DoD Power, Energy & Propulsion

Military Perspective
Thomas W. Hicks
Deputy Assistant Secretary of the Navy
(Energy)

Green Fleet  Ground Generators  REPPS  DoD Renewable Energy Sources  Shelter Energy Developments

Saving Energy and Saving Marines: BGen Robert F. Hedelund, Commanding General, USMC Warfighting Lab
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Military Perspective
Thomas W. Hicks
Deputy Assistant Secretary of the Navy (Energy)
Insights

Tactical Defense Media is pleased to publish our first issue of DoD Power, Energy & Propulsion (PEP). Each issue will examine operational, technology and policy trends across the U.S. Department of Defense’s energy portfolio. In addition to feature articles, we will provide insights by the Department’s leadership and highlight other developments through the Green Notes and Technology Developments departments.

As TDM prepared this issue for publication, I had the opportunity to visit with many of you at DoD and industry energy conferences beginning last fall. With few exceptions, the military and industry team is focused on meeting the spirit and the letter of the law in President Obama’s Executive Order 13514 of 2009. This order gave DoD marching orders that included slashing petroleum use by 30 percent and increasing water efficiency by 26 percent -- all by 2020.

As DoD progresses down the road to energy efficiency, there are some truly breathtaking, early accomplishments occurring in the Department’s material systems and business practices. While the services are gaining energy efficiencies in the current generation of ground and air vehicles, and naval forces, they are also fielding new systems which optimize renewable energy sources and have other innovative capabilities. Some of these developments are benefiting forward deployed units in Afghanistan and other remote operating areas. At the same time, the Department’s buildings are being upgraded and built to dramatically reduce their energy footprint.

DoD cannot continue to transform its energy portfolio without adequate funding. On a positive note, the Department appears committed to figuratively walking the talk as far as funding is concerned. As this issue was being published, President Obama released his 2012 budget proposal. In it, the President proposed doubling funding for energy efficiency and renewable energy innovation.

This is a pitch for Congress to pass its FY 2012 defense budget with adequate funding for these energy programs. DoD’s charted course for its energy program will provide handsome dividends for all Americans. The services’ efforts are already reducing demand for energy through increased fuel efficiency, new technologies related to alternative energy sources and other strategies. The passage of the President’s FY12 budget request will allow the Department’s research, development, test and evaluation programs and other enabling efforts to remain on track.

I look forward to meeting with many of you at this spring’s energy conferences. TDM will distribute PEP at a number of defense exhibitions including the Joint Service Power Expo in Myrtle Beach, SC and the Environment, Energy Security and Sustainability Symposium and Exhibition in New Orleans, LA.

As always, I look forward to your comments!

Marty Kauchak
Editor
DoD Power, Energy & Propulsion
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For the U.S. Military, conserving fuel is a top priority. Which is why DRS has developed technologies for a range of applications that allow for a more efficient use of fuel. From newer, greener naval power plants that can save the Navy billions of dollars, to ways of using ground vehicles to deploy low-cost battlefield power, to Environmental Control Units that are up to 25% more fuel efficient. **Saving Fuel And Money. That’s Go To.**

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More Efficient Generators

Industry is bolstering the efficiencies of DoD’s ground generators as part of a broader effort to gain Department-wide energy savings.

By Marty Kauchak, Editor

The 2008 Defense Science Board report “Defense Energy Strategy, More Fight – Less Fuel” called attention to current and looming energy challenges across the department. One area of interest throughout the document was the need for more efficient generators for the operational forces.

The report’s authors’ concerns about the current generation of ground generators were summarized when it asserted “But during wartime, generators become the largest single fuel consumers on the battlefield. Gensets in Iraq, overwhelmingly used for space-cooling, seem especially amenable to innovative technical solutions for improved fuel and load efficiency.”

The DSB report is one of several recent high-level reviews and pronouncement to indicate a need for more efficient and effective generators for land forces. In response, industry is delivering enhanced and new generators for fielding in even the most rigorous tactical environment.

The Quiet Requirement

Generators are expected to produce power for an increasing array of combat and combat support equipment – and to accomplish this task with reduced levels of noise and thermal signatures.

DoD’s tactical quiet generators (TQGs) were designed to replace inefficient legacy systems that were more than 20 years old when the TQG program began more than a decade ago.

For its part, DRS Technologies has produced more than 61,000 TQGs for the U.S. military over the last 10 years. “Our TQGs represent approximately 75 percent of the Tactical Quiet Generators in service today and range in size from the small 3kW TQG, to the medium-sized 5, 10 and 15 kW TQGs to the large 100 and 200 kW TQGs,” Carl Geary, director of business Development at DRS Fermont, said. These systems provide mission critical power for a myriad of applications from powering small command posts to large forward operating bases (FOBs) and field hospitals, as well as weapons systems including the Patriot Missile system.

DRS Fermont’s TQGs were designed to provide better fuel efficiency, operate on the standard military fuel (JP 8) and provide the reduced noise and thermal signatures required for force protection on the modern battlefield. Geary said his company’s “DRS TQGs are also more capable than many of the non-standard, commercial generators that are used within the DoD in that they are designed to perform under extreme environmental conditions including high temperatures and altitude which cause significant reductions in reliability and performance in systems not designed to military performance standards.”

Small but Important

On the lower end of DoD kW-rated generators is the 2kW offering from Dewey Electronics. The generator’s lower power output should not be interpreted as operational limiting.

John Dewey, CEO, explained the attributes of the generator and noted how they helped it find favor with military customers.

The 2kW system, when compared to its larger siblings, is simple in construction – single cylinder and almost entirely air cooled. “This provides a tremendously enhanced level of reliability and uptime. They are much easier to repair when they...
break – they break much less frequently. And with many fewer components they are easier to support," Dewey remarked.

Some representative uses of Dewey’s 2kW generators are on the mission critical end – including support of weapons systems and platforms – as well as mobile kitchens and other logistics uses on the non-mission critical end.

Dewey Electronics has delivered about 15,000 generators to its customers.

**Other Developments**

Goodman Ball, Inc. does not have a specific product line but rather a group of products designed specifically for unique military applications. GBI’s expanding customer list includes the U.S. Army Communications-Electronics Command, Marine Corps and other DoD and U.S. government organizations.

GBI’s recent enhancements to its’ stable of products includes the development and refinement of high power density alternators and their associated power delivery modules (inverters and regulators).

Gavin Ball, general manager, GBI, noted recent developments he has observed include fuel efficiency and the reduction of size and weight, replacing ground-based generators with vehicle-integrated generators. “Vehicle platforms have continued to evolve and their previous core missions have been expanded to provide both on-board and exportable power. This evolution includes vehicle platforms that use under hood power, on-board auxiliary power units and in-line power systems.”

GBI has been working towards enhancing its current Model 4310 5kW 28VDC APU that uses a direct-driven field wood brushless alternator. The new unit would have a more compact, lighter, direct-driven permanent magnet alternator-power head with associated power delivery modules (inverter and regulator) to change the output from 5kW 28VDC to 5kW 120/240 VAC 60Hz or 5kW of 28VDC or any combination of the two up to 5kW. “This approach will ultimately reduce the product’s weight and may reduce fuel consumption by using a variable speed alternator output approach,” Ball said.

There are other trends at play when discussing evolving ground generator systems.

U.S. ground operations in Afghanistan are expected to continue their reliance on FOBs and similar mission concepts. This is placing a demand on decreasing forward deployed forces’ use of fuel to help reduce in theater logistics demands.

“That will drive hybridization – a variety of ways to generate and manage power – through solar, and other sources,” said Dewey. For its part, his company is developing hybrid solutions through internal R&D efforts. He continued, “All the technology in there we are selling to the primes, whether they are building a trailer system or other system. The parts are all getting fine-tuned.”

DRS’s Geary commented on the trend to further increase fuel efficiency by incorporating renewable energy sources such as wind and solar into the tactical power architecture. This action would reduce the number of generators and the amount of time they have to run to provide power for tactical operations. “By incorporating available renewable sources, the concept is to use as much of that power first while adapting the generators to sense and prioritize that renewable energy and only run generators as needed to augment the power provided and stored through the use of wind and solar,” he added.

Geary also pointed out another trend to even further increase efficiency – by developing generators that can be networked into a tactical “microgrid” that manages and regulates the power of multiple generators, balancing and sharing the loads based on power demands. “This is far different from today’s approach that uses stand-alone generators that in many cases run continuously (thereby wasting fuel) even though they may not be running to full capacity. By developing generators that can function in a microgrid as a ‘system of systems’ both power and fuel efficiencies can be optimized thereby lowering logistics and maintenance requirements and resulting in significant fuel cost reductions,” he concluded.

**Generators for Shelter Systems**

Generator sets are also a vital component of shelter systems. DRASH is one company inserting innovation into this product category.

Kevin Shirey, DRASH’s spokesperson at the AUSA conference, pointed out significant trends in his company’s generator portfolio, including the migration to “intelligent power.” This strategy helps move the product portfolio toward the networking trend described earlier.

“So, we’re going from analog systems to digital systems. This allows the operator to hook up multiple trailers in a series. Whatever they select as the master trailer will be able to turn on and off other trailers as the power demand increases or decreases. You’re getting fuel consumption savings as you’re not running your generators all the time.”

For its part, DRASH’s Utility Support Transport trailers have generators to deliver power and other capabilities for the supported shelter system. Generator outputs are rated at 18, 33 and most recently 60kW.

Supporting the recent development is DRASH’s HP-6G/60 Intelligent Power Technology (IPT) Trailer by DHS Systems LLC. The trailer features two 60 kW digitally-controlled, parallel-capable generators that can provide a 120kw output or 60kW with automatic failover. The Digital IPT power management system reduces fuel consumption by operating at optimum efficiency. The HP-6G/60 IPT trailer is compatible with all other DRASH IPT trailers.
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With the increased use of electronics in sensors, communications and weapons, the dismounted warfighter will have to carry more power sources – especially when conducting extended missions in remote areas with treacherous terrain. In the past, this meant loading up on batteries, which adding weight to a load that's already very heavy.

