# ARMOR & Mobility

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FLIR Turns 50

## JOCOTAS & Agile Shelters

## Commander's Corner

**MG H.R. McMaster**
Commanding General
U.S. Army Maneuver Center of Excellence (MCoE)
Fort Benning, GA

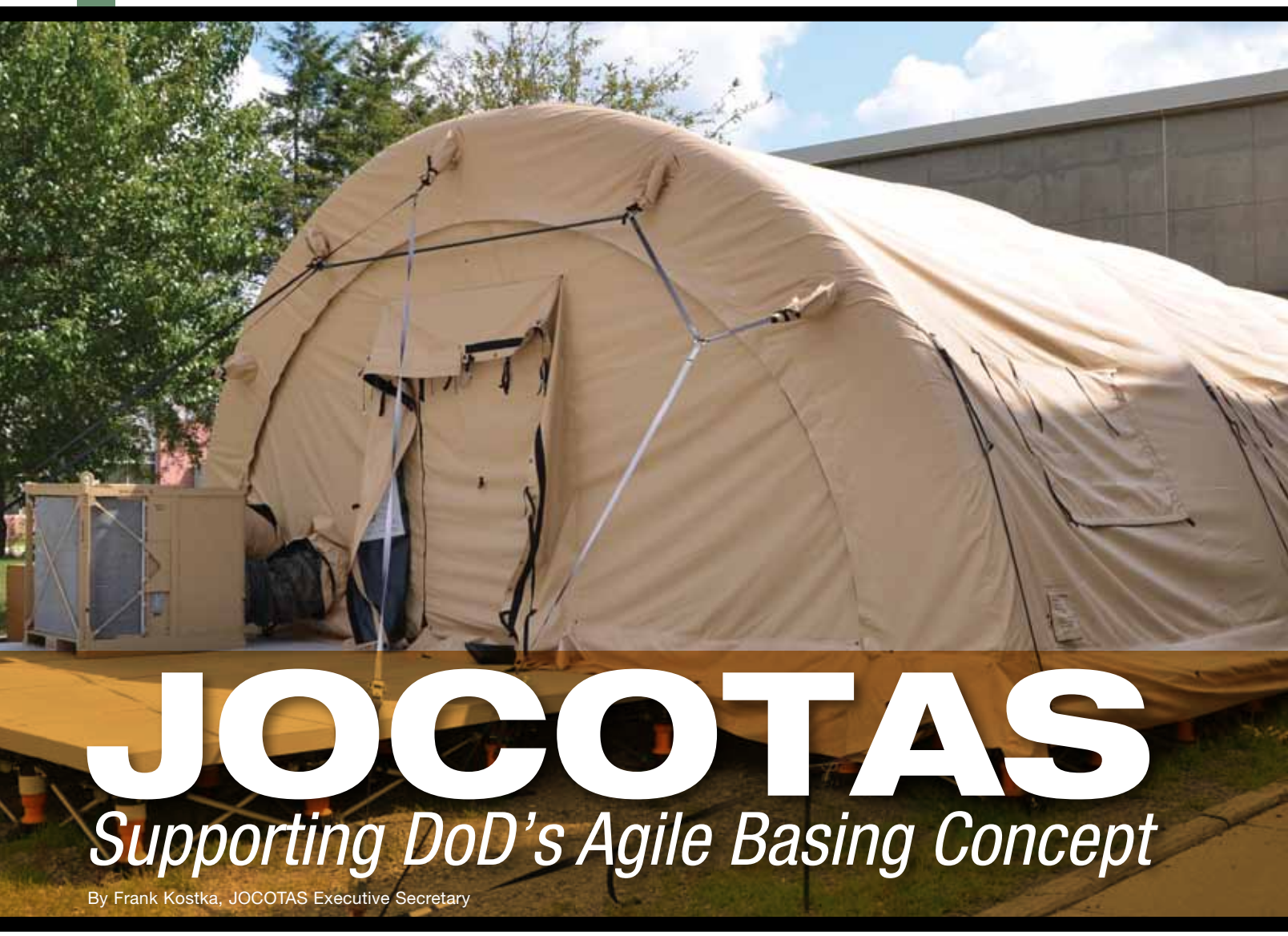
HMMWV: Updates at Red River

JLTV: EMD Delivery

## Warfighters Gear Guide

Fire Suppression ■ MARFORCOM: USMC Maintains Forward Presence

Spotlight: Top Shelter Manufacturers ■ Add-on Armor for Heavy Trucks



# JOCOTAS

## *Supporting DoD's Agile Basing Concept*

By Frank Kostka, JOCOTAS Executive Secretary

*The Joint Committee on Tactical Shelters (JOCOTAS) was founded in 1975 under the Office of the Secretary of Defense (OSD) to prevent the duplication of Tactical Shelter Research and Development, maximize the use of DoD Standard Family of Tactical Shelters, and to eliminate the proliferation of nonstandard tactical shelters within DoD. JOCOTAS enables interaction between its members from the Army, Air Force, Marine Corps, Navy, and Defense Logistics Agency (DLA) by holding a minimum of two formal Technical Working Groups (TWGs) per year. It encourages direct meetings with industry and academia both on an ad hoc basis and through a formal biennial meeting.*

The JOCOTAS Executive Secretary and the Technical Working Group (TWG) Chairs are working on three efforts to keep our community informed and our industry and academic partners up to speed on the latest shelter developments.

- We will seek opportunities to update the broader shelter community by submitting multiple articles on shelter-world developments to our media partners.
- We will hold the 2013 Fall Government JOCOTAS Joint Working Group (JWG) meeting at Natick using a combination of direct attendance and video teleconferencing.
- We will investigate nontraditional venues for a spring 2014 meeting with industry ranging from webcast to industry sponsorship.

### Direction of Shelter Development Activities

As we close out operations in Southwest Asia, the military is beginning to realign for a tilt towards the Asia Pacific (A/P). The ongoing unrest in northern and central Africa also cannot be ignored. Six months after President Obama announced the new focus for military operations, I began researching the topic as a potential leading indicator for new mission requirements. I built a database of articles focused on developing trend lines using

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The challenge for JOCOTAS in times of sequestration, furloughs, and constraints on expenditures, travel, and conference attendance is to meaningfully engage with the shelter community, academia, and our industry partners in an uncertain and asymmetrical environment.

open-source documents. The data included 250 articles, maps, photos, and illustrations. A key feature of note is that both the A/P and Africa areas include tropical conditions not seen by U.S. forces since Vietnam, and this will impact a military force that for over 12 years has fought primarily in a relatively dry environment. The A/P realm consists of four thrusts: basing agreements, establishment of early warning radar systems, low-level sparing between regional players, and provocations from North Korea. On 17 December 2012, the Army Times identified eight exercises involving U.S. Forces in the Asia Pacific rim, many of which will be joint in nature.

From my research, it was clear that Africa will be a location of future conflict. Contributing factors include the Africanization of the Al Qaeda movement and rise of Boko Haram, Al-Qaeda in the Islamic Maghreb, Ansar al Shariah, M23, and al Mouthalimin—terrorist groups that have wreaked havoc across fourteen countries, culminating with assaults on the U.S. Consulate in Benghazi, Libya, and a natural gas operation located at Amenas, Algeria. Based on open-source data, we are currently operating in at least two of these countries at a low level.

## Supporting Science and Technology Efforts

In 2008, the U.S. Army Natick Soldier Research, Development, and Engineering Center (NSRDEC) asked for senior leadership authorization to reprogram internal science and technology funds to formally establish a shelter tech base project. Beginning in fiscal year 2012, the VT4/5 (6.2/6.3) project was initiated under the leadership of NSRDEC Technical Director Dr. Jack Obusek. Expeditionary Basing Directorate staff members Amy Soo Klopotoski and Jean Hampel established additional supporting programs under the Army Rapid Innovation Fund (RIF), OSD's Operational Energy Improvement Fund (OEIF), and the Small Business Innovative Research (SBIR) program. The combined funding of these programs in fiscal year 2013 to date is $9.6 million.

According to Rod Fisher, the lead Expeditionary Modernization Engineer at the Air Force Civil Engineer Center (AFCEC), the Air Force is also actively working this area. The AFCEC and Air Force Research Lab (AFRL) will investigate technologies to improve energy efficiency of the medium and large shelters used in expeditionary settings for maintenance, supply, storage, and other uses. Some of the technologies being tested include coating the outside of the tents with low emissivity coatings to limit solar loading and the development of adjustable liners that they can drop down and reduce the ceiling height in the shelters, thereby limiting the volume of air needing to be cooled and creating an "attic" that can be vented. The goal is to maximize energy security for Basic Expeditionary Airfield Resources (BEAR) assets in the field while reducing energy consumption.

## Near Term Sustainment Solutions from the Services

PM Force Sustainment Systems (PM FSS), led by LTC Ross Poppenberger and Mike Hope, is NSRDEC's key shelter tech transition partner. They manage Force Provider (FP), the Army's

Conflict areas in Central and Northern Africa (JOCOTAS)

Ongoing training activities in the Asia Pacific theater (JOCOTAS)

premiere base camp program. FP is a totally contained 600 Warfighter camp complete with environmentally controlled shelters, hygiene facilities, combat feeding systems, laundries, morale and welfare functions, and command and control capabilities. FP is quickly deployable and brings its own facilities support package, including power generation and distribution, water storage, dispersion, processing and reuse, waste management, and security lighting. The system can be broken into four Warfighter camps of 150 troops each. Emerging requirements to support platoon size patrol bases and Special Operations activities are also being pursued. Some future systems will include modular ballistic protection.

Under the leadership of Mel Miles and Dianne Mofield, the Air Force's BEAR program is a key Agile Combat Support (ACS) enabler that provides vital support required to stand up, bed down, and support our Warfighters. Lessons learned from increased operations showcased the need to redesign ACS capabilities to better support a constantly changing global security environment. In addition, because we are operating with limited resources, we must obtain all possible efficiencies. To support this reality, BEAR program managers modernized the program with the following key objectives: 1) better energy efficiencies, 2) smarter technology, 3) smaller footprint, and 4) lighter assets. BEAR is involved in Joint Modernization initiatives as members of the Joint Expeditionary Basing–Working Group (JEB-WG), Functional Capability Integration Board, JOCOTAS, and through the American Recovery and Reinvestment Act under the Joint Capabilities Technology Demonstration (JCTD). These initiatives not only encourage communication and awareness between services but also develop excellent joint solutions.

The America Recovery & Reinvestment Act granted $4.8 million to the BEAR program to develop alternative and sustainable energy sources. The AF BEAR project will support the requirement to reduce reliance on fossil fuels, reduce the U.S. dependence on foreign fuel, and decrease power consumption and our reliance on convoys to supply fuel to base camps. ACC/A4RX partnered with the Advanced Power Technology Office (APTO) and the BEAR Program Management Office (PMO) at Robins AFB, the Air Force Civil Engineering Center (AFCEC), and the Air Force Research Lab (AFRL) at Tyndall AFB, to identify projects for BEAR. The group decided on two major efforts:

1) To participate in the Joint Capabilities Technology Demonstration (JCTD) at Fort Erwin, CA. BEAR managers are working in concert with the Army to develop a Solar Integrated Power Shelter System (SIPSS) that will reduce bare base electrical demand by 50 percent. This initiative has now developed into a full joint Air Force/Marine acquisition of new small shelter energy-efficient systems.

2) The Smart-microgrid System (BEAR-SMS) that will automatically manage several power sources (including solar and wind) and all bare base load demands. Smart grid technology will coordinate the production of power from large numbers of distributed power producers such as solar panels, wind turbines, and primary and secondary diesel generators.

## Flexible Photovoltaic Update

We are midway through the redesign of the PowerShade solar tent. This program, which also includes technology improvements, is on track to increase the power output of the PowerShade by over 50 percent while reducing the cost per watt by 25 percent. Along with these improvements, standard lifetime is being increased from three to 10 years, and the weight is being reduced to make installation easier. Electrical storage and electronics are in design to go with the new tents, which allow the systems to intelligently interact with generator sets to minimize run time and fuel consumption.

On the technology transition front, six brigades were partially equipped with 60W and 120W foldable amorphous silicon PV arrays from PowerFilm as part of systems to provide portable power for their electronics. Later this year another four brigades are scheduled to receive these systems, which are designed to enable longer missions without resupply of batteries. The 120W arrays weighed just 6.5 pounds and folded for transport in rucksacks. A new generation of these foldable power units is being targeted, which provides the same 120W of power but weighs less than 4.5 pounds, further reducing the weight burden on the soldier.

### Marine Corps Expeditionary Energy Office Update

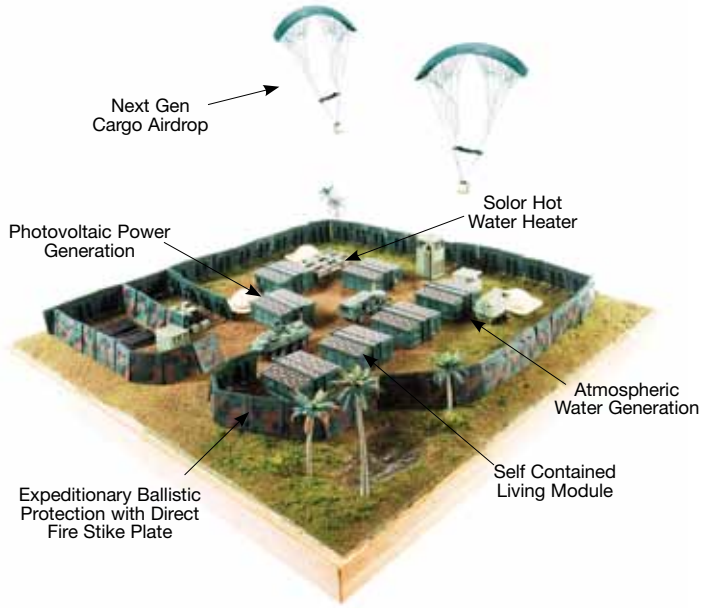
The Marine Corps recently completed its latest demonstration at 29 Palms, CA, in May 2013. The ExFOB process is designed to identify and evaluate commercial technologies that increase the self-sufficiency and capability of expeditionary forces for any future operating environment we may face. Marines trained to value resources, energy-efficient equipment, and renewable energy provide our commanders with a lighter, more capable, and versatile force that will go farther and stay longer at less risk.

Through the ExFOB process to date, the Marine Corps has conducted six demonstrations at bases across the country, reviewed over 300 technologies, purchased 11 for extended user evaluation in the United States and Afghanistan, and transitioned four to programs of record.

ExFOB 2013 focused on hybrid power systems that will redefine how the Marine Corps powers the future force. Hybrid power generation—combining smart controls, energy storage, and solar PV with traditional diesel generators—has demonstrated up to 50 percent fuel savings and ~80 percent reduced run time with less maintenance, which extends the life of current generators.

The Corps is working closely with the Army to develop requirements for a family of four hybrid power systems that will increase the combat effectiveness of both services. Two draft capabilities development documents (CDDs) are underway. The Marines are leading development of the first CDD for the two smaller hybrid systems (up to 10 kW), known as Mobile Electric Hybrid Power Sources (MEHPS). Army has the lead for the second CDD, focused on two larger systems (10–300 kW), known as Mobile Electric Microgrids (MEM). Production and fielding of hybrid power generation systems may begin as early as 2016.*

**Katherine Hantson from the Marine Corps Expeditionary Energy Office provided this update.*




Advanced Expeditionary Patrol Base

## Technology Demonstration and Off-the-Shelf Evaluation Efforts

All services are working on systemic test and evaluation efforts. The Army's prime efforts take place at the PM FSS Force Provider Base Camp Integration Laboratory (BCIL) at Fort Devens, MA. The BCIL compares state-of-the-art expeditionary basing systems currently in the field with new engineering developments and emerging technology using two approaches. The first variant compares two 150-soldier modules side by side on a component basis. One of these is the benchmark standard and the other is the "lab." The alternative is to actually change out entire subsystems on the "lab" module, such as shower units, generators, laundries, or shelters. Each camp is then operated for a period of time under the same conditions to assess performance. Note user troops are living in the base camps during test operations. This provides real-life use comparable to FP camps deployed in theater. Over 11,000 troops have rotated through the BCIL in the past 18 months.

