



Saving Energy and Saving Marines

By Brigadier General Robert F. Hedelund
Commanding General, USMC Warfighting Laboratory

When speaking to the National Marine Corps Council last April 17th, then Commandant of the Marine Corps, General James T. Conway strongly emphasized one item that stands very high on his list of priorities—“In Afghanistan,” he said, “it is absolutely essential that we get the trucks off the roads.” He went on to note that far too many of our Marines have fallen victim to improvised explosive devices (IEDs), while guarding convoys of trucks hauling water and energy sources, mostly batteries and fuel, to forward operating bases (FOBs) in Afghanistan’s remote regions. “The objective of our efforts in developing alternative energy sources should be to find technologies that are capable of removing, in whole or in part, the need to move supplies to FOBs by ground transportation and, in so doing, save the lives of our Marines.” The Commandant’s bottom line was quite clear—Reduce deployed units’ demand for energy, especially fossil fuels. As he phrased it, “The fewer resources a unit consumes, the fewer resupply convoys it requires.”

To bring to light just how serious this transportation problem has become, General Conway had earlier convened the first annual U. S. Marine Corps Energy Summit on August 13, 2009. During this assembly, he identified tenuous lines of communication in Afghanistan and the inefficient use of logistics resources as a critical vulnerability to our operating forces. He also challenged industry to find ways to increase efficiency at the cutting edge in order to reduce or eliminate the number of logistics resupply convoys, therefore “getting the Marines off the roads.” And as a further measure of his commitment to solving this problem, the Commandant established the Expeditionary Energy Office in the Office of the Commandant in November of 2009.

ExFOB

In order to achieve the Commandant’s vision and take on the challenges he put forward, the Commanding General, Marine Corps Combat Development Command approved a temporary, experimental, platoon-size combat outpost at Quantico, and established a virtual company-size Forward Operating Base, in order to simulate and measure critical consumption metrics; develop, test, and evaluate potential material and non-material solution models; and establish base line data for use in future experiments.

The Experimental Forward Operating Base, or ExFOB, is a multi-organizational effort, with participation by: the Marine Corps Warfighting Laboratory, Office of Naval Research, Marine Corps Systems Command, Training and Education Command, the Expeditionary Energy Office and other contributors. The overall project is composed of four phases, with specific objectives geared toward the support of an extended user evaluation (EUE) with an operational unit.

The first two phases were executed aboard Marine Corps Base Quantico from March 1-3, 2010. The purpose of these phases was to determine the requirements (i.e., what requires electrical power, power generation support and distribution, fuel and water requirements, etc.) of a standard Marine infantry company. Broken down slightly more, one of the specific objectives of Phase I was to assess the shelters, equipment, as well as the energy and water demands of a Marine FOB. The focus of Phase II was the search for commercially available solutions to the problems identified in the previous phase. During an Industry Day at Quantico in conjunction with Phase II, several commercial off-the-shelf (COTS) items of equipment were identified for further testing and evaluation.

A few of the material solutions that were tested and evaluated included:

- 1Kw Power Shade—The Military Solar Power Shade Shelter provides 1 Kilowatt or 300 watts of continuous solar power to low power draw items; and also provides shade from the sun to reduce solar heat load from 80 to 90 percent. The Solar Power Shade is designed to fit over the Modular General Purpose Tent System.
- Ground Renewable Expeditionary Energy System (GREENS)—Solar panel-based renewable energy system capable of continuous power or 1 Kw peak power. The unit is designed to be scalable and adaptable for missions that do not require the full amount of power or energy storage.
- Light Emitting Diode (LED) lighting kits provide continuous tent lighting over a 20 day period in temperatures from 85 – 112 degrees Fahrenheit. This saves a significant amount of energy and works well with renewable energy sources. The lighting system has proven very durable and can be setup by two Marines in less than five minutes.

Although not tested and evaluated during Phase II, the Marine Corps is also very interested in the Solar Portable Alternate Communication Energy System – a flexible solar panel array that can be rolled out anywhere to charge batteries or run a field radio.

Phase III was the implementation phase in which material and non-material solutions were provided to an operational unit to conduct an EUE. The 3d Battalion, 5th Marine Regiment was identified by the I Marine Expeditionary Force as the unit that would conduct the EUE. In June, the Marine Corps Warfighting Laboratory subject matter experts provided instruction on the use of the experimental equipment set, as well as techniques, tactics, and procedures. In July, the location of the ExFOB shifted from the east coast base at Quantico to the desert of southern California. This move was due to the fact that the environment in that area of the United States more closely resembled that of Afghanistan, to where the battalion would eventually deploy. Exercise Enhanced Mojave Viper 5-10 at the Marine Corps Air-Ground Combat Center at Twentynine Palms, California provided the battalion with a realistic and representational environment in which to practice how its Marines could incorporate and employ the energy-related equipment. It was important to make sure that Marines deploying with the ExFOB gear were well trained on it, knew what the equipment can do and can't do, and know if the equipment is going to be able to function in the operational environment. Following the exercise, and as part of Phase IV (August), commercial vendors and academic experts were invited to a demonstration on the base at Twentynine Palms. The intent of Phase IV was to allow industry to demonstrate their technologies in order to provide applicable information necessary to advance the combat development process and assist with the overall science and technology efforts.



Brigadier General
Robert F. Hedelund

This final phase of ExFOB that ended last August focused on less mature technologies in three specific categories:

- Energy efficient heating and cooling;
- Efficient utilization of fielded generators; and
- Energy efficient water cooling.

The battalion deployed to Afghanistan last fall with its new equipment and is currently providing feedback that has already been a benefit to the combat development process as renewable energy technologies are being further advanced. These new technologies that 3/5 are evaluating will be used to supplement, not necessarily replace, traditional power supplies. After 3/5 returns from its deployment this year, its Marines should have valuable data on the potential payoff of renewable energy on the battlefield, and in operations in remote areas. At the present time, rough estimates show that by replacing conventional generators with solar devices, fuel consumption could be reduced by 30 to 50 percent.

OTHER INITIATIVES

Another part of the Marines' energy savings push is to reduce their dependence on bottled water, which has to be transported by ships, aircraft and trucks. Because the standard for water purification is so rigorous (the federal fit-for-human-consumption test), it is currently necessary to ship bottled water from the Persian Gulf and traverse Pakistan via land routes a high risk endeavor as we have recently seen. Experiments have demonstrated that we must reduce our dependency on bottled water and reduce the risk to convoys and heliborne resupply assets while Marines are co-located with local water sources that could be tapped to provide purified, safe water. It is estimated that for every fuel truck on the road, there are seven trucks carrying water. The solutions to the water problems are still being explored. During ExFOB, Marines tested a number of water-purification devices that would allow them to pump and filter water from local sources. Additional units are now requesting similar equipment to test and evaluate. The ExFOB team has received inquiries from the 2d Battalion, 9th Marine Regiment, which is currently deployed in Afghanistan and from other units that will deploy this year.

Although all of these energy savings efforts and projects are still works in progress, General Conway's vision of less trucks (and Marines) on the roads of Afghanistan is getting closer to becoming a reality. With a goal of decreasing the number of deaths and injuries suffered by Marines providing security to truck convoys in Afghanistan, the Marine Corps Warfighting Laboratory is incredibly proud to be playing a major role in this energy-related project, and responding to this challenge.

contact@tacticaldefensemedia.com