NREL and Army validate energy savings for net zero energy installations

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The U.S. Army has partnered with the Energy Department's National Renewable Energy Laboratory (NREL) to increase energy security through improved energy efficiency and optimized renewable energy strategies at nine installations in the Army's portfolio. If all nine of the Army Net Zero Energy Installation (NZEI) pilot sites achieve net zero energy, they will replace approximately 8 percent of the Army's current total installation energy use with renewable energy. In fact, if all Army installations worldwide were to achieve a 25 percent reduction in energy consumption, as the NZEI pilot sites can, the Army would save approximately 20 trillion BTUs and up to $300 million in annual energy costs.

The NZEIs studied by NREL employed technologies that can be replicated across the Department of Defense and other federal agencies, setting the stage for broad market adoption. The Energy Department's Federal Energy Management Program has been supporting this project's implementation and replication efforts.

"It's been exciting to be a part of the net zero energy journeys of so many installations and to see the variety of approaches," NREL Project Leader Sam Booth said. "For example, Fort Hunter Liggett is on track to achieve net zero energy largely through many small projects, while Kwajalein is focused on achieving its net zero goal through a single large project."

Six of the Army pilot sites focused solely on net zero energy: Camp

Parks Reserve Forces Training Area (Calif.), Fort Detrick (Md.), Fort Hunter Liggett (Calif.), Kwajalein Atoll (Republic of the Marshal Islands), Sierra Army Depot (Calif.), and West Point (N.Y.). Three other sites volunteered for unique net zero energy initiatives. Oregon Army National Guard is piloting a net zero energy initiative that includes all of its installations across the state. Fort Bliss (Texas) and Fort Carson (Colo.) are piloting integrated net zero energy, water, and waste programs.

The findings from NREL's collaboration with the Army are detailed in a recently released report, "Army Net Zero Energy Roadmap and Program Summary."

NZEIs produce as much energy on site as they use throughout a year. An NZEI reduces its overall energy use by maximizing energy efficiency, energy recovery, and cogeneration opportunities and offsets its remaining energy demand with on-site production of renewable energy.

NREL supported the Army's NZEI pilot program by performing energy assessments that incorporate a mix of energy efficiency and renewable energy projects to meet the net zero energy goal at each location. The assessments identified energy efficiency projects to reduce demand and on-site renewable energy technologies to meet the remaining energy load. System infrastructure, interconnection solutions, microgrid potential, and financing options are also part of the assessments. Key project development considerations included location and available renewable resources, the types of permits required, technical performance goals, and technology development partners.

While the initial installations were selected for the same end goal, the path to achieving net zero is unique to each installation. They all have different mission requirements, energy costs, building types and ages, renewable energy resources, and staff resources.

As a result, each NZEI has unique benchmarks and projects tailored to its location. Fort Carson, for example, transformed 1950s-era barracks into contemporary Leadership in Energy and Environmental Design (LEED) certified office buildings. The result was a dramatic reduction of energy use in the building envelope, lighting, plug loads, and heating, ventilation, and air conditioning (HVAC) systems.

Several NZEIs have installed or have plans to install solar arrays of varying sizes. Camp Parks Reserve Forces Training Area is on track to have a 2-megawatt (MW) photovoltaic (PV) array built soon, and Fort Bliss has proposed a design for a 20-MW PV array to reduce electricity purchases by 15 percent.

"While setting a net zero energy strategy is an important first step, the road to net zero requires a sustained effort from a strong and motivated team to continue to develop, refine, and execute the strategy," said Paul Volkman from the Office of the Assistant Secretary of the Army (Installations, Energy & Environment).

Provided by National Renewable Energy Laboratory

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