## NSRDEC Capabilities for Independent Assessment of New Lighting Concepts and Photovoltaics (PV)

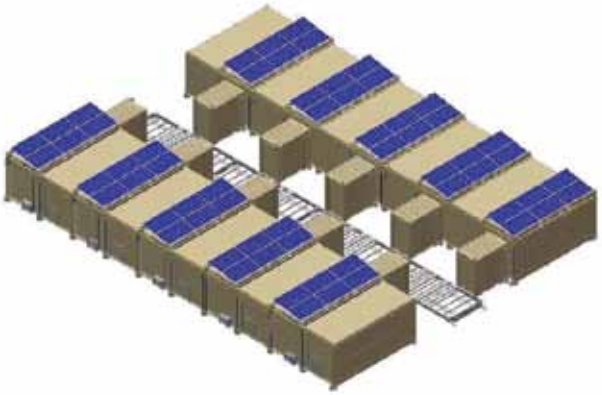
Karen Buehler and Gary Proulx at NSRDEC set up a lighting in-situ test capability to independently assess the performance of emerging technologies such as light-emitting diode (LED) light fixtures compared to standard MIL-PRF-44259E fixtures. The Marine Corps Systems Command requested that NSRDEC assess a new LED fixture for potential use in their Marine Corps Expeditionary Shelter System. Both individual fixtures and the fixtures as a system are being assessed within the ongoing evaluation. Individual fixture characterization is focusing on illumination from the fixture at varying heights, including light color comparison, correlated color temperature, dominant wavelength, power draw, current draw, power factor, and radiant temperatures. Basic measurements of fixture dimensions and masses were also gathered to use in calculations of system transport weight and volumes.

The evaluation of PV systems involves providing radiant illumination of the cells and measuring the electrical output.

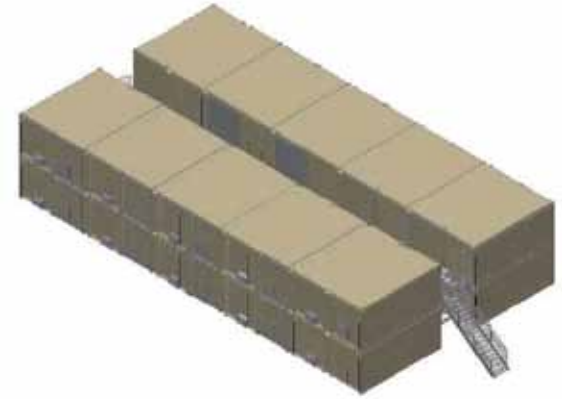
# Fully Modular, Energy Efficient Shelters

CRS in Transport Mode (Stacked 4-High to form a 20' Module)

Four CRS's Deployed and Grouped into 2 Separate 20' x 32' Living Areas



CRS 1-Story Shelter Complex With Solar Panels & Quadcon Vestibules



CRS 2-Story Shelter Complex with Mezzanine & Stairways

## The Sea Box Collapsible Re-Deployable Shelter (CRS)

## Efficiency In Every Aspect Of Design!

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- Rapidly re-deployable with a long, usable life span (20+ years).
- Fire-rated walls, doors and other safety features, designed to meet all DOD UFC 1-201-01 Standards.
- High thermal efficiency for reduced heating and cooling energy consumption.
- Energy efficient LED lighting, ECUs, and optional Solar Panel Platforms.
- Improved quality of life for the Warfighter.
- Design allows for various living area dimensions.

All elements of the CRS are completely modular! Walkways, Mezzanines, Solar Panel Platforms and Quadcon vestibules connect together to form their own 20' ISO Modules. This greatly reduces transportation costs by eliminating the need for additional shipping containers.

Sea Box also offers a full line of Modular Shower, Latrine, Laundry, Kitchen, EMI, Command & Control and Medical Service Shelters as well as Refrigerated Systems.

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NSRDEC's Doriot environmental chamber solar simulator array (Army)

The panel illumination can be handled with either natural sunlight or simulated with an appropriate light source and filters. The Doriot Climatic Chambers located at NSRDEC recently installed a solar simulator that meets the requirements of irradiating the cells with a spectrum that simulates natural light. This is the standard spectrum used for evaluating PV systems for terrestrial applications. The climatic chambers allow for the control of ambient temperature, humidity, and wind speed. NSRDEC is using this system to evaluate commercial PV systems under these conditions. The test system is also being used to evaluate developmental PV systems for Soldier-borne applications.

## Rapid Base Camp Establishment: Enabling Mobility and Lethality

The Army is looking at reducing base camp set-up time through rapidly deployable systems, including shelters and initial base defenses. During the Afghan campaign, it was not uncommon to spend several months establishing and fortifying a position. This provided our adversaries plenty of time to scope out our defenses. More important, it reduced the number of soldiers outside the wire on patrols, and this limited situational awareness as well as interaction with the local populations. One school of thought is that if camps could be set up in a matter of days and quickly redeployed, U.S. forces would be more agile.

This has led to the investigation of non-traditional, highly energy-efficient rigid wall shelters by PM FSS. Work is ongoing in the Technology and Engineering Development acquisition phases to fully assess this option. We know upfront that there is an initial transportation impact. The downsteam side to the equation is that less site prep and construction of plywood floors is required saving both set up time and ancillary shipments. In addition, generator size or quantity can be reduced as HVAC is projected to be reduced by 75 percent and fuel shipments could be significantly reduced over the deployment.

On rapidly deployable base defense, NSRDEC and PM FSS have teamed on the Modular Ballistic Protection System (MBPS). It is a lightweight, low-cost, rapidly deployable, ballistic protection system comprised of a panel-and-strut construction. Program lead, Nick Tino provided this update. The MBPS can be deployed around at the rate of 100 linear feet per hour by four Warfighters. All system components are man-portable, and no special tools or training is required for set up (technical manual included). MBPS weighs near 4 pounds per square foot while offering protection from direct fire and fragmentation similar to the Advanced Combat Helmet (ACH). The system has undergone extensive laboratory ballistic testing in addition to arena testing (live fire) and blast overpressure testing according to UFC 04-010-01. The MBPS is currently a Pre-Milestone B program awaiting the signature of the Force Provider Expeditionary Capabilities Production Document (FPE CPD) to move forward as a Program of Record (POR) with PM Force Sustainment Systems. The system is ideal for expeditionary base camps, fighting positions, and village stability operations.*

**The MBPS program lead, Nick Tino, provided this update.*

## Implications for Future Shelter Development

For shelters and basing developers, this means that for the foreseeable future, the military will continue to operate in austere environments using contingency base camps as force projection platforms. This translates into an ongoing requirement that all military developmental efforts ranging from Science and Technology and Engineering Programs of Record through Sustainment drive to reduce footprint and minimize future energy demand.

The JOCOTAS community is at the leading edge of this endeavor, with multiple programs to passively and actively reduce energy demand while enhancing deployability. OSD took a major role on energy reduction with the initiation of the 2008 Joint Net Zero Joint Combined Technology Demonstration (JCTD) that was managed by Ms. Barbara Brygider and held at the National Training Center, Fort Irwin, CA. The Army, Air Force, and Marine Corps teamed over an 18-month period to assess shading materials, high-performance insulation, photovoltaic arrays, LED lighting, and microgrids. All Services followed with formal programs that include Marine Corps ExFOB evaluation and product improvement of best-of-breed off-the-shelf systems; the Army's VT4/5 Expeditionary Mobile Base Camp Technology and Demonstration project; the Air Force's Air Force's Basic Expeditionary Airfield Resources Modernization program; and the Navy's initiation of the Future Next Generation Expeditionary Outposts effort, Transformative Reductions in Operational Energy Consumption (TROPEC), focused on assessing technologies under tropical conditions and developing standard test protocols to accelerate development and fielding of effective energy solutions from all sources. The TROPEC work will be a key developmental enabler to support tropical operations.

The ability to quickly establish a force projection platform is critical to warfighting operations. More important, leadership remains vigilant on effectively managing the use of operational energy as a key tenet of mission planning and execution.

*Frank Kostka has worked in the shelter business area for 30 years at NSRDEC, a member of the the U.S. Army Research, Development, and Engineering Command (RDECOM) family. RDECOM is a major subordinate command of the U.S. Army Materiel Command, which is the Army's premier provider of materiel readiness—technology, acquisition support, materiel development, and logistics.*

**More info: jocotas.natick.army.mil and nsrdec.natick.army.mil**