

Pew Study: Department of Defense Accelerating Clean Energy Innovation to Save Lives, Money

The U.S. Department of Defense (DoD) is accelerating clean energy innovations in an effort to reduce risks to America's military, enhance energy security and save money, according to a new report by The Pew Charitable Trusts. "From Barracks to the Battlefield: Clean Energy Innovation and America's Armed Forces" finds that DoD clean energy investments increased 300 percent between 2006 and 2009, from \$400 million to \$1.2 billion, and are projected to eclipse \$10 billion annually by 2030.

The DoD is now one of the world's largest institutional energy consumers. Using more than 300,000 barrels of oil daily and roughly 3.9 billion kilowatt hours of electricity a year, the U.S. military consumes more petroleum products than three-quarters of the countries in the world. Further, in Iraq and Afghanistan, fuel shipments account for 80 percent of all supply convoys. Military officials recently reported that one out of every eight U.S. army soldiers killed in Iraq died while protecting such missions. But new Pentagon initiatives could dramatically reduce our battlefield fuel demand through the use of new clean energy technologies, helping both save lives and stretch ever-scarce defense dollars.

The Pew report documents how DoD is helping to accelerate the development and deployment of clean energy technologies in three key areas: vehicle efficiency, advanced biofuels and energy efficiency and renewable energy at bases.

Energy efficiency and renewables at bases: With more than 500,000 buildings and structures at 500 major installations around the world, DoD manages three times the square footage operated by Walmart. Since 1985, DoD has reduced its facility energy consumption by more than 30 percent. By insulating 9 million square feet of base structures in Iraq and Afghanistan, energy consumption has been reduced by 77,000 gallons per day. Another initiative is the Army's "Net Zero" program which aims to have each of six installations produce as much as they consume in energy, water or waste by 2020, and two other installations, Fort Bliss in Texas and Fort Carson in Colorado, will become Net Zero in all three areas.

The DoD has 450 ongoing renewable energy projects producing or procuring 9.6 percent of its energy from clean sources in fiscal year 2010. Renewable energy spending by the department is projected to reach \$3 billion by 2015 and \$10 billion by 2030. The military's implementation of smart microgrids will grow by 375 percent to \$1.6 billion annually in 2020. Market analysts indicate that the DoD will account for almost 15 percent of the microgrid market in 2013.

934th Airlift Wing, Minneapolis-St. Paul International Airport

This past year, the 934th Airlift had the central steam plant, in operation since the 1940's, replaced. Boilers located in the central heating plant burned natural gas but, in agreement with the natural gas utility, on-demand burned jet engine fuel, similar to kerosene, and fuel oil. New, high energy efficient boilers were installed in many base buildings, replacing the old central plant. The natural gas-fired boilers have lowered base greenhouse emissions and operate at a higher efficiency. Emission reductions were 79% sulfur dioxide, 38% nitrogen oxides, 35% carbon monoxide, and greenhouse gas total CO2 equivalent of 37%.

Heat losses, incurred by over a mile of steam and condensate piping in tunnels, were eliminated through the removal of this underground piping system. Additionally, heat exchangers that used steam to heat the buildings were removed and resulted in further reduced energy losses. Overall, this has raised efficiency in heating the base buildings. The BTUs heating requirements for FY11 vs. FY10 were reduced by 34% when the heating degree days were normalized.

Over the last five to seven years, inefficient high energy consumption lighting has been replaced with more energy efficient lights. A recent project replaced the large neon sign, announcing the base to arriving and departing commercial air traffic travelers, with a high-efficiency, LED sign that has reduced electrical consumption and is more esthetically appealing.

Roofing and window replacement projects have incorporated additional insulation, and have resulted in reduced air infiltration, solar incidence, and reducing energy costs associated with heating and cooling. HVAC projects incorporate environmentally-friendly refrigerant, high-efficiency motors, and energy saving variable speed drives on fans and refrigeration compressors. Replacing shower heads in the base hotel with low flow heads has resulted in an estimated 21,000+ gallons of water a month.

The 148th Fighter Wing, Duluth, MN

The 148th set a goal back in 2003 to reduce energy consumption by 30% before 2013. As of now, the installation is over 90% of the way to realizing that goal.

This past spring the 148th installed five wind turbine generators. The Honeywell WT6500 Wind Turbines were installed on the roof of a cold storage building that directly supplies base energy requirements. These turbines utilize a new inverter technology that converts direct current to alternating current. Instead of generating power that is transferred to batteries, these turbines supply power right to the storage building on which they sit. This project will serve as a testing unit for both the Air National Guard and the manufacturer to see what the benefits and long term pay back will be.

In addition to utilizing wind energy, the 148th has implemented initiatives that look at the efficiency of already established buildings. The Installation Development Plan focuses on time-phased consolidation and energy efficiency improvements as buildings age. The 148th also implemented the Multi-Facility Energy Project which eliminated the central heat plant, replaced lighting switches, and installed digital thermostats set on timers that drop the temperature in the room during non-duty hour to automate energy usage.

Arden Hills Army Training Site (AHATS)

The Army Energy Management Report for FY09 contains a list of projects in planning or in construction and what their energy goals are. AHATS set a goal of 30 % below energy code requirements for the Readiness Center.

AHATS believes they will achieve the 30% reduction based on energy modeling of the building in standard code compliant form and with modifications applied to get a better performing building.

To date, enhancements that have been made to decrease energy usage include: enhanced insulation levels, building features allowing natural light into some interior spaces reducing day-time lighting requirements, fixed awnings on south-facing windows limiting the solar heat gain of summer sun angles, occupancy control of all lighting fixtures, higher efficiency boilers and a heating system designed to take advantage of the operating efficiencies of these boilers.

Although available funding did not allow for the inclusion of any on-site renewable energy sources into this building, AHATS does plan to participate in the utility company's renewable energy purchase program to obtain 7% of the electrical needs from off-site wind energy sources.

AHATS has also implemented The Infrastructure Improvement Project which is designed to support the planned campus development at the AHATS site. The project is underway now and allows for the study of district heating and cooling systems and the comparison of those systems to building specific systems. The district heating and cooling is felt to give AHATS some options to share renewable energy resources as well as enable the use of biomass. This review is currently underway.

The next building in the campus development is a 100,000 SF vehicle maintenance facility for which the construction contract was just awarded. (Rendering at left) This project will include a 40 KW Solar PV system and a solar thermal domestic water heating system.

The Pew Project on National Security, Energy and Climate is dedicated to highlighting the critical linkages between national security, energy independence, the economy and climate change. For more information, please visit www.PewTrusts.org/EnergySecurity.

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