As part of our goal to increase energy independence on the battlefield, the Army Power division of the U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC) is focusing on providing renewable energy solutions. Renewable energy is convenient and sometimes essential when soldiers are operating in areas that are far removed from main power distribution lines. It also addresses rising fuel costs and the security risks associated with delivering fuel. One of our efforts recently deployed to Afghanistan is the Rucksack Enhanced Portable Power System (REPPS), which is a battery recharging kit.

The REPPS provides forward charging capabilities by combining solar panels, connectors and adaptors for increased charging options. It's portable and can charge most common military battery types in five to six hours. If devices with higher power need to be charged, several REPPS may be daisy-chained together.

This means units no longer have to be tethered to vehicle power or tactical operational centers. Rather, a solar panel and suite of power accessories provide alternative energy for operating C4ISR equipment and charging standard Army batteries. The system, which has been used for surveillance and reconnaissance missions, is designed for silent watch operations and operations in remote areas.

The system is light weight and portable weighing in at approximately 10 pounds. At the heart of the system is the solar charge controller. The charge controller is designed to adjust and configure the appropriate power output for the use of the power input devices and power output devices. Furthermore, the supplementary output adapters and connectors are compatible with existing lithium ion batteries currently in use and offer the added capability of safe and efficient portable field charging. The set of adapters and connectors provides the most complete battery charging system because it enables the charging of the most widely used batteries in the battlefield (MBITR and BB-2590 batteries).

Additionally, the REPPS’ pass-thru assembly cable allows simultaneous battery recharging while delivering power to an end item. This enables the warfighter to complete their mission for longer operations and extends the usage time for their equipment. Through the use of interchangeable adapters, the system automatically configures the charging profile for the particular battery type being charged.

User feedback has been of critical importance in improving the system. As a result, REPPS has evolved significantly since 2004, expanding from the Soldier Photovoltaic Portable Power Panel (SP4). At the time, the SP4 had only the capability of recharging a BB-2590 Army standard battery. We’ve added interchangeable connectors and adapters to provide power input when solar is unavailable.

Fielding the REPPS has been highly successful. Preliminary feedback has been overwhelming positive and the units who have used it are very content with the capabilities and

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**REPPS:** Renewable Energy Takes Charge on the Battlefield

One of CERDEC’s efforts recently deployed to Afghanistan is the Rucksack Enhanced Portable Power System (REPPS); a battery recharging kit.

By Tony Bui

[Image of REPPS system]
flexibility to use in different missions. CERDEC has been actively reaching out to units in rotation that would benefit from this technology. We have provided 75 of the 725 kits that are in development to various Infantry Divisions and Airborne Brigade Combat Teams. The feedback has been overwhelmingly positive, with units expressing great content with the reduced fuel consumption, ease of use, ruggedness, durability and operational flexibility extending their capabilities. Eighty kits will be delivered in early 2011 to the Joint Readiness Training Center at Fort Polk, Louisiana for rotating units to train with before deploying with them to Afghanistan.

However, due to the high cost of procurement and low solar panel efficiency, the technology is not readily available for wider Army use. A reduction in photovoltaic product size, weight and cost could translate into a significantly increased user acceptance by the U.S. Army in the near term. Over the long term, a reduction in operational weight and life-cycle cost could be realized over current tactical power generation systems. With the advent of solar photovoltaic systems, an energy-independent warfighter will enable reduced logistics and improved readiness in future U.S. Army operations.

CERDEC is also envisioning the next generation of photovoltaic systems to use wind power generation as part of a hybrid system for larger-power demand applications. The system is called Reusing Existing Natural Energy Wind and Solar (RENEWs). The concept combines wind generation and solar harvesting components to collect energy and store it in a battery bank for future use. Embedded AC/DC outputs would allow military devices to connect to the system for power. Applications that can benefit from this type of system are re-transmission sites, battery charging, command posts and communication equipment. The first set of prototypes is expected to be delivered December 2010.

We are always looking for the next innovation in power and energy systems for the Warfighter that are low cost, light weight and effective. Industry, academia and other government agencies can reach us at conferences, trade shows and our public website, http://www.cerdec.army.mil/directorates/c2d_army_power.asp.

*Editor’s note: Tony Bui is an engineer with the Army Power division of the U.S. Army Communications-Electronics Research, Development and Engineering Center, which is located at Fort Monmouth, N.J.*
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Military Perspective

Thomas W. Hicks
Deputy Assistant Secretary of the Navy
(Energy)

Tom Hicks was appointed deputy assistant secretary of the Navy for Energy in March 2010. Hicks serves as the Secretariat focal point on all matters pertaining to the Department of Navy’s energy conservation, energy efficiency, energy sources, and green initiatives.

Mr. Hicks joined the Department of the Navy from the U.S. Green Building Council where he held several executive roles. As vice president of the Leadership in Energy and Environmental Design (LEED) green building rating system, Hicks led the development and implementation of all LEED rating systems. During his tenure, he led the three-fold growth of LEED activity as well as the expansion of the LEED family of rating systems from four to ten unique rating systems. As vice president for International Programs, Hicks led the development of USGBC’s international enterprise quadrupling global activity in LEED in two years. Most recently, he spearheaded a new strategic venture on behalf of USGBC – the Building Performance Initiative – to ensure that all green buildings meet or exceed their energy and environmental performance goals.

From 1996 to October 2004, Hicks was a senior program manager at the U.S. Environmental Protection Agency within the Energy Star for Buildings program. In this role, Hicks served as the principal architect of the Energy Star commercial building rating system, the nation’s largest and best-known energy efficiency initiative which has been utilized to assess the energy performance of over 70,000 buildings totaling over 10 billion square feet of floor space nationally.

From 1992 to February 1996, Hicks led the formation of the energy efficiency program for the U.S. Navy Public Works Center Washington. In this capacity, Hicks created and led the team which performed energy audits on over 15 million square feet of floor space and completed energy efficiency upgrades totaling more than $50 million in value at various U.S. Navy and U.S. Marine Corps installations.

Hicks received his Bachelor of Science in Mechanical Engineering from the Clark School of Engineering at the University of Maryland.

Q. Highlight some of the Navy’s recent successes to gain energy efficiencies throughout the service.

A: In October of 2009, Navy Secretary Ray Mabus announced five ambitious energy goals which laid the foundation for an unprecedented approach to energy efficiency for the Department of the Navy. Although, just nine months in, progress on each of these goals has been made:

• With respect to Navy’s acquisition process, we have initiated the preferred suppliers pilot program to provide an incentive structure around energy efficiency to those contractors who do business with the Navy.

• In April 2010, an F/A-18 Super Hornet flew Mach 1.2 on a 50/50 blend of camelina-based biofuel and JP-5. Following this truly watershed moment for the biofuels industry, the Navy will begin testing of a combat ship running on a 50/50 blend of algal-based biofuel and F-76 later this fall.

• As of July 2010, the Navy has more than 10,000 alternative-fuel vehicles (mostly E85 ethanol/flex-fuel with some B20 bio-diesel) within its non-tactical vehicle fleet. We’re finalizing plans to include a wider use of hybrids, neighborhood electric vehicles, plug-in hybrids, compressed natural gas vehicles, and others.

• On the shore side, the Navy has installed advanced meters in 22,000 of its 38,000 Navy facilities with the remaining to be completed by October 2012.

• Also, since 2006 the Navy has required LEED-Silver Certification for all new buildings. We currently have 16
certified buildings, which makes up 9 percent of all the certified government buildings. We have 300 projects registered with U.S. Green Building Council. This year (2010), we have five buildings certified (three Gold and two Silver). The most recent is a LEED Silver Certified Hangar in Jacksonville, Fla.

Navy has begun to fit surface vessels with stern flaps, hull coatings, and propeller coatings during typical dry dock schedules to provide more energy efficient ships.

Addressing the culture is also another key part of energy efficiency. To that end, the Navy is expanding an energy efficiency incentive program, iENCON (incentivized Energy Conservation Program). A program that has proven to be very beneficial in energy consumption during maritime operations will now be implemented in aviation squadrons. In FY08, iENCON saved over one million barrels, or $136 million in fuel consumed by maritime operations – enough fuel to power 20 destroyers for one year.

Q: How will the Navy of 2015 differ from today’s service in terms of energy consumption and conservation, and other criteria?

A: While many of the Secretary’s goals are for 2020, by 2015 the Navy will begin to look very different with respect to energy in several ways:

- In 2012, biofuel certification testing will be complete for all surface vessels and all aviation platforms.
- By 2012, the Navy will conduct a demonstration of our Great Green Fleet by sailing a carrier strike group only on biofuels in local operations. And, in 2016, that carrier strike group will be deployed using biofuels.
- By 2015, our non-tactical vehicle fleet of 50,000 vehicles will use 50 percent less petroleum than it does today.
- In 2012, we will have all of our advanced smart meters in place on all of our installations.
- The Navy and the Marine Corps are installing major renewable energy systems on our bases. This year we are conducting 22 wind assessments for the potential of putting up wind turbines. By 2015, we will have many more wind turbines in place.
- We are in the process of putting two different solar multiple action contracts in place in the Southwest and Hawaii. By 2015, we will have up to another 100MW of solar power to help us offset what we are buying off the grid.
- We are exploring various geothermal resources on our bases in the Southwest. By 2015, we will be further along in having more geothermal power plants in place besides our current 270MW plant at Naval Air Weapons Station China Lake.

Q: Looking further downrange, describe how energy efficiencies are being addressed for next generation weapons platforms.

A: Through research and development, we have found that more aerodynamic and hydrodynamic airframe and ship designs are much more energy efficient. We are ensuring that winglets on the tips of the applicable aircraft, and stern flaps on the transom of ships are designed in at the beginning. We are also applying hull coatings and propeller coatings to provide greater efficiency.

Q: Tell us how industry and the academic community can bring innovative ideas about energy conservation and similar efforts to the Navy’s attention.

A: There are areas of research and development that need to have more emphasis – energy storage devices, more efficient solar panels, more radar-friendly (ie stealthier) wind turbine designs, and developing training programs to encourage less energy consumption.

Q: Describe the three leading energy efficiency and conservation challenges the Navy needs the help of industry and the academic community to resolve.

A: 1. Wide availability of competitively priced biofuels derived from non-food feedstocks.
2. Set of advanced technologies and approaches that can result in net zero energy installations.
3. Better understanding of the role of human behavior and culture change.
Power Boost for Micro Air Vehicles

ADA Technologies, Inc. received a contract from the Air Force Research Laboratory (AFRL) for research related to powering micro air vehicles (MAVs). MAVs are unmanned aerial vehicles that can be as small as six inches in size and allow remote observation in areas that are inaccessible to ground vehicles. ADA will conduct research to develop a hybrid-power device for MAVs capable of operating in both high-power and high-energy modes.

The increased energy and power density provided by the proposed technology will enable greater on-board power for MAVs as well as allowing for more payload capacity thereby broadening the mission profile for next generation MAVs. Furthermore, the developments undertaken will substantially improve the safety and lifetimes of the energy storage devices.

Doug Campbell, spokesperson, ADA Technologies, elaborated. “ADA is involved in an ongoing effort supported by the U.S. Air Force to advance the state-of-the-art of lithium-ion batteries for MAV applications. As part of this effort, ADA anticipates developing advanced lithium-ion batteries possessing 2 to 3 times greater energy density as compared to current state-of-the-art battery systems. As part of this effort, ADA is developing novel, high capacity electrode materials that enable substantial energy density. ADA’s current plan is to complete technology development by late 2011/early 2012, initial manufacturing scale-up by early 2013 with initial battery production in 2014.

Doug Campbell: dougc@adatech.com

Wind Turbine Installation Nears Completion

NordicWindpower is preparing to place into operation in early 2011 a 1MW rated wind turbine at Fort Huachuca, Az. Phillip Dickinson, director of sales and marketing, told Tactical Defense Mediathat he expects the turbine to generate 2 million kW hours to be generated over the course of a year. “Many times they look at that as 1MW of capacity is equivalent to roughly 250 average American homes.”

Phillip Dickinson: pdickinson@nordicwindpower.com

USAF Global Hawk Flies With Alternate Fuel Mixture

A U.S. Air Force remotely-piloted aircraft (RPA) completed a 32-hour flight test using an alternative fuel mixture late last fall.

The 412th Test Wing’s Global Vigilance Combined Test Force’s Block 20 RQ-4 Global Hawk took off Nov. 22 and became the first RPA to fly using the Fischer-Tropsch Synthetic Paraffinic Kerosene fuel blended with regular JP-8 jet fuel.

The Fischer-Tropsch process is a set of chemical reactions that converts carbon-based materials into liquid hydrocarbons. Typically utilizing coal, natural gas or biomass as a feedstock, the resulting synthetic liquid is utilized as a petroleum substitute.

Follow-on test flights were scheduled in to early this year.

Source: www.af.mil
Hummingbird Optimal Rotor System Described

Boeing’s A160T Hummingbird is being evaluated by or deployed with U.S. DoD services and components. Jeff Shelton, senior manager for UAS Business Development at Boeing, described the system during a January 2011 conference attended by Tactical Defense Media. The UAS has a unique optimum speed rotor system that allows the rotor system RPM to be adjusted to operate in the 60 to 100 percent RPM range. “We do that in order to maximize fuel efficiency. Depending on the environmental conditions and the air vehicle operating weight, we adjust the rotor RPM to minimize fuel consumption, which increases our endurance,” Shelton said. The demonstrated endurance of the model on display at the conference was 18.7 hours with a 300 lb. payload and with 90 minutes of fuel onboard after landing. “We know we can go for 20+ hours with a 300 lbs payload, but 18.7 hours was a world record,” he added. While the Hummingbird’s current flight tested speed is about 140 knots, the company is eyeing an increased speed during future testing of 170 knots.

Marc Sklar: marc.a.sklar@boeing.com

Solar Power Supports Water Projects in Iraq and Afghanistan

WorldWater and Solar Technologies Inc. demonstrated a model of its Mobile MaxPure system at the AUSA conference. The device is a solar-powered, stand-alone unit designed to pump, filter and purify water.

Army Major Jesse Stewart, speaking on behalf of the company’s service customer, told Tactical Defense Media that the systems are used in forward operating base scenarios and elsewhere to help reduce fuel expenditures and other logistical costs. “In addition to providing 30,000 gallons of water a day, it also has additional electricity that you can slave off of – run a computer, fan, TV or whatever,” he said.

The Mobile MaxPure may be found supporting U.S. troops or their projects in Iraq and Afghanistan.

Melissa Burns: mburns@worldwatersolar.com

In-Theater Water Production Decreases Logistics Force Fuel Requirements

DRS Technologies has placed into service an initial Expeditionary Water Packaging System (EWPS) with U.S. forces in Afghanistan. The ability to provide an approved, pure water source at a remote location results in a number of cost savings, including reduced fuel use from transporting the water in and throughout the theater of operations by ground or air platforms.

Aside from the one unit in full production, DRS is awaiting its Army customer’s permission to place a second unit in full production. A third unit is expected to be operational in early 2011.

Retired Army Lt. Gen. Jerry Sinn, president, DRS Tactical Systems Group, told Tactical Defense Media at the AUSA conference that his industry team is also making progress to field an Expeditionary Water Reclamation System. This system is expected to provide additional logistics savings through decreased fuel consumption. “To dispose the waste water you have to haul it away or do other things to it. If you put it through the EWRS you have good water that won’t hurt anything. You use it for showers, cooking or whatever else you want to use it for, and the rest of what’s left is clean ash,” Sinn said.

Brian Gallagher: gallagher@drs.com
Kurt Lauer
Vice President and Company Spokesperson
ADI Wind

To provide our troops at any depot level station whether in theater or state-side, with clean and renewable power, purified water and waste removal, ADI Wind is currently developing the most powerful THEPS (Transportable Hybrid Electric Power Station) available. Our THEPS System erects in hours and withstands the harshest of elements for years, reducing the risk, cost and logistics of supplying fuel to unreliable, noisy and inefficient electric generators.

Each towed wind turbine erects 108 feet into the clean flowing air to provide over 80 kW of wind power. An ISO container holds a 35 foot wide thin film solar array that when unrolled and connected between containers 300 feet apart, allows 60 kW of the sun’s power to be captured as well as a shady place to relax. A waste to energy system housed within another ISO container not only eliminates that foul smelling mound of garbage into useable gas fuel for generating electricity, it can produce biodiesel from discarded plastic and tires. A battery storage system within another ISO container gathers all this power and distributes it where it’s needed and when it’s needed. Hard working men and women need rewarded with a refreshing water to drink and wash in. Water like that doesn’t get shipped in from miles away. This water is derived from any source of liquid rite on site. Water so pure, you could perform surgery with it. All these systems combine to offer our troops an experience that they don’t just need to perform their jobs to the best of their ability – it’s what they deserve.

ADI Wind is a veteran owned company, building American equipment, using American components and American workers. We understand what the troops want what they need and we proudly support our brave men and women serving our great nation.

John Pitre
Founder and President
Natural Power Concepts

Natural Power Concepts is a Hawaii-based alternative energy technology incubator focused on developing innovative new ways of harvesting electricity from natural forces such as wind, waves, tidal and current flow, and solar or geothermal heat. NPC conducts design, engineering, prototyping, and testing of renewable energy technologies up to a proof-of-concept level, and then collaborates with industry partners for manufacturing and commercialization. NPC has developed a variety of
new technologies with significant potential for use by the DoD, including a mobile, folding-blade wind turbine system for rapid deployment to remote locations; a river and tidal energy conversion device for quickly generating power from flowing water resources in disaster, humanitarian assistance, or combat missions; a series of storm-proof wind turbines for integration with urban buildings; and new types of ocean energy buoys that can be used for electricity generation, hydrogen production, or seawater desalination applications. For more information visit www.naturalpowerconcepts.com.

Chris Yakes
Vice President, Advanced Products
Oshkosh Defense

ProPulse hybrid diesel-electric system from Oshkosh Defense is a drive system that improves fuel economy, reduces emissions, improves life cycle costs simplifies vehicle maintenance and serves as an on-board AC generator with enough military-grade power output to supply an entire airfield or hospital.

There is a rapidly growing demand in the military for on-board power to support mobile radar systems, command centers, IED-defeat systems, forward operating bases and many other applications to provide troops with increased tactical flexibility, while reducing their logistics footprint. ProPulse increases fuel efficiency by up to 20 percent and decreases vehicle emissions.

The ProPulse system uses a unique, modular series-hybrid arrangement to simplify the transmission of power to the wheels. The diesel engine powers an electric generator, which provides direct power to electric motors that power the wheels, eliminating the torque converter, automatic transmission, transfer case and drive shafts. The system has no batteries, using ultracapacitors for energy storage instead. A regenerative system uses the traction motors as generators for vehicle braking, storing the energy and then uses it during the next acceleration event, thus reducing wear and tear on the brake system.

Oshkosh Defense received a contract in mid-2010 to integrate ProPulse technology on the Oshkosh-produced MTVR standard and extended cargo trucks for U.S. military testing.

