



Left: On April 7, 2013, a procession of trucks from 307th Engineer Battalion line up at a fueling point manned by MWSS-271 bulk fuel specialists on Forward Operating Base Delaram, Afghanistan.

ENERGY

Powering the Warfighter

Every ounce of fuel, every watt of electricity, should be strategically supporting the mission.

By the staffs of the USMC Expeditionary Energy Office and MCICOM Facility Operations and Energy

The equipment that powers Marines in the field—generators, environmental control units (ECUs), radios, medium tactical vehicle replacements (MTVRs)—is critical to the mission. It also all has one thing in common: a reliance on a stable supply of energy. If the supply of fuel or electricity is compromised, individual parts of the kill chain (the structure of an attack) can be interrupted, delaying or halting the mission and putting Marines, in critical danger. For some Marines, especially bulk fuel specialists, utilities chiefs and the basic utilities tech-

nicians, energy is always top-of-mind. For others, it is just assumed that energy will be available when and where it is needed.

The Marine Corps works to secure its energy supply on the battlefield and in garrison. A primary goal of the expeditionary energy program, led by the Expeditionary Energy Office, is increasing the operational reach of Marine forces so they can go farther and stay out longer using the same amount of energy. Achieving this requires advancements in equipment efficiency and use of all available energy, including solar, wind and energy scavenged on the battlefield. It also requires changes to the way Marines think about and consume energy. The need to reduce energy waste is what drove the creation of the “Energy Ethos”—the shared vision that

the efficient use of energy resources is a critical component of mission readiness.

Energy is not only directly critical to the mission, but also makes up a large part of the budgets. In the battlefields of Afghanistan, for example, estimates of the fully burdened cost of fuel (the price when considering transportation, manpower and more) were hundreds of dollars per gallon. On base, energy is paid for with money that competes with funds for barracks repairs and the maintenance of training ranges, making it increasingly difficult to create balanced budgets.

The Unit Energy Manager (UEM) Program was launched in October 2014 by Marine Corps Installations Command (MCICOM) to help in part with the burden of energy costs on base; the program has

already seen success. The noncommissioned officer UEMs and Marines at 2d Tank Battalion implemented the Energy Ethos in their unit and, through their efforts, managed to reduce their energy consumption by 17 percent compared to the previous year. Energy initiatives on base and in the battlefield will help reduce energy waste and make deployed forces more effective in training and in combat, and every Marine has a role to play.

Energy cannot be taken for granted by anyone, regardless of grade, military occupational specialty, or mission. October is Energy Action Month, and in observance of that, five Marines shared their experiences with energy use across the Corps to encourage a new way of looking at our power resources.



CPL ALI AZIMI, USMC

Marines from MARFORRES and 2d Tank Bn learn to set up and operate the Ground Renewable Expeditionary Energy Network System (GREENS) and the Solar Portable Alternative Communications Energy System (SPACES) during a training session on June 28, 2012.

Energy as a Mission-Critical Element

Staff Sergeant Darien McCarthy, Operations Utilities Chief Engineer Maintenance Company, 1st Maintenance Battalion

As a utilities chief, I come up with power distribution plans for my battalion. I determine our power needs, secure the proper generators—it might sound simple, but not all Marines consider the logistics behind operational power supply.

For instance, a single generator can weigh 5,000–10,000 pounds. They are the heart behind our operations, and we have to account for not only the fuel that powers them, but also the fuel to transport them, the spare parts and the back-up generators. Simply put, our forward-deployed power needs have an enormous logistical footprint.

Then there are the power needs of our communications equipment—our eyes and ears during operations. The systems today require more energy and data link connectivity than ever before, and our very ability to communicate while deployed is directly tied to energy.

Think about it this way—when your smart phone dies, you probably feel disconnected from the digital world, or at the very least limited in your ability to communicate. Now, imagine you are a Marine in a hostile environment. You need real-time intelligence, you need to be able to signal for help and eventually will need more ammunition—in short, your life might depend on your ability to communicate, which depends on the power stored in your batteries, which depend on electricity from the generators or vehicles, which depend on the availability of fuel. It is all connected, and it shows how much we rely on energy.

We have become power-addicted and power-reliant—not just in the Corps, but in society. Luckily, we’re innovating and working toward a future where we have supplies of power that are highly mobile and removed from the fuel convoy, like solar. I’m looking forward to that future.

Below: Maj Sean Sadlier, a materials requirements analyst and energy officer for Headquarters Marine Corps, demonstrates GREENS equipment at Naval Surface Warfare Center, Carderock Division. (Photo by Nicolas Malay)



Energy and the Base Budget

Colonel Robert Rice, USMC (Ret)
Former Commanding Officer
Marine Corps Base Hawaii

When I assumed the role of commanding officer at Marine Corps Base Hawaii, one of the first things I did was review the budget briefs, and the energy cost floored me. The electric bill was \$24 million and accounted for over 20 percent of the base's operating budget.

The thing to understand about the budget is that the base has to pay for all of the energy it consumes, so any energy that we waste in buildings that aren't occupied or on equipment we aren't using is just money that flies out the window. And it may not come directly out of a Marine's pocket, but it's money we can't spend on vital infrastructure, like roads, runways and training facilities.

I made it a priority to reduce that bill. I worked with leaders on base, created policy and reviewed energy data. I'm proud to say that, over my time there, we were able to cut energy spending by \$6 million. That's money I'd rather spend equipping ranges to train Marines than waste it on the electric bill.



NATHAN L. HANKS JR.

On Oct. 19, 2015, civilian and military leaders at MCLB Albany, Ga., mark the installation of America's first Borehole Thermal Energy Storage system. From left to right Chuck W. Hammock, principal engineer of Andrews, Hammock & Powell, Inc.; MajGen Craig C. Crenshaw, CG, Marine Corps Logistics Command; Col James C. Carrol III, CO, MCLB Albany; and LT Jose Centenosado, director of facilities, MCLB Albany.



In 2012, then-Capt Brandon Newell, the expeditionary energy liaison officer for Regional Command Southwest, talks to project contractors about the technical properties of a solar energy project for the Nawa District bazaar.

Energy and the Logistics Challenge

Major Brandon Newell, Military Fellow
National Renewable Energy Laboratory

As a communications officer with a secondary MOS as an electrical engineer, the Marine Corps' codependent relationship with energy has always stood out to me. Using our energy efficiently isn't about meeting some mandate or political objective—it's about maximizing Marines' abilities to complete their mission successfully and safely.

I remember during our march from Kuwait to Baghdad in 2003, we were moving faster than any Marine unit had moved that distance before. But our speed, which is usually the strength that sets us apart from every other service, was a real stress to logistics units—so much so that the leading units, some of which weren't heavily armed and didn't have infantry, began to outpace the supply chain. Eventually, we had to take a four-day pause on the push forward because we had completely outrun our own supplies—not just our water



CPL JEFF DREW

LCPL KATHY NUNEZ, USMC

Cpl Brandon O'Connell with 1st Recon Bn, 1stMarDiv, tests the Lightning Pack on a treadmill during the Experimental Forward Operating Base '14 on May 15, 2014, at MCB Camp Pendleton, Calif. The pack uses a generator to convert the walking movement of the person wearing it into electrical power.

and our ammunition, but our batteries and our fuel. Waiting to replenish all of this energy compromised our tempo because we were too dependent on fuel sources that couldn't keep pace. That experience in Baghdad just highlighted to me how much of an impact the availability of our energy resources has on the way we fight and how we need to be self-sustaining and efficient.

A solar-powered energy distribution system is tested near MCAS Yuma Oct. 1, 2012. According to SSgt Casey Bazor of "Bravo" Battery, 1st Bn, 10th Marines, the system could be used to power everything from radios and laptops to truck batteries and howitzers.



LCPL LURIEL AVENDANO, USMC

Energy and the Operating Environment

First Lieutenant Yosef Adiputra, Executive Officer, Headquarters and Service Battery, 2d Low Altitude Air Defense Battalion

As the executive officer, my job is to maintain operational readiness, training standards, and administrative needs for 60 to 70 Marines. One of the first considerations I must make as a LAAD officer is to plan for Marines' energy use. How many batteries do I need to sustain all of my Marines in their training or operational environments? It's a constant question and a constant concern. "Will we have enough to last an entire day of operations?"

A big part of the answer to that depends on the deployed environment, and sometimes, that environment presents huge logistical challenges. When I was attached to the 31st Marine Expeditionary Unit in the mountains of South Korea, the requirement to use only the energy we absolutely needed was amplified. In

that remote environment, we had limited charging resources and had to pack lightly with as few batteries as possible so we could maintain our agility in the rough terrain. How far I was able to push my Marines depended directly on the amount of power we had.

Another time the environment affected our energy use was during my first large-scale exercise at Weapons and Tactics Instructor Course 2-15. I was serving as platoon commander when a few of my LAAD teams had to come back to the command post for a resupply of radio batteries. Our batteries did not fare well in the high desert heat, so Marines were struggling to conserve the energy they needed to accomplish their mission. We solved the problem by co-locating teams and sharing resources, but if we were in the battlefield and lost our radio capabilities, it could have been a crippling challenge.

Above: LCpl Corey Champagne with 3d Bn, 12th Marines, 1st MarDiv, tries out Bionic Power's PowerWalk during ExFOB'14 at Camp Pendleton. The PowerWalk generates power as the wearer moves their legs and possibly could be used by the Marine Corps in the future.



LCPL KATHY NUÑEZ, USMC

Energy and Field Technology

Staff Sergeant Brian Baez, Utilities Chief, 1st Radio Battalion

Early on in Iraq and Afghanistan, I was deployed as an engineer equipment electrical systems technician with 9th Communication Battalion. We took over for a unit that didn't have the equipment to set up their power grid, and they had to keep the generators running 24/7, wasting a lot of fuel.

Power conservation is a big thing for us. Fuel is crucial and expensive, especially when you're deployed. If we have a generator up and running that isn't being utilized to its full potential, we're just wasting our resources. The good thing is that the energy program office is coming up with great products to help us.

At our last field operation at Command Post Exercise 3,

we saved fuel by deploying a system called a microgrid that lets us program generators and remotely control their usage. We had four, 60,000-watt (60 kW) generators hooked up to the system, but unlike in a typical exercise, we only had to keep one or two on at a time. It worked like this—we started with one generator, and if the amount of electricity needed ran above 60 kW, a second generator turned on. If it went above 120 kW, the third turned on, and if it went back below 60 kW, extra generators automatically turned off. Going from three generators down to one could save over 100 gallons of fuel a day, and I'm looking forward to using the microgrid again at Marine Expeditionary Force Exercise.

Conclusion

Following the drawdowns in the Middle East, the Marine Corps is focused on getting back to its roots—a true flexible expeditionary force. Success as a lean and lethal Corps will require all Marines to pay close attention to how they are using energy in MTRVs, tanks, and planes, and with radios, ECUs and lights. Doing so will reduce dependence on the logistics tail and free up resources in money and manpower. The Energy Ethos can help lead the Corps toward energy independence, which is a level of technical or operational proficiency where energy requirements are no longer a significant recurring requirement that adversaries can exploit.

Likewise, at home, defense budget constraints are reducing the funds available

to support our bases and training. Every nonessential kilowatt saved is money that could be better allotted toward support of the mission and Marine families. Additionally, living this efficient mentality on base will also help shape strategic use of energy resources in the battlefield because Marines train how they fight.

The programs, offices, and Marines supporting Marine Corps energy demonstrate how critical these resources are. The Energy Ethos is a part of the Warrior Ethos because it contributes to overall mission readiness and effectiveness. This ethos must be integrated into the mindset of the Marine Corps and institutionalized in the way we execute our mission—from bases to battlefields.

Editor's note: The USMC Expeditionary Energy Office was created to analyze, develop, and direct the Marine Corps' energy strategy in order to optimize expeditionary capabilities across all warfighting functions. It works closely with the combat and technology development communities and serves as the proponent for expeditionary energy in the force development process.

The MCICOM Facility Operations and Energy (GF-1) mission is to provide policy, conduct programming, and oversee the execution of programs and functions relating to Energy, Utilities, and Facility Operations/Services across the Marine Corps in order to fully and cost-effectively support Marine Corps readiness and quality of life.

