

Fort Huachuca Direct Coupling® DC Microgrid

U.S. Army Facility Begins Shift to Renewable Energy Sources with Installation of Solar Powered, Direct Current Microgrid

OVERVIEW

Federal government mandates require the nation's military facilities to reduce the amount of their energy consumption by 30% by 2015; new or refurbished buildings must reduce fossil fuel use by 55% (from 2003 levels) by 2010, and 80% by 2020.

The U.S. Army Corps of Engineers contracted Nextek Power Systems to install a Direct Coupling® DC Microgrid located in the water chemistry lab of the south chiller plant at Fort Huachuca, AZ, in a demonstration project designed to illustrate progress towards the above goals, as well as evaluate the potential for larger installations.

Ft. Huachuca is located 50 miles southeast of Tucson, and receives, on average, 6.0 to 7.0 kWh/m²/day via solar energy throughout the year, which places it at the upper end of the solar energy reception spectrum in the United States. It is in a region of high potential for the development of solar energy.

In typical microgrid installations, DC power generated from renewable sources is inverted to AC current to access the grid, and then rectified back to DC for use in the load. Each

conversion incurs energy losses ranging from 3% to 30%.

SOLUTION

Direct Coupling® technology utilizes DC-compatible equipment that eliminates the need for most of these conversions/inversions, regulating the solar array and the power to the load, thereby reducing power loss in the system, which translates to energy cost savings.

Existing photovoltaic panels were employed. The solar array produced between 60 – 120 VDC through a Maximum Power Point Tracking Controller to a constant output voltage for distribution through a Power Server Module. The input of the PSM combines DC from the PV (or other renewable source), with the bidirectional functionality of a battery backup/storage unit, and AC from the grid.

RESULTS

The DC photovoltaic system successfully powered the facility, completely eliminating the use of grid-supplied AC power since its installation, and showed potentially significant energy cost savings if installed base-wide.



RESULTS AT A GLANCE:

AC Grid Energy Reduction
100% (No AC grid power has been consumed since the installation of this project, in July 2011.)

ROI breakeven point
3.13 years

System life expectancy
20 years

Large-scale (25,000 sf) energy and efficiency savings
\$3,000/year

Reconfiguration Savings
\$1.7 million (large-scale)

DC Microgrid system efficiency
97% for DC input

Reduced risk of electrical shock by replacing 110 VAC lighting system with safer, low voltage 24 VDC system.

CONTACT NEXTEK

Find out how we can design a custom solution for your business.

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