U.S. Marine Corps Stands at Forefront of Energy and Water Savings

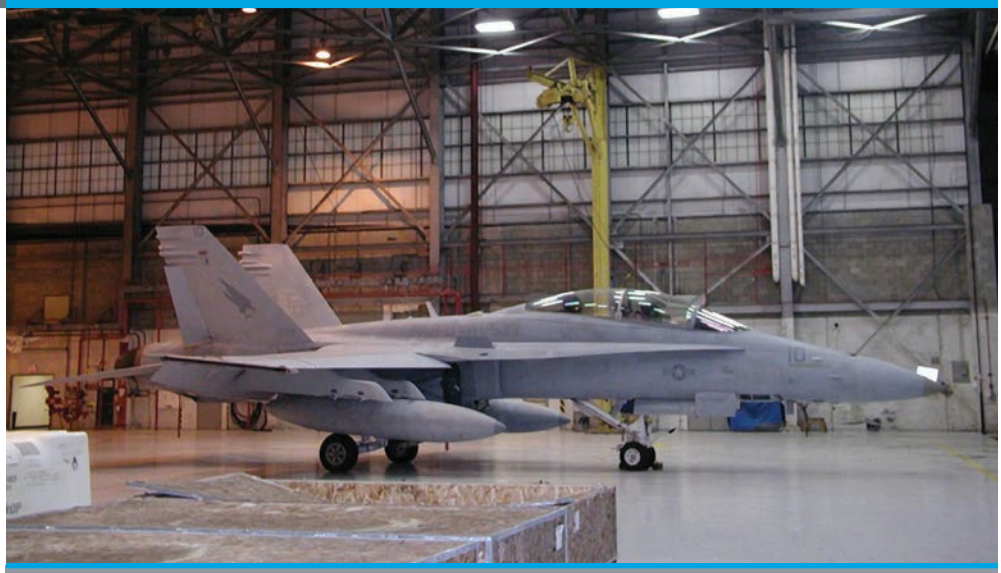
Located in the heart of South Carolina, the U.S. Marine Corps Air Station (MCAS) Beaufort is among the military's most important installations. Located on 6,900 acres 70 miles southwest of Charleston, the installation has established an energy- and water-saving culture that explores and implements new strategies and management approaches aimed at surpassing presidential mandates.

As a result, in June 2012 MCAS Beaufort reduced its energy intensity by 30% compared to its 2003 baseline, meeting the 2015 goal of 30% reduction. MCAS Beaufort also realized a 48% reduction in water intensity compared to its 2007 baseline—far exceeding the 16% Department of Navy reduction goal.

Most notable among MCAS Beaufort's energy- and water-saving achievements is the completion of a three-phased project that used an energy savings performance contract (ESPC) to install high-efficiency geothermal heat pump heating, ventilation, and air conditioning (HVAC) systems; high-efficiency hangar and high bay area lighting; occupancy sensors for lighting; high-efficiency facility lighting;

Fleet Fuel Reductions

MCAS' conservation efforts extend to reducing petroleum consumption in their fleets as well. MCAS Beaufort integrates the use of E85 in their fleet vehicles and has also purchased hybrid and electric vehicles. Together these efforts, have contributed to a July 2012 fossil fuel reduction of 52% with respect to the 2005 baseline.



High-pressure sodium lights replaced high-intensity fluorescent lights to reduce energy use and increase lighting quality. *Photo from U.S. Marine Corps Air Station Beaufort*

energy-efficient chilled water systems; as well as low-flow water fixtures and energy use data tracking tools. The contract was a Trane Technology-Specific Geothermal Super ESPC that utilized the Department of Energy's umbrella ESPC. MCAS Beaufort was also able to claim renewable energy from its geothermal heat pump installations and installed a solar-powered hot water system at its Officer's Club. A cogeneration plant that supplies heating water along with 1 MW of electricity has also been installed. This plant is used to supply heating for the barracks and other facilities, along with reducing electrical load during peak energy demand periods.

Energy and Water Efficiency

To reduce energy and water use, MCAS Beaufort implemented additional best practices, such as efficient lighting systems and water fixtures, direct digital controls for HVAC, and a base-wide energy-management control system that provides the data and control capability needed to significantly reduce energy consumption.

In addition, advanced metering initiatives provide real time as well as historic energy data used to monitor and track energy performance at MCAS Beaufort.

Diverse Energy Portfolio

MCAS Beaufort's energy strategy includes a diverse portfolio of renewable energy technologies that combined provide more than 4,714 Mbtu in annual thermal and electrical generation—the equivalent of roughly 2.6% of the installation's total energy consumption. MCAS Beaufort demonstrated innovative leadership by building a natural gas-powered cogeneration plant. Also known as combined heat and power, cogeneration produces electricity and useful heat from the same fuel or energy source. There are many benefits of cogeneration systems:

- They reduce fuel use by utilizing waste heat.
- They are located at the point of energy use, so they provide high-quality reliable power.

- They reduce congestion on the electric grid by removing or reducing load during peak energy demand periods (thus helping the local utility in peak demand reduction).

The majority of MCAS Beaufort's renewable-energy production comes from geothermal heating systems, which are designed to pump heat from the earth into a facility during the winter and pull heat from the facility during the summer. Geothermal heat pumps use less electricity than traditional systems, so they reduce air pollution. In 2001, the HVAC systems in 1,236 housing units were replaced with geothermal heat pumps that have the capability of generating hot water as a byproduct. This project reduced energy intensity by 30%.

Other energy-production best practices put in place by MCAS Beaufort include a solar hot water unit in one of its buildings and a roof-mounted photovoltaic array on a covered parking area that provides 65 kW of electricity to the installation. Renewable energy projects continue to be pursued with new construction and major roof renovation projects. These projects are all being provided with a solar component, such as hot water generation or photovoltaic electrical generation.

The Marine Corps' solar roof initiative prompted the addition of this 65-kW solar array on a parking structure at MCAS Beaufort. *Photo from U.S. Marine Corps Air Station Beaufort*

An ESPC was used to install a 1 MW cogeneration plant that supplies heat to the barracks, mess hall, and medical facility. *Photo from U.S. Marine Corps Air Station Beaufort*

Ensuring Success

Clearly outlining roles and responsibilities for MCAS Beaufort's conservation efforts has been a key factor in its energy and water conservation efforts. An example of this is MCAS Beaufort's standard operating procedure, which now requires facility architects and engineers to address energy-efficiency in all facility designs and specifications.

The program has been so successful that several other military and government agencies have adopted MCAS Beaufort's best management practices and technologies, such as the use of geothermal energy and power.

MCAS BEST PRACTICES

Best Practice	Easy Things You Can Do
Develop all projects with energy conservation in mind.	Create a working group that includes all energy stakeholders such as building occupants, site planners, maintenance staff, architects, and engineers to develop your energy conservation goals and strategies.
Establish a "green" procurement standard for energy-efficient equipment.	To obtain more information about this "green" procurement standard, contact Amanda Sahl at the U.S. Department of Energy (DOE): 202-586-1662, *amanda.sahl@ee.doe.gov*
Integrate all HVAC and lighting into the base-wide energy management system.	Install occupancy sensors for lighting and programmable thermostats. Install an energy management system.
Use advanced metering to track and analyze energy data.	Capture, track, and analyze your energy data—whether it is through an advanced metering system or simple utility data in a spreadsheet.
Leverage an ESPC to help fund your energy conservation projects.	If you're interested in an ESCP at your site, contact a DOE Federal financing specialist listed at: *www.femp.energy.gov/financing/espcs_financingspecialists.html*

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