USARAF/SETAF Environmental Technology Request

Quad, and Vignettes

Operational Energy

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Lead: USARAF

Synopsis of Issue / Problem:

(U) USARAF lacks validated solutions to meet operational energy requirements to include alternative energy options and processes to use energy resources efficiently in a contingency environment. Identified solutions must reduce energy consumption and the logistical burden of delivering fuel, which will ultimately reduce costs and potentially reduce risk to soldiers and equipment.

Risk to Mission / Description:

(U) There are limits to the amount of funds available for contingency operations and the energy requirements are significant. Although the cost of a gallon of fuel may be $2-$3 per gallon, shipping the fuel to a deployed location by ground or air can range between $13 to $400 per gallon. The US Army estimates fuel can cost up to $400 dollars per gallon if it is shipped by helicopter. (Sandra Erwin, 2010, How Much Does the Pentagon Pay for a Gallon of Gas, National Defense). The risk to the mission is its cost of supplying energy and the logistical assets needed to deliver the energy. Each convoy of fuel also adds risk to the personnel conducting the logistics operations.

Supporting Data

Gap linkages:

- 2009 National Defense Authorization Act
- DoDD 5134.15, ASD (OEM)

Direct Tie to Strategic Guidance:

- NSS, NMS
- Assistant Secretary of the Army, Installation, Energy, and Environment Strategy 2025. Energy is a Key Business Driver.
- DoD Operational Energy Strategy, 2011

Desired Outcome / Effects:

- Find alternatives for perimeter lighting.
- Find alternatives for improved generators.
- Evaluate and adopt deployable power distribution systems to reduce the number of generators needed on a base camp.
- Evaluate shelter systems/building materials that conserve energy.
- Evaluate waste reuse systems that reduce the logistics requirements for the delivery of new product and waste-to-energy systems that reuse materials for energy production.

Operational Energy Vignette

US Army Africa Command Vignettes

Vignette Source: USARAF DCSENG; Mr. Michael Wolford

Vignette/Storyline: US Army and AFRICOM require USARAF to implement operational energy systems and methods for operations, training events, and projects on the continent of Africa. The objective of operational energy is to reduce the energy demand at the source which in turn will reduce the logistics tail that supports US Forces during operations in Africa. US Army should develop a case or demonstration project that will prove the ability to apply operational energy in the austere environments we operate and perform a cost benefit analysis. Engineers would need to determine the baseline use of energy at installations and base camps in order to determine the technologies available for use at installations and contingency locations.

Mission Impact: Using energy more efficiently has the potential to save considerable resources, reducing the cost of operations.

Root Cause of Problem: The root cause of inefficient use of energy is a culture in the military that the resources will always be available, but with the continued shrinking of operational funds, more efficient uses of resources is necessary. This culture has limited the scientific community within the Army to devote funding to address this issue.

Potential Mitigation:
- Implementing the NETZERO concept. This would require an evaluation of existing sites to find the right technology to reduce the footprint of the site.
- Identify potential technology available to reduce the energy use at enduring and contingency locations.
- Research several deployable systems for alternative energy.
- Research deployable microgrids. Smart grids that can accept energy from several sources (solar, wind, generators).

References: USARCENT introduced NETZERO concept at Camp Buehring in Kuwait. The evaluation resulted in several process change recommendations and several systems to be installed at the camp.

Wastewater and Water Purification

☐ Approved ☐ Modify ☐ move

Lead: DCSENG

Synopsis of Issue / Problem:

(U) USARAF lacks sufficient technology and systems to treat wastewater and purify water for consumption at contingency locations. Systems should be sought that will allow US Forces to recycle wastewater for other purposes than consumption. USARAF needs systems that can be rapidly deployed, has low maintenance requirements, and is reliable for short term missions on the ground in Africa. Technology must be easy to use in order to deploy to austere environments and have Soldiers operate. It must be scalable so that the systems can be adjusted for fluctuating populations. Although Force Provider has a shower water reuse system, we must have systems that can deploy when Force Provider sets are not appropriate for the mission.

Risk to Mission / Description:

(U) Improper disposal of wastewater can effect the health of local populations and US Military personnel. If the host nation (HN) water is contaminated and that issue linked to US Forces, resentment can develop between the US Military and HN locals causing an increased threat to the mission. Some locations may be water poor and adding additional personnel from a US Military base can overuse local water sources which also can have a strain on relations.

(U) Many bases use bottled water either shipped by US Military logistics personnel or provided by contractor. Shipping bottled water is a significant burden on logistics assets and allowing HN contractors on US bases is an additional security risk.

Supporting Data

Direct Tie to Strategic Guidance:

- NSS, NMS
- US Army Water Security Strategy, Dec 2011
- Department of Defense Strategic Sustainability Performance Plan, 2012

Desired Outcome / Effects:

- Evaluate the use of recycled wastewater at all enduring and contingency bases.
- Acquire technology to treat and recycle wastewater that is deployable, scalable, and easy enough for Soldiers to operate with minimal training.
- Acquire technology to treat water from all sources, except wastewater, for consumption by Military personnel. Technology should be deployable, scalable, and easy enough for Soldiers to operate with minimal training.

Wastewater and Water Purification Vignette

US Army Africa Command Vignettes

Vignette Source: USARAF DCSENG; Mr. Michael Wolford

Vignette/Storyline: 2002-2009, US Forces Afghanistan used “Pump and Dump” contracts for the majority of base camps in Afghanistan. At Bagram Air Field, gray water was dumped directly into a stream that small cities used just two miles from the base. Although dumping wastewater in the desert is permissible and has little adverse impact on the human population, when the wastewater is dumped into a host nation water source used for human consumption it presents a health and safety issue for the local populations and service members stationed at base camps that use the HN water. Water quantity was also an issue. The US Army Central Command planning factor for water consumed by a base camp is 50 gallons/person/day. Depending on the size of the base and their mission, this had adverse effects on the local water sources. Recycling wastewater for other uses will reduce the amount of fresh water consumed by US Forces during contingency operations, but in many cases (i.e. shower and laundry use) wastewater must first by treated before it can be reused.

Mission Impact: Treating water before its release to a host nation water source will reduce tensions between local populations and the U.S. Military. Recycling water will reduce the amount of HN water used which will also reduce tensions between local populations depending on the water and the U.S. Military.

Root Cause of Problem: Poor planning of water requirements and wastewater disposal. Lack of understanding on the benefits of using recycled water. Lack of deployable systems to clean wastewater and HN water for reuse and consumption. Lack of policy requiring water recycling.

Potential Mitigation:
- Portable/deployable water purification systems that can clean wastewater to a standard acceptable for reuse.
- Portable/deployable water purification systems that can clean HN water for consumption by US Forces.

References: Mission in support of Operation Enduring Freedom, Afghanistan.

Historical/Cultural Property Protection

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Lead: DCSENG

Synopsis of Issue / Problem:

(U) US Army has an affirmative legal obligation to avoid undertaking planned actions which may result in unnecessary damage to environmental and cultural properties to the extent practical and consistent with mission necessity. Currently, the DoD lacks a systematic process for identifying, cataloging, and communicating the existence and locations of important cultural and natural properties to military Commanders, operational planners, trainers, partner militaries, and other interested parties.

Risk to Mission / Description:

(U) Failure to protect environmental and cultural properties can cause poor relations with the host nation and create a hostile atmosphere to the presence of US Forces.

Supporting Data

Direct Tie to Strategic Guidance:

- NDAA 2015, Section 1273, Report on Protection of Cultural Property in the Event of Armed Conflict
- CERDIP Final Transition and Outreach Plan, 19 Nov 2015
- Hague Convention on the protection of cultural properties

Desired Outcome / Effects:

- Create a database or identify an existing database that will house environmental and cultural property information.
- Identify a process to be institutionalized that will allow the population of the database.
- Identify an organization to manage and maintain the database.

Historical/Cultural Property Protection

US Army Africa Command Vignettes

Vignette Source: USARAF DCSENG; Mr. Michael Wolford

Vignette/Storyline: US Army has an affirmative legal obligation to avoid undertaking planned actions which may result in unnecessary damage to environmental and cultural properties to the extent practical and consistent with mission necessity. Currently, the DoD lacks a systematic process for identifying, cataloging, and communicating the existence and locations of important cultural and natural properties to military Commanders, operational planners, trainers, partner militaries, and other interested parties. Military planners do not have a single location from which to obtain this information and many planners do not have the expertise to know where to find the information nor what information is needed to protect environmental and cultural properties during a military operation. In many of the national resources throughout the world, the regional and local environmental and cultural properties are not listed, but their destruction can have an adverse effect on the relationships between local nationals and the US Military in those local/regional areas so the protection of these properties may prove advantageous for local commanders. As regional and local environmental and cultural properties are located, the US Army needs a central database for this information to be collected and allow dissemination to planners for future operations. The operation of this database can also pull information from national and global databases such as the World Heritage List operated by the UN Educational, Scientific and Cultural Organization (UNESCO).

Mission Impact: Failure to protect environmental and cultural properties can cause poor relations with the host nation and create a hostile atmosphere to the presence of US Forces.

Root Cause of Problem: No standard process for reporting and recording environmental and cultural properties existence. No one location to store this data. No organization identified to maintain the database and ensure data is properly vetted.

Potential Mitigation:
- Adopt the process created and validated by NDCEE, Consolidated Environmental Resources Database Information Process (CERDIP).
- Create or identify a central database to store environmental and cultural property data.
- Provide an organization to manage and maintain the database.

References: Several references were found that point to the US Military destroying cultural properties, a few were: “Babylon wrecked by war”, World News, Rory McCarthy, 15 Jan 2005; “Brutal Destruction of Iraq’s Archaeological Sites Continues”, World Post, Diane Tucker, 21 Nov 09; “Destruction of Cultural Heritage”, Global Policy Forum. CERDIP Final Transition and Outreach Plan, 19 Nov 2015. The Hague Convention on the protection of cultural properties, ratified by the US Congress in 2009.