Artificial Intelligence Managed Microgrid with Energy Storage

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Abstract

Secure resilient power is required for circuits to support DOD critical mission. Robust energy storage and technologies are needed to provide resilient power. In our initial surveys of California DoD bases, we found that all bases reviewed had the water and elevation / topography needed to support pumped hydro- energy storage on the order of 250KW for four hours or more. It is interesting that even MCAGCC 29 Palms in the Mojave Desert has reclaimed water from the base wastewater treatment plant. We also found that several of the bases reviewed constantly flush / waste potable water in order to comply with the Safe Drinking Water Act disinfectant minimum level. This means that Vandenberg SFB loses 30 percent of its potable water at system dead ends. This "bad news" is "good news" for pumped hydro energy storage. Our efforts are centered around using an axial piston pump and controls ($75,000) to achieve 80% round trip efficiency at small (for hydropower) scales versus 25-65% for standard centrifugal pumps. This pump has been ordered and is scheduled to arrive in FY23. We want DoD to be aware of the new (draft) Microgrid Unified Facility Criteria (UFC).

Biography

Rob Nordahl is a registered mechanical engineer with more than thirty-three years of DoD experience, working at U.S. Navy NAVSEA, NAVFAC EXWC and NAVFAC NBVC and U.S. Air Force AMC and ACC. Nordahl currently is the Microgrid Power Systems Team Lead and guides microgrid efforts for Standing up Academy for Microgrid Training. He leads microgrid efforts in multiple sites, including San Nicolas Island, Rota Station, Spain, and McMurdo Antarctica. Nordahl also served as a nuclear engineer for seven years at the Bechtel Power Corporation.

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