Wilson Stevenson
CEO
Outpost Solar

Outpost Solar, is hard at work building renewable power solutions for war fighters on the front line. Our off-grid Armored Mobile Solar generator (AMS-5) is an ideal solution to fill the need for remote generation in the most hostile areas of the world. We strongly feel that a system like ours, that is easily redeployable and rugged, can dramatically reduce the high-risk fuel resupply missions, provide more covert operations while saving money.

We have engineered the AMS-5 to fit inside a ½ height, ½ length ISO container that we up-armor. Since our system is ISO based, it can be easily deployed by equipment that the military currently has, power the typical needs of a forward operating base, withstand the environment it is deployed in and contain enough batteries to run a typical load for up to five days without sun. Our AMS-5 reduced fuel resupply missions and takes soldiers and contractors out of harm’s way. When considering the fully-burdened price of fuel for bases in areas like Afghanistan, the costs, both in dollars and lives, make our investment worthwhile.

Our website at www.outpostsolar.com, tells you more more about all our products and you may watch some YouTube videos of the container easily being deployed and recovered. We donated the AMS-5 to cleanup crews recovering Opryland after the terrible floods in Nashville, Tennessee, where it performed 24/7 exactly as designed. As far I can tell there are currently no other products on the market that come close to providing a solution like ours. We are still hard at work, exploring the necessary channels to move our project forward.

C. Richard Chou, PE
Vice President, Engineering
DHS Systems LLC

While many power technology companies are beginning to explore ways to build more efficient generators and incorporate renewable energy sources, one company, DHS Systems LLC, has introduced an entire line of DRASH Intelligent Power Technology (IPT) Trailers - trailers equipped with smart system generators for greater power generation efficiency and demand management on the battlefield.

Traditionally, generators used to power tactical operations centers have been designed to run in “island mode” - operating independently of one another and creating multiple power grids within a single facility. These generators do not run based on the amount of power needed for a facility to operate, but rather are sized to run peak loads, continuously running on partial loads and producing power less efficiently.

DRASH's line of IPT generators reduce unnecessary fuel consumption and establish more efficient, flexible mobile facilities. Digital smart systems allow users to parallel generators to operate as a single power grid that only supplies the power needed to meet a facility’s immediate operational requirements. More simply put, the IPT system allows users to connect multiple generators which will automatically turn off unneeded units. This ensures that a facility will only generate the amount of power it needs to operate - no more, no less. In other words, net-zero meaning
no waste. Additionally, Chris Yakes Wilson Stevenson Eric Wescott no generators are operated with small partial loads, so all power generated is done in the most efficient manner possible, allowing field operators to get the most out of their limited fuel resources. With less run time, wear and tear on gensets is also greatly reduced.

Combined with source management, DRASH is incorporating load management capabilities. Multi-tiered load shed capabilities are already incorporated in the IPT system. The controller also records all events and warning for prognostics and diagnostics, which is a great tool for logistics to have available to them.

This smart system infrastructure is only the first step. Once the ability to control the grid is established, the ability to integrate renewable and alternative energy resources becomes feasible. DRASH is currently looking at multiple options to incorporate solar, wind, fuel cell, and other alternative energy devices into the deployable tactical grid.

The Department of the Army announced that Katherine Hammack was officially sworn in as the assistant secretary of the Army for installations and environment. Prior to her appointment, Hammack was a leader in Ernst & Young LLP’s Climate Change and Sustainability Services practice. There she assisted clients with obtaining Leadership in Energy and Environmental Design (LEED) green building certification for their buildings and identification of sustainability strategies.

REv announced two new additions to its team: Ron Steeper, VP corporate development and Martin Lee, VP production and engineering.

Protonex Technology Corporation announced that it has named Paul Osenar, Ph.D., as president and chief executive officer. Scott Pearson, the former president and CEO will remain with the company in a non-executive capacity, assuming the role of Chairman of the Protonex board of directors. Harry Fitzgibbons, the chairman of Protonex since May 2006, will remain on the board as a non-executive director.

Ultralife Corporation announced that its Board of Directors has appointed Michael D. Popielec president and chief executive officer. Popielec replaces John D. Kavazanjian who is retiring after serving as Ultralife’s president and chief executive officer since July 1999. Following his retirement, Kavazanjian will serve as a consultant to the company through February of 2012, assisting in the company’s development plans particularly in the energy storage market.

Richard Carlin, Ph.D., the director of the Sea Warfare and Weapons Department in the Office of Naval Research (ONR), was honored with the 2010 Fuel Cell Seminar and Exposition Award.

“This award recognizes Dr. Carlin not only for his efforts to advance fuel cell technology, but also for his many years of promoting partnerships and building coalitions in the industry,” said Nancy Garland, Ph.D., Department of Energy Fuel Cell Manufacturing Team Leader and co-chair of the Fuel Cell Seminar and Exposition Award, Technical Program Committee.
**NDIA DEFENSE EXHIBIT GUIDE**

**Maximize Your Reach & Budget!**

America’s Top Rated Defense Exhibitions For 2011 (as of Dec. 1, 2010)

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**22nd Annual SO/LIC Symposium & Exhibition – #1880**
February 8-9, 2011 ▶ Washington, DC
Exhibit POC: Alden Davidson, CEM 703-247-2582
Meeting POC: Meredith Geary, CMP 703-247-9476

**PRECISION STRIKE WITH COALITION PARTNERS**
February 23-24, 2011 ▶ Ft. Walton Beach, FL
POC: Dawn Campbell 703-247-2590
Visit www.precisionstrike.org

**2011 Pacific Operational S&T Symposium & Exhibition – #1540**
March 14-16, 2011 ▶ Honolulu, HI
Exhibit POC: Luellen Hoffman 703-247-9460
Meeting POC: Tia Pitt 703-247-9467

**2011 Ground Robotic Capabilities Conference & Exhibition – #1380**
March 22-24, 2011 ▶ Orlando, FL
Exhibit POC: Alden Davidson, CEM 703-247-2582
Meeting POC: Mary Katherine Saladino 703-247-2540

**27th Annual Logistics Conference & Exhibition – #1730**
March 28-31, 2011 ▶ Miami, FL
Exhibits POC: Dennis Tharp CEM 703-247-2584
Meeting POC: Kelly Seymour 703-247-2583

**AFEI – Department of Defense Enterprise Architecture Conference**
April 11-15, 2011 ▶ Hampton, VA
POC: Betsy Lauer 703-247-9473
Visit www.afei.org

**46th Annual Armament Systems: Gun & Missile Systems Conference & Exhibition – #1590**
April 11-14, 2011 ▶ Miami, FL
Exhibit POC: Taryn Crowder 703-247-2566
Meeting POC: Allison Doherty 703-247-2570

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**12th Annual Science & Engineering Technology Conference/DoD Tech Expo – #1720**
April 12-14, 2011 ▶ Charleston, SC
Exhibit POC: Allison Hitchner 703-247-2573
Meeting POC: Mary Anna Christiansen 703-247-2596

**International Infantry & Joint Services Small Arms Systems Symposium Exhibition & Firing Demo – #1610**
May 23-26, 2011 ▶ Indianapolis, IN
Exhibit POC: Dennis Tharp, CEM 703-247-2584
Meeting POC: Kelly Seymour 703-247-2583

**8th National Small Business Conference and Exhibition – #1140**
June 7-8, 2011 ▶ San Diego, CA
POC: Britt Bommelje 703-247-2587

**2011 Defense Logistics Agency Enterprise Supplier Conference and Exhibition – #1780**
June 28-30, 2011 ▶ Columbus, OH
Exhibit POC: Dennis Tharp, CEM 703-247-2584
Meeting POC: Taryn Crowder 703-247-2566

**26th International Ballistics Symposium & Exhibition – #1210**
September 12-16, 2011 ▶ Miami, FL
Exhibit POC: Kelly Seymour 703-247-2583
Meeting POC: Kari King, CMP 703-247-2588

**US Coast Guard Innovation Expo – #2230**
October 25-27, 2011 ▶ Tampa, Florida
Exhibit POC: Luellen Hoffman 703-247-9460
Meeting POC: Angie DeKeine 703-247-2599

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**2011 Joint Service Power Expo – #1670**
May 2-5, 2011 ▶ Myrtle Beach, SC
Exhibit POC: Luellen Hoffman 703-247-9460
Meeting POC: Angie DeKeine 703-247-2599

**Global Explosive Ordnance Disposal Conference & Exhibition – #1950**
May 3-5, 2011 ▶ Ft. Walton Beach, FL
Exhibit POC: Alden Davidson, CEM 703-247-2582
Meeting POC: Mary Anna Christiansen 703-247-2596

**2011 Environment, Energy & Sustainability Symposium & Exhibition – #1440**
May 9-12, 2011 ▶ New Orleans, LA
Exhibit POC: Allison Hitchner 703-247-2573
Meeting POC: Kari King, CMP 703-247-2588

**2011 SOFIC Conference & Exhibition – #1890**
May 17-19, 2011 ▶ Tampa, FL
Exhibit POC: Alden Davidson, CEM 703-247-2582
Meeting POC: Meredith Geary, CMP 703-247-9476

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POC: Luellen Hoffman, Director of Exhibits 703-247-9460

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Army Sustainability Report Highlights Energy and Environmental Achievements

The Department of the Army released its second Annual Sustainability Report highlighting energy and environmental achievements and milestones supporting the Army’s sustainability concept and goals.

The annual sustainability report informs primary stakeholders, partners, the American people, and other interested parties on the Army’s progress to embody the principles of sustainability in its operations and installation management.

The report and other information on Army sustainability programs and initiatives are available online to download at http://www.aepi.army.mil.

Source: www.army.mil

More Efficient Powertrain Technology Effort

SAPA Transmission, Inc., U.S.A., Fort Lauderdale, Fla., was awarded a contract to perform research and development of efficient powertrain technologies over a period of 48 months. The contractor shall develop and demonstrate an electronically controlled, integrated powertrain, which improves overall efficiency of current powertrains by reducing fuel consumption, providing exportable electrical power, reducing noise, and which is capable of operating on a wide range of fuels and fuel mixtures. The estimated completion date is Sept. 24, 2014.

Source: www.militaryindustrialcomplex.com

EnerSys Awarded U.S. DoD Contract

EnerSys received a multi-year contract award from the United States Defense Logistics Agency (DLA), to produce valve regulated lead acid (VRLA) batteries using its proprietary thin plate pure lead technology. The award is for EnerSys’ Hawker Armasafe Plus batteries for use by the United States Army and Marine Corps and for EnerSys’ Hawker F-16 batteries for use by the United States Navy and Air Force. The contract provides for the DLA to exercise additional equal annual options through 2014.

Richard Zuidema: mediacontact@enersys.com

Army’s Goal: “net-zero” Energy Consumption by 2030

The Army has a goal of “net-zero” energy consumption by 2030, one of three challenges laid out by the service’s assistant secretary for installations, energy and the environment.

Net-zero energy means an installation or building produces as much energy as it consumes, resulting in a net usage of zero.

“The goal is net-zero: net-zero energy, net-zero water and net-zero waste,” said Katherine Hammack, the assistant secretary of the Army for installations, energy and the environment, during the AUSA show, attended by the Tactical Defense Media.

Hammack noted the Army’s goal for 2030 is for energy only, and that the timeline for water and waste goals have not yet been set.

“(We’re) working on developing strategies. We’re testing various scenarios,” she said. “Those are our challenges to both our operational forces and to our permanent installations.”

The effort is part of providing energy security to the Army, meaning that the Army can continue its mission without depending on the civilian power grid. Achieving that would require both a reduction in energy use by finding efficiencies, and also the addition of power-generation capabilities.

As part of that effort, Hammack said the Army has a new policy to phase out incandescent light bulbs, which were invented 130 years ago. “It’s amazing to me we still purchase them,” she said, adding that 88 percent of bulbs purchased today are incandescent.

The Army will finish off the incandescent inventory and start purchasing more efficient technology, such as compact fluorescent bulbs. Additionally, she said, the Army has changed the way it designs and develops Army facilities. New construction will incorporate principles from the American Society of Heating, Refrigeration, and Air-Conditioning Engineers standard 189.1.

Hammack said new construction will include things like cool roofs, solar water heating, storm-water management and water efficiency. The policies can help the Army find energy savings by as much as 45 percent, she said.

“That is going to be our new design standard for buildings,” Hammack said.

Source: www.army.mil
Lockheed Martin LCS Power and Propulsion Awards

Lockheed Martin, one of two OEMs to provide Littoral Combat Ships (LCS) to the U.S. Navy, was awarded a contract in December 2010 for ten more ships.

Rolls-Royce will supply gas turbines and waterjets for the Lockheed Martin LCSs.

Designed to operate in combat zones close to the shore (littoral waters), each LCS will be equipped with two Rolls-Royce MT30 gas turbines powering four large waterjets, enabling the vessels to reach speeds in excess of 40 knots. “At 36 megawatts, the MT30 is the world’s most powerful marine gas turbine,” read Rolls Royce statement. Combining this power with Rolls-Royce waterjets makes the LCS highly maneuverable, able to operate in shallow waters and to stop and accelerate quickly.

Rolls-Royce is already supplying propulsion equipment on the first two Lockheed Martin vessels. The announcement extends this with one firm order and options for a further nine ships of the same design.

In another development Fairbanks Morse Engine announced that it has been awarded a contract to supply two Fairbanks Morse Colt-Pielstick 16-cylinder PA6B STC propulsion diesel engines for the LCS program.

F-22 Flown on Bio Synthetic Fuel

An F-22 Raptor successfully flew at supercruise in March on a 50/50 fuel blend of conventional petroleum-based JP-8 and biofuel derived from camelina, a weed-like plant not used for food.

The flight was the capstone of a series of ground and flight test events conducted by members of the 411th Flight Test Squadron, using the biofuel blend.

DARPA Awards Contract to Support Renewable Jet Fuel Research

Logos Technologies Inc., was awarded a cost-plus-fixed-fee contract (HR0011-10-C-0187). This work is for the BioJet program to demonstrate an end-to-end lipid fermentation process at scale for the commercially viable production of hydrotreated renewable jet fuel. The work is expected to be completed by June 30, 2012. The Defense Advanced Research Projects Agency is the contracting activity.

Army SBIR Phase II Award

Precision Combustion, Inc. (PCI) was awarded the 2010 Army Small Business Innovation Research Achievement Award for its performance under an SBIR Phase II project developing compact JP-8 burners for military Stirling engines. This award recognizes outstanding achievement in the Phase II efforts of small businesses that have exemplified the SBIR goals of bringing innovative technologies and products to the marketplace.

A company statement noted, “Electricity runs the advanced technical systems and processes that support Army tactical operations. Readily available electric power on the mobile battlefield is essential to mission performance, as is the need for lightweight quiet power generating systems in the 100 We to 2 kWe range that are efficient across wide turndown ranges and can be fueled by available logistics fuels. Using logistics fuels such as sulfur-containing JP-8 is especially challenging.”

The technology offers broad applicability across the Department of Defense, including robotics and portable generator sets.

Tony Anderson: aanderson@precision-combustion.com
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.

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.
There is a subtle revolution occurring in the power production, management and storage systems supporting U.S. DoD shelter systems. As wind, solar and other renewable energies are harnessed to provide power, other efforts are improving energy management and storage solutions for the department’s systems.

DoD’s Items of Interest

The Joint Committee on Tactical Shelters (JOCOTAS) is one of DoD’s premier initiatives to gain material system efficiencies through inter-service dialogue and actions. The committee, formed in 1975 at the direction of the Office of the Secretary of Defense, fulfills these major responsibilities:

- Advance the state of the art in shelter design and shelter ancillary equipment;
- Search for common solutions to identified user needs;
- Reduce and eliminate duplication of shelter research, development, test and evaluation;
- Create a standard shelter family and maximize its use within DoD; and
- Share information and expertise to solve shelter problems

Frank Kostka, JOCOTAS executive secretary, provided a state of the art overview of technology focal points within the Department. “The services are working aggressively to reduce energy usage across the board and in the shelter area the focus has been on cutting air infiltration by tightening up seals between shelter panels barrier materials that block solar loading on the outside surfaces of shelters, maintaining steady state temperatures inside by developing high performance flexible high performance insulation that reduces cooling and heating requirements, photovoltaics arrays that both reduce thermal loading and produce power and, smart power distribution grids that efficiently provide electricity produced by a bank of generators that turn off and on depending on system draw.” Kostka emphasized that all materials being evaluated are subject to strict safety and fire code requirements.

Two energy management and power generation projects that capture ongoing 2010 service activities are the Joint Capabilities Technology Demonstration (JCTD) Net Zero that is managed by the DoD Power Surety Task Force and the Marine Corps ExFOB project [editor’s note: see the accompanying article on the Marine Corps’ ExFOB in this issue]. The JCTD Net Zero for expeditionary shelters has been underway at the National Training Center (NTC) located at Fort Irwin, CA since the spring of 2009.

Lori Biszko, an Army representative on the JOCOTAS, provided highlights from the JCTD Net Zero program. “The Army is aiming to achieve a ‘Net Zero’ base camp: a forward operating base (FOB) that is energy independent from power generation. In order to accomplish this, the FOB will need to produce the same amount of energy that it consumes.”

Biszko pointed out the U. S. Army Research, Development and Engineering Command’s (RDECOM) Natick Soldier Research & Engineering Center (NSRDEC) has been evaluating a number of energy saving technologies through various programs, one of which is the JCTD Net Zero Plus program. “The objective of this program is to collect energy usage data for environmental control units,
evaluate advanced lighting systems, and determine general electric load inside the shelters. This information will then be applied to the development of Net Zero base camps,” she added.

NSRDEC is gathering energy usage data for energy efficient shelter systems and comparing this to baseline systems in order to recommend the best approach to reducing energy usage in the field. Some of the technologies that are being demonstrated though this program are advanced insulation, advanced shading, smart power management, renewable solar, wind, and geothermal energy, LED lighting and electroluminescent lighting systems. Ideally, by utilizing and combining these technologies, the energy loads necessary to run FOBs will be reduced and Net Zero base camps will become a reality.

NSRDEC is collaborating with the Air Force and Marine Corps on these efforts. NSRDEC started the evaluation in April 2009, with the Air Force joining in November 2009 and the Marine Corps in June 2010. “A variety of configurations of shelters and technologies are set up at the National Training Center at Ft. Irwin for the evaluation. The testing will continue until December 2010,” said Biszko.

JOCOTAS-guided efforts have produced significant deliverables to the department. Thermal blocking materials supported by standalone structures that are designed to shade open spaces that were evaluated during the assessment include the Advanced Solar Cover (ASC) and the Army’s Ultra Lightweight Camouflage Net System (ULCANS). Wrap around versions of solar blocking fabrics using similar materials were also were also assessed.

“Thousands of the ASC’s are deployed in Iraq and Afghanistan. It blocks approximately 60 percent of the solar load on a testing (according to a TECOM test report) showed that this was adequate to bring surface temperatures down to ambient. The cover is extremely porous allowing good air flow and reducing the requirements for heavy support poles needed to resist wind loads associated with denser materials,” said Biszko.

She also pointed out the ULCANS nets provide a greater blocking capability (90 percent) when compared to the ASC due to the need to match the thermal gradient of the surrounding surfaces. “Support poles are loosely constrained and free to float in the breeze,” explained Biszko.

**Power Generation**

Military shelter system manufacturer DHS Systems (DRASH) has provided the U.S. DoD with reliable, rapidly deployable mobile infrastructures through its line of Deployable Rapid Assembly Shelters (DRASH) and Utility Support Transport (UST) trailers for more than 20 years.

Recognizing the military’s objective of achieving greater efficiency on the battlefield and dire need to reduce the logistics burden of deployed forces, DRASH is one company that is actively pursuing energy efficiency technologies to incorporate into its shelter systems.

The company's initial effort to gain energy efficiency is at the point of power generation. DRASH Intelligent Power Technology (IPT) trailers incorporate digital smart systems for greater power generation efficiency and demand management on the battlefield.

The company’s IPT generator strategy goes beyond the legacy concept of battlefield generators – which run in “island mode” - operating independently of one another and creating multiple power grids within a single facility. These generators are sized to run peak loads, continuously running on partial loads and producing power less efficiently.

C. Richard Chou, Vice President for DHS Systems Engineering, said the company’s line of IPT generators reduce unnecessary fuel consumption and establish more efficient, flexible mobile facilities. “Digital smart systems allow users to parallel generators to operate as a single power grid that only supplies the power needed to meet a facility’s immediate operational requirements. More simply put, the IPT system allows users to connect multiple generators and will automatically turn off unneeded units,” she explained, and added, “This ensures that a facility will only generate the amount of power it needs to operate - no more, no less. Additionally, no generators are operated with small partial loads, so all power generated is done in the most efficient manner possible, allowing field operators to get the most out of their limited fuel resources. The IPT system has the potential to reduced fuel consumption by 40 percent or more in small deployable grids” (Based on testing performed at DHS

**Load Demand Start Stop (LDSS) system**

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utilizing representative brigade load profiles and a 3-generator set system.)

While relatively new, DRASH IPT Trailers are already in deployment under the Terminal High Altitude Air Defense (THAAD) and Harbormaster Command and Control Center (HCCC) programs.

Another power generation trend is improving solar, wind and hybrid power production systems.

Efforts at Solar Stick led to a major redesign of the company’s flagship rigid panel-based Solar Stik systems, which come in solar only and solar/wind hybrid versions. “The purpose of this redesign was to make the systems more compact and portable, making them a better choice for portable applications, including tactical shelters. The Solar Stiks can be very quickly deployed within 50 feet of the supported shelter systems to provide power for lights, computers, communications equipment, and troop comfort items such as small scale refrigeration, water purification, and non-A/C cooling applications,” said Al Zaccor, CEO, Solar Stik.

As this issue was being published, Solar Stik was releasing a wind-only version of its generators, provisionally called the Wind Stik. The product was unveiled at the September 2010 Modern Day Marine Expo at Quantico.

“This will support shelters that already have another solar application (a solar tent roof, for example), but wish to add small scale wind to the equation. These devices, like our Solar Stiks, and unlike our competitors’ wind solutions, will be very quick to deploy and redeploy, in minutes and without any tools,” pointed out Zaccor.

Solar Stik also released a new version of its flexible solar panel-based systems, called the Shelter Pak. This system pairs a Solar Stik Power Pak with two 190-Watt amorphous silicon flexible solar panels from PowerFilm. Zaccor noted the configuration is ideal for quick deployment on top of small shelters, such as used by platoon and company level command posts, combat outposts, and other remote forward locations. “Like all of our other systems, multiple units can be daisy chained to provide more power. The Shelter Pak is a superior solution to solar systems built into tent roofs for a variety of reasons.” At the top of Zaccor’s list was the ability to deploy the Shelter Pak on top of a shelter, on the ground, or staked to the south side of a shelter, etc., making it a more flexible and adaptable system.

The Shelter Pak was released earlier in 2010 under that name. “A DoD entity did deploy the product (under another name) to Haiti in the aftermath of the earthquake there, but almost certainly used it in a non-shelter application (on the ground),” said Zaccor.

**Power Management and Storage**

Industry continues to grapple with the vexing challenge of managing and storing power generated by solar or wind for shelter systems.

Solar Stik’s solution to this challenge is its Power Paks – compact 500 or 1000-Watt-hour storage units that include integrated solar charge controls, battery monitoring, and multiple power output options, including AC, DC, and programmable circuits. Zaccor said the storage capacity of these Power Paks can be easily expanded by the addition of modular Expander Paks in 500 or 1000-Watt-hour increments, using plug and play connectors. He continued, “The compact nature of the Power and Expander Paks makes them easier to transport and more flexible in application. They can be placed in various parts of a shelter (in each corner or along each wall, for example), rather than concentrated all in one place. You can temporarily remove an Expander Pak to give you a mobile source of power at a remote location, and then return it to the shelter power system for recharge.”

Solar Stiks, Power Paks and Expander Paks, as well as most of the company’s flexible panel systems (Scout, Recon, and Patrol Paks) are in production and have already been deployed to DoD units.

The company has also engineered a line of inverter/charger/UPS devices called P.R.O.-Verters. These devices provide various levels of power management and controls, but are primarily useful in integrating additional sources of power to supplement the solar and wind power provided by Solar Stik’s renewable energy generators. “The P.R.O.-Verters enable Solar Stik’s power systems to act in a hybrid configuration, combining renewable energy and conventional generators in a highly efficient way,” emphasized Zaccor.

Various versions of Solar Stik’s P.R.O.-Verters have been in use by DoD organizations for more than two years. The latest version, the P.R.O.-Verter 3000APM AGS, was being turned over to the government for testing as this issue was published.

STOPPING THE (E) ENERGY LOSS

Current designs of energy efficient systems also seek to minimize lost energy, in particular, in extreme environmental conditions. To maintain ambient temperatures within field facilities when deployed in extreme climates, a significant amount of heating or cooling must be produced, which uses a significant amount of energy. DRASH is incorporating advanced thermal insulation into its shelters to help reduce this demand. “Already able to offer an R-value of 3.1 and actively seeking advanced technologies for further improvement, this enhanced insulation helps to reduce the heating and cooling loads significantly,” said DRASH’s Chou.

DRASH is also working on the next generation of environmental control units (ECU), which will incorporate the latest technologies to improved cooling capabilities and increased efficiency and reliability. C. Richard Chou pointed out, “By addressing both the thermal losses within the shelter and improving the efficiency of the ECU, DRASH is on the leading edge of creating a complete, energy efficient mobile facility that can be deployed anywhere in the theater of operations.”
The headlines are everywhere and the message is clear: environmentally-sound practices are not only good for the planet; they’re good for operations too. When President Obama signed Executive Order 13514 in October 2009, each agency was directed to develop a sustainability plan. Many agencies have tackled this order with enthusiasm, and the Defense Department is no exception. From combat energy managers to the DOD’s 99-page sustainability plan, the military and its many supporting groups are already laying the groundwork for a sustainable Defense Department in the future.

**RESOURCES**

The Executive Order and the various agencies’ responses to it have caused many to ask, where can I learn more about sustainability for my agency? The Center for Environmental Innovation and Leadership – CEIL – is the go-to resource for federal employees responsible for sustainability projects. CEIL is a nonpartisan organization designed to facilitate information and education exchange among government professionals responsible for green projects and the vendors, contractors, and consultants that provide green goods and services. In that spirit, CEIL’s Website, CEILeadership.org, blog and the GOVgreen Conference and Exposition are all excellent resources for federal professionals.

CEIL utilizes many forms of social media to ensure the best and most recent information about green products and practices reaches federal employees. CEIL’s primary resources are its website and blog. When you need reliable information about green products, the Product Directory an easy-to-access resource. To help you keep up with the latest green news to stay ahead of the sustainability curve, CEIL news is updated regularly to feature the best news content gathered from across the web. And when you want to find out how your federal colleagues are going green, listen to CEIL’s timely, informative, and free Green Government Podcast Series or join the Networking community online. Add the CEIL Blog to these resources, and CEILeadership.org provides quality daily news, valuable reference resources and networking opportunities – all easily accessible online.

CEIL’s web resources are extensive, but the Center goes well beyond the Internet. In November 9-10, CEIL sponsored the GOVgreen Conference and Exhibition in Washington, D.C. GOVgreen was an education event designed to bring together government and military professionals responsible developing and managing green programs.

GOVgreen provided attendees with the broadest possible educational and exhibition experience. GOVgreen’s 30 sessions featured more than 85 speakers on topics ranging from energy to transportation and from conservation to facilities design and management. Over 100 hundred exhibitors were on hand to showcase hundreds of green products and services. But most importantly, employees from across the federal government were able to exchange ideas, experiences, and tips on how they are fulfilling Executive Order 13514.

**LOOKING AHEAD**

In 2011, the Center for Environmental Innovation and Leadership will further expand its educational offerings with a series of conferences on the major focus areas of EO13514, a West Coast GOVgreen and of course the Washington, D.C.-based GOVgreen November 30-December 1.

Federal employees work hard – CEIL knows this – which is why the Center is will continue to work to ensure that Defense Department professionals can fulfill the directives laid out in Executive Order 13514 simply and effectively. CEIL provides the tools, knowledge, and networking forums to enable success. Now is the time to take advantage of all CEIL has to offer--and to suggest improvement and additions to CEILeadership.org and the GOVgreen Conference and Exposition.

*Editor’s note: Ann Seltz is president, Center for Environmental Innovation and Leadership, and be contacted at aseltz@CEILeadership.org.*
During the Surface Navy Association conference, Navy experts provided insights on the service’s efforts to field advanced propulsion systems and achieve other efficiencies.

By Marty Kauchak, Editor

The U.S. Navy is changing course to field the nation’s first Green Fleet – running on biofuels and using a blend of nuclear and hybrid-electric surface ships. Naval Sea Systems Command subject matter experts updated attendees at the January Surface Navy Association conference about their efforts to steer a course away from fossil fuels and inefficient propulsion sources.

**Propulsion Programs**

The Navy is pursuing full-electric drive and hybrid-electric propulsion systems for different classes of surface ships.

George Drakeley, the Director of Marine Engineering, explained the game-changing propulsion changes for ships that will be part of the new DDG-1000 Zumwalt-class. “Now we have two large generators and two other electric auxiliary generators going into a high voltage ring bus that can be used for propulsion or electric power. This gives us a lot of flexibility with the ship.”

This strategy will provide the DDG-1000s with a full electric integrated power system (IPS). This capability will provide more efficient fuel consumption and an added benefit – it will best support the service’s need for more onboard electricity for advanced radars and other sensors, and a new generation of directed energy weapons, including the electric rail gun and the like.

The ability of the Zumwalt-class and other ships to support these energy-intensive systems will do nothing short of revolutionize warfare at sea.

The Navy’s Land Based Test Facility at Philadelphia is the focal point for integrating the turbines and other components for the DDG-1000 and other new ship propulsion efforts. “We’re learning how to integrate things. We have tested the generators and motors up to full power individually and are working on integrating the system. As with any new technology we are having some problems but we are working through them and learning a lot of good lessons,” Drakeley said.

Drakeley noted the Navy is pursuing hybrid electric drive propulsion for its amphibious and DDG-51-class ships. “When you look at the speeds of the LHD-class, you will see the speeds they do over time most of their time is at low speed. We successfully installed a hybrid electric system on LHD-8 [USS Makin Island].”

LHD-8 differs from earlier ships of the class in that it is powered by gas turbine engines rather than steam turbines. LHD-8 is the first U.S. Navy amphibious assault ship to replace steam boilers with gas turbines, and the first Navy surface ship to be equipped with both gas turbines and an auxiliary propulsion system (APS). This unique auxiliary propulsion system is designed with fuel efficiency in mind. The APS uses two induction-type auxiliary propulsion motors powered from the ship’s electrical grid instead of using main propulsion engines to power the ship’s shaft. Instead of using its gas turbines which are less efficient at lower speeds, the ship will be able to use its APS for roughly 75 percent of the time the ship is underway. Over the course of Makin Island’s lifecycle, the Navy expects to see a savings of more than $250 million. Because the
gas turbines will be used infrequently, the Navy will also save on maintenance and lifecycle costs.

Similarly, the DDG-51 class also has low-speed requirements as it remains on station during ballistic missile defense missions, anti-piracy and counter drug operations, and other tasks — and would benefit from a hybrid electric drive system.

The service has a proof-of-concept, multi-phase approach to develop the DDG-51 hybrid electric drive. “We are starting with a motor with the idea that in the future this motor can become a generator and provide extra power for the combat systems when needed. The DDG-51 has two gas turbine engines for its propulsion and three gas turbines for energy generation,” Drakeley explained. He outlined the road ahead to obtain a hybrid electric system. “What we are going to do is add switchboards and drives and a motor into the reduction gear so when the ship is going at low speeds we can secure the gas turbine for main propulsion.”

DRS in Milwaukee is the OEM for the DDG-51 prototype. The company is completing testing of the motor and drive. Following completion of this round of testing, the components will be shipped to General Atomics’ Tupelo, Ms. plant for integration and follow-on testing, before being returned to the Navy’s Philadelphia facility. SSS Clutch Company is providing the clutch for the system.

“The system is on track for assembly on USS Truxtton (DDG-103) in March 2012,” Drakeley said.

Drakeley reminded the SNA attendees that there is a request for proposal issued for a follow-on DDG-51-class system. “We’re out to industry for their design for motors that we can backfit on the DDG-51 class, and the switchboards and drives so that we can turn this into an IPS system — and feed power back into the weapon system with both gas turbines up and driving the ship when we need.”

**OTHER DEVELOPMENTS**

Much like its sister services, the Navy is seeking a new generation of more capable batteries for operational use — this time onboard ships and for offboard purposes.

The service’s planned use of next-generation batteries is for unmanned vehicles supporting ships and other warfighters, and to support on-board power requirements. “Another reason that we need high power batteries is for the hybrid electric drive,” Drakeley added. “If you are going to use the hybrid electric drive to drive the ship and you are going to be securing gas turbines you are going to need a backup source of power.”

The Navy is also accelerating its effort to replace petroleum-based fuels used in the fleet (F-76 and JP-5) with alternate fuels.

Ed Godfrey, the director for the Ship’s Performance Integrity Group, who has oversight over Alternate Fuels Development and Alternate Fuels, said the process must lead to a “drop in replacement” fuel so “we won’t have to make any changes and it meets all the requirements of the fuels that we have today.” The Navy is actively investigating alternatives to F-76 and JP-5 fuels including hydro-treated, refined fuel from algae. Any fuel derived from algae will be derived from an extensive process and refining process. And it will need to meet existing standards for marine applications, Godfrey noted. A partial list of specifications would include the alternative fuel’s performance with nozzles and other fuel system components, a propulsion engine’s output and other criteria.

“One area we are taking a hard look at is aeromatics — how does it affect seals — seal swell and sealing. With the algae fuel it does not have the aeromatics that we have with the F-76 – so we are looking at a 50-50 blend too, so we don’t eliminate certain areas that we need to have,” Godfrey said.

An ambitious alternatives fuel testing program with different Navy engines was in progress during the SNA.

Alternative fuels are expected to be introduced in the fleet for operational use not later than 2012.
Rob Sainsbury
VP Business Development
DRS Power and Environmental Systems Group

Rob Sainsbury joined DRS Technologies in October 2006. He is currently leading the business development (BD) professionals for several divisions as the vice president, BD for the Power and Environmental Systems Group (PESG). Prior to DRS, Sainsbury successfully fulfilled business development, engineering, program and general management roles at several companies including General Electric Co., Raytheon, Veridian, and Microvision. He served eight years in the U.S. Navy as a submarine officer and retired from the Naval Reserves in 2000.

Rob Sainsbury received his B.S. in Mechanical Engineering from the University of Rhode Island and his M.S. from the University of Pennsylvania for joint studies in Engineering and Business. He also completed post-graduate work with the U.S. Navy Nuclear Power program, culminating in qualification as a chief engineer.
Q: Tell us about the DRS Power and Environmental Systems’ product portfolio.

A: The DRS Power and Environmental Systems Group (PESG) provides a wide range of customer-focused solutions for environmental control and power generation, conversion and distribution. Our products meet stringent performance requirements necessary for U.S. and international defense and enhanced specification marine platforms, supporting military ground operations and power generation, oil drilling, transportation, renewable energy and other industries worldwide.

The rugged environmental systems and equipment available from PESG deliver heating, air conditioning, ventilation, and refrigeration control in numerous configurations for ships, facilities, mobile shelters, aircraft ground support and combat vehicles. For applications requiring enclosed mobile environments, we design and build shelters and trailers that can support operations in extreme climate conditions. In addition, our group provides decontamination systems as well as systems that suppress fires on ships.

DRS PESG provides a variety of solutions for shipboard power distribution requirements including integrated power management systems, medium and low voltage load centers and switchboards, hardened circuit breakers and power conversion modules; all of which are designed to meet challenging naval and marine power quality specifications. Our shipboard motor controls and drives are proven performers in harsh marine environments. For clean, reliable, isolated power on ships and for land-based operations, we offer uninterruptible power supplies in several hard-mounting, rack mounting and briefcase configurations. DRS converters and frequency inverters provide conditioned power for combat vehicles, helicopter starting and battery charging.

The rugged generators manufactured within DRS PESG are proven portable sources of mission-critical electric power. Our durable permanent magnet motors are power-dense solutions for propulsion, pumps, drilling rigs, generators and other applications requiring precise mechanical torque. We also provide full-service packaging for large rotating machinery, including gas turbines, used for power generation applications onboard ships and on land.

Q: Where might we find your products and services in use by the U.S. DoD?

A: The divisions within DRS PESG are proud to have been key suppliers to the U.S. DoD for many decades. Our Environmental Control Units (ECU), Refrigerated Container Systems (RCS), Tactical Quiet Generators (TQG) and Trusted Series™ Uninterruptible Power Supplies (UPS) provide air-conditioning, heating, refrigeration, mobile electric power and power conditioning to U.S. armed forces on the move – from small command shelters to forward operating bases. More than 40,000 TQGs, built at our DRS Fermont facility in Bridgeport, Connecticut, have been deployed since 1993 in 3, 5, 10, 15, 100 and 200 kW configurations.

Our flight line ground support development team at DRS Environmental Systems in Florence, Kentucky has supplied the majority of U.S. military specified flight line air conditioners over the past 30 years. The same facility provides environmental control systems for the launch and missile alert facilities of the U.S. Air Force’s Minuteman Intercontinental Ballistic Missile system and integrated management microclimate conditioning systems for the U.S. Army’s Paladin self-propelled Howitzer.

For more than 20 years, our DRS Environmental Systems Cincinnati, Ohio facility has engineered, designed, built and tested mission-critical structural systems for the U.S. military. We have provided ground control shelter stations for several programs, including Predator/Reaper and Global Hawk Unmanned Aerial Systems. Purpose-built shelters and trailers built by DRS have been used for radar, air traffic control, communications, after action reviews and numerous training applications.

As a leading U.S. Navy supplier for robust power conversion, motor drives, power distribution equipment and operator controls, our DRS Power & Control Technologies division, headquartered in Milwaukee, Wisconsin (has provided critical equipment on every U.S. Navy ship since 1904) over a century of support to our customers. Among the platforms deployed today you’ll find DRS switchboards, load centers, drives and controls on Nimitz and Ford-class aircraft carriers, LHA, LHD and LPD amphibious ships, the Freedom-class littoral combat ship, and Virginia, Los Angeles and Ohio-class submarines. DDG 51 destroyers have DRS motor controllers and interfaces on board, and the Navy’s next-generation destroyer, DDG 1000, will have extensive DRS power distribution and conversion, drive and control systems onboard when it deploys. Many of these ship platforms also have power conditioning systems including helicopter starters and uninterruptible powers supplies from our DRS Pivotal Power facility in Nova Scotia, Canada.

Our DRS Power Technology (PTI) facility in Fitchburg, Massachusetts has packaged the gas turbines for the Freedom-class (Lockheed Martin) littoral combat ships and DDG 1000. This will shortly be expanded to all new DDG 51 and Independence-class (General Dynamics) ships. DRS PTI is one of the foremost steam turbine design companies supporting the U.S. Navy (along with commercial power producers and steam turbine OEMs). They have provided services for the entire CVN 68 class, CVN 78, LHD 3 and a number of the Navy’s submarines.

In addition to our naval power and propulsion products there are heating, air-conditioning and ventilation products from DRS Marlo Coil in High Ridge, Missouri on every class of military-specified surface ship and submarine in the fleet today. These include air handling units, fan coil assemblies, gravity coils, unit heaters and other HVAC components.
Q: Describe how the group is planning to stay competitive and meet the military customer’s requirements in a post-Iraq and Afghanistan defense environment.

A: The knowledgeable and innovative engineering, program management, supply chain and business development teams within DRS PESG have already been hard at work pooling our talents. They are focused on improving existing products and developing new products to meet the military's need for increased energy efficiency and reduced total ownership costs today and in the decades ahead. Understandably, customers demand an affordable up-front price. They need equipment that operates reliably in harsh environments AND meets or exceeds expectations for reduced Total Ownership Costs. DRS PESG is a leader in meeting these needs. For example, DRS proposed a Hybrid Electric Drive (HED) system to the U.S. Navy that is projected to save upwards of 400,000 gallons of fuel, per year, for each DDG 51. That system is now under development with our partner, General Atomics. Another example is an improved Environmental Control Unit used for heating and cooling shelters that sustain our service men and women. Now in full-rate production, that unit is designed to save approximately 11 percent of power compared with units it is replacing.

To achieve success we leverage our years of experience and incorporate design-to-cost, lean manufacturing and design for manufacturability processes early in the design cycle. Employing rigorous program management practices along with a focused approach to risk management will allow us to stay competitive. We are committed to working with our customers to develop solutions to ensure their mission success.

Q: At the 2011 AUSA Winter conference, your group featured the Combined Heating Air Conditioning Medium Mobile Power System (CHAMMPS©) and the On-Board Vehicle Power (OBVP) system. Highlight the energy efficiencies that these systems offer the military customer.

A: The Combined Heating Air-conditioning Medium Mobile Power System (CHAMMPS©) is a next generation system for powering, cooling and heating command posts and other tactical shelters. It reduces the military’s deployed footprint and logistics requirements by providing mobile electric power and environmental control in one unit. The biggest benefit the military will realize from deploying CHAMMPS© will be the lower fuel consumption required for sustained operations.

CHAMMPS© improves energy efficiency three ways; it is equipped with a highly fuel efficient engine; it recaptures the engine’s waste heat when heat is needed (rather than using an inefficient electrical heating element which consumes additional electricity and fuel) and it features a digital control system allowing it to be linked in a Micro-Grid configuration with up to 16 other power generating units. This control system includes a load dependent start/stop system, which senses the load requirement of the grid, then runs the correct number of units which will automatically start and stop based on the load demand needed to meet the power requirements. Using a digitally-controlled micro-grid to manage power sources reduces generator maintenance requirements compared with running all available generators, as is common today.

On-Board Vehicle Power (OBVP) is a retrofittable transmission integral generator that enables power generation on tactical vehicles with no impact to drive train length and no additional belts, bearings, shafts or seals. OBVP-equipped light tactical vehicles (like the HMMWV) have 10kW of power available for vehicle DC and AC electronics while on the move and 30kW of exportable power when stationary to power a variety of military systems including tactical operation centers. DRS has partnered with Allison Transmission to deliver OBVP capabilities for medium tactical vehicles as well. These larger OBVP-equipped vehicles will feature 125kW of stationary electric power and 60kW of on-the-move electric power.

Led by the system integrator within DRS Technologies’ Tactical Systems Group, DRS Test and Energy Management, the OBVP system includes components from two divisions within DRS Power and Environmental Systems Group. DRS Power Technology, Inc. in Fitchburg and Hudson, Massachusetts, manufactures the permanent magnet generator machinery and DRS Fertmont, in Bridgeport, Connecticut, provides power conditioning elements.

Adding on-board power capabilities to future ground vehicle fleets will help meet increasing battlefield power requirements, reducing the need for additional power generators and optimizing the use of all power assets, thus improving total fuel efficiency.

Q: President Obama’s proposed FY2012 defense budget contains a significant increase in funding for energy systems and programs. Discuss some of the new and continuing business developments opportunities your group sees in this budget.

A: The military is experiencing challenges that mirror those encountered within the civilian sector. Simultaneously, capabilities and equipment are being introduced that have an increased need for power while the cost of that energy is increasing. New sensors, communication equipment, and electromagnetic weapons and launchers are but a few examples.

For the Navy, The Navy Next Generation Integrated Power Systems initiative has the goal of affordably providing reliable and fault-tolerant power to U.S. Navy platforms as they migrate towards systems that will require vastly increased power levels. For land forces, On-Board Vehicle Power, previously described, is analogous and will support increased capabilities in a form factor that allows decreased size and weight on platforms. By leveraging our knowledge of power plants, power distribution, power conversion and safety systems, DRS is well positioned to provide innovative solutions.

On the efficiency side of the equation DRS is actively working many projects that can contribute to reduced fuel use that translate not only into reduced Total Ownership Cost but also enhanced personnel safety. Reduced fuel use with increased local production
of power means shorter logistics tails, limiting the number of service members placed in harm’s way during the transport of fuel. One system, the Micro-Grid control system, already demonstrates this potential through intelligent load vs. generator balancing. In addition, renewable sources of energy (i.e. solar, wind, hydrokinetics) can be integrated into the grid further reducing fuel demands.

Overall, using our knowledge of power systems, we believe DRS PESG is uniquely positioned to help solve some of the tough challenges addressed in the FY2012 defense budget.

**Q: Are there any new product offerings or product upgrades the group may offer the defense market in the next six or so months?**

A: A couple of new offerings come to mind. First, the DDG-51 Hybrid Electric Drive program will reach a significant milestone later this year when it is installed at the Navy test site in Philadelphia, Pennsylvania. Once it is fully integrated and passes all tests, the intention is to install it on one shaft of an operating DDG 51 class destroyer to gain some real-world operating experience.

The second offering, the On-Board Vehicle Power (OBVP) system for Medium Tactical vehicles (those that are heavier than the HMMWV) will also pass significant integration testing in the near term. That will allow DRS to offer the system to OEM vehicle manufacturers with confidence, thus providing them a significant source of power without the need for an Auxiliary Power Unit. The OBVP system offers significantly reduced weight and removes the space-claim often considered mandatory for a power upgrade.

With all the products and capabilities that we have to offer within PESG, there are both minor and significant product and service upgrades being made available to our customers year-round. The most recent is an upgrade to one of the Uninterruptible Power Supplies (UPS) offered by our UPSI facility in Chantilly, Virginia. Their Trusted Series™ TR-IV UPS systems replace the older TR-III UPS models; upgrading the communications interface RS-232 connector to a more useable B-Type USB port and redesigning the faceplate to make the load and battery levels easier to read. It is not a major upgrade but it will make the system more flexible and user-friendly. This upgrade is another example of our customer-focused approach and DRS’ continued commitment to provide quality products and services and stand behind them.
2012 January

Military Perspective

Katherine Hammack
Assistant Secretary of the Army Installations,
Energy and the Environment (Invited)

Features

Industry Leadership Insights
We’ll ask senior industry leaders to discuss recent efforts to increase efficiencies in U.S. Navy diesel engines.

Greener DoD Buildings
Exploring efforts to make Department buildings “greener.”

Lighter vs. Energy Efficient
Examining the challenges of lightening the load of soldier-borne systems – and making them more energy efficient.

Airborne Innovation
Learning about U.S. Air Force programs to save fuel, develop more effective engines and gain other efficiencies in manned and unmanned air vehicles.

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Calendar of Events

May 2 – 5, 2011
Joint Service Power Expo
Myrtle Beach, S.C.
www.ndia.org/meetings

May 9 – 12, 2011
Environment, Energy Security and Sustainability (E2S2)
New Orleans, LA
www.ndia.org/meetings/e2s2

May 17 – 19, 2011
Special Operations Forces Industry Conference
Tampa, FL
www.ndia.org/meetings/SOFIC

August 9 – 10, 2011
FORCENET 11
Fort Bragg, NC
www.suggsgroup.com

August 10 – 11, 2011
Military Vehicles Expo
Cobo Center Detroit
www.idga.com

September 6 – 9, 2011
IEEE Vehicle Power and Propulsion Conference
Chicago, IL
www.vppc2011.com

September 13 – 15, 2011
Infantry Warfighter Conference
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www.fbcinc.com

September 20 – 22, 2011
Renewable Energy Technology
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www.retech2011.com

September 27 – 29, 2011
Modern Day Marine
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October 10 – 13, 2011
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DRASH Intelligent Power Technology (IPT) Trailers combine the proven reliability of DRASH Utility Support Transport (UST) Trailers with a digital smart system for optimal power generation efficiency in the theater of operations.

Designed to meet users' unique power generation needs, each trailer allows personnel to operate generators together in parallel, not only helping to reduce current military fuel consumption, but also reducing maintenance and providing users with greater flexibility than ever before.

Features include:
- Power management system with automatic start/stop capabilities only runs the number of generators needed.
- Plug-and-play capabilities allow users to connect additional IPT Trailers as needed.
- Load shedding turns off low-priority equipment to prevent brownouts.
- Anti-wet stacking prevents engine clogging.
- Military-tested trailers allow for easy transport of generators through even the harshest terrain.