energy Plans per the Office of the Assistant Secretary of Defense for Energy, Installations, and Environment (OASD (EI&E)) Memo, *Installation Energy Plans –*

Energy Resilience and Cybersecurity Update and Expansion of Requirement to All DoD Installations.

- Offer innovative business models for financing resilience improvements.

Proposals that include modifying or integrating with existing assets (e.g., PV array, privatized utility) that are owned or operated by non-DoD entities should include the asset owner/operator on the project team. Proposals that address only unique site-specific needs or seek to demonstrate mature microgrid technologies will not be considered responsive to the intent of this solicitation.

BACKGROUND

Recently, an increased focus on installation energy resilience has facilitated a lot of work within the Services to determine mission-based energy requirements and identify and prioritize energy resilience projects. In 2016, OASD (EI&E) issued a memo requiring the Services to include Installation Energy Plans as part of their required Installation Master Planning process; in 2018, another memo was issued requiring the Installation Energy Plan to include assessments of energy resilience and cybersecurity. Additionally, the DoD has funded several Tabletop and Energy Resilience Readiness Exercises to assess the performance of installations' electric power infrastructure and to test emergency operations processes. The results of these exercises have been helpful in identifying capability gaps between interdependent systems and relating these gaps to impact on mission assurance.

Each military Service has a variety of on-site PV systems of varying size and procured through different methods. These PV systems have been developed over the course of several years and were initially motivated by statute and DoD renewable energy goals[1]. Today, DoD pursues renewable energy to advance its energy resilience, but most of the existing projects for generating renewable energy within military installations have been designed to achieve cost savings, and some projects do not supply any electricity for on-site use. Multiple challenges exist to integrate existing solar power systems into an islandable backup power system that can support critical loads and improve power quality during a grid outage. The solar project's location, size, and contract/ownership can be less than ideal, and the linkage to the on-base distribution system and controls can be absent. Given the requirements to support critical loads at military installations for up to two weeks, on-site, renewable generation sources that do not require supply of fuel from off-site offer great advantages. Cost effectively transforming renewable energy projects primarily designed subject to economic considerations to ones that also support substantial improvements in energy resiliency would support DoD's energy resiliency goals.

Load awareness and management can directly improve energy resiliency and reduce the life cycle costs of resiliency solutions. A major cost of resiliency is onsite distributed energy resources (DERs) to serve critical loads during grid outages. The size of the required DERs is set by the installation peak critical load that must be protected. Microgrids can exploit the complexity of critical loads in a building. Many such loads do not require continuous, uninterruptible power.

[1] The Department is subject to two renewable energy goals: title 10 U.S.C. § 2911(g) and Section 203 of the Energy Policy Act (EPAct) 2005 (42 U.S.C. § 15852(a)). Title 10 U.S.C. § 2911(g) established a goal for DoD to produce or procure not less than 25 percent of the total quantity of facility energy it consumes within its facilities by FY 2025 and each FY thereafter from renewable energy sources. Additionally, in 2009 each Service establish a goal of procuring 1 GW of renewable energy by 2020.

Microgrids, if well-integrated with building management systems (BMS), can also rapidly manage these interconnected loads to maintain a stable power supply to critical loads during outages in the event of DER failures or unanticipated increased load requirements. In addition, advanced load management should enable greater participation in advanced demand response markets. The primary barriers are the cost, time, and risk of meeting cyber security requirements and the ability to interface with multiple legacy BMS.

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For pre-proposal submission due dates, instructions, and additional solicitation information, visit the ESTCP website.