Four New Programs to Improve Military Energy Performance
By John Jennings | August 12, 2013

Earlier this summer, DoD initiated four multi-year programs to improve the energy performance of our forces in the field with $4.3 million in initial 2013 funding. The awards, part of DoD's Operational Energy Capabilities Improvement Fund (OECIF), kick-off efforts to develop new energy efficiency technologies for the combat force, resulting in improved military capabilities.

These FY13 awards support programs to:

- Reduce drag on military aircraft
- Improve the energy efficiency of combat outposts though better planning and operations
- Develop open tactical microgrid standards to speed their adoption throughout the force, and
- Reduce the number, resupply, type, and weight of batteries borne by troops.

These programs will feature consortia or similar organizations in order to involve a wide variety of outside organizations, particularly small businesses and non-traditional defense contractors. Total funding is budgeted at $39.2 million over the life of these four multi-year efforts. As part of the collaboration between DoD and the Department of Energy, DOE's Building Technology Office is also involved in one of these programs.

You can view fact sheets on each of the programs below. The Secretary of Defense kicked off OECIF in January 2012 announcing six military programs had won a share of $18.0 million in funds to reduce the energy demand of future expeditionary outposts. An article by me describing that kickoff called **DoD Announces Winners of $18.0 Million Fund to improve Battlefield Energy Security** was published on January 31, 2012 and appears in *OE News*.

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Operational Energy Capabilities Improvement Fund Program Highlights FY 2013

Engineered Surfaces and Materials for Drag Reduction

Led by Air Force Research Laboratory (AFRL) with partnership from U.S Navy (Naval Aerodynamic Test Facility) and NASA (Environmentally Responsible Aviation).

The United States Air force consumes over two billion gallons of fuel per year at a cost of approximately eight billion dollars per year. As of 2011, jet fuel comprised about 8% of the total Air Force budget and 86% of the Air Force energy budget. Improving aircraft energy efficiency, which is a function of L/D (lift-to-drag ratio), can lower these costs while increasing range and payload capacity. The goal of this research is to improve L/D by reducing skin friction drag, which accounts for approximately 50% of the drag on transport aircraft. The program goal is to reduce aircraft fuel consumption by reducing drag through engineered surfaces and materials that will not only reduce the USAF's huge fuel bill, but will also have an impact on military capabilities and operations. Range and payload capacity will improve, thus creating second order operational energy benefits such as a reduction in necessary sorties, tanker support and fuel requirements at forward operating locations. Drag reductions of 1-2% will result in fuel savings or range increases of about the same amount.

Soldier and Small Unit Operational Energy

Led by U.S. Army Natick Soldier Research, Development & engineering Center (NSRDEC), with partnership form PEO-Soldier, PEO-C3Tand the Marines.

Dismounted troops and units perform difficult missions that require situational awareness, lethality, and mission tools that consume large quantities of energy; a typical Soldier carriers 16 pounds of batteries for a 72-hour mission. The units must carry the power needed while facing harsh operating conditions, durations, environments, and terrains. The logistics burden placed on the small unit incurs a high cost operationally, fiscally, and in terms of individual Soldier human performance. Reducing the number, resupply, type, and weight of batteries borne by Soldiers and small units requires a systematic approach that considers the dismounted warfighter as a platform. The goal is for DoD to gain a comprehensive system engineering framework for understanding and managing the power and energy needs of dismounted soldiers and small units thereby limiting the burden they create, along with an organizational structure to attack the problem, educate unit leaders, and create a more efficient use of power. A comprehensive approach to the problem may be able to reduce the number or weight of batteries carried by Soldiers or units by up to 30% through informed leadership, reduced waste, effective training, and more efficient and effective technologies.

Tactical Microgrids Standards Consortium

Led by U.S. Army Engineer Research and Development Center (ERDC), with partnership from U.S. Army Communications-Electronics Research Development and Engineering Center (CERDEC), and U.S. Army Research Laboratory (ARL).

Energy availability is a major concern on today's battlefield. Reducing the need for fuel resupply in operations cuts costs and reduces combat risk associated with moving and protecting convoys. Microgrids do this by tying existing battlefield generators and renewable energy sources together, controlling their output as one system, rather than running individual generators powering separate electrical loads. When demand is low, the microgrid system turns off un-needed generators to optimize overall efficiency. Notably, tactical microgrids differ from microgrids used at large DoD installations in that they must be deployable, rugged and can be set up with maximum safety. The program goal is to organize a new Tactical Microgrids Standards Consortium to develop a final specification that will be non-proprietary, universal, tactical microgrid standards which will resolve the most significant impediment to widespread microgrid implementation. Benefits will include:

- Reduction in fuel consumption for electrical generation at contingency bases.
- Ability to prioritize and utilize power resource according to mission needs.
- More reliable and resilient network for increased energy availability.
- Improved cross-platform compatibly of microgrids and their components for simplified logistics and sustainment.
- Using microgrids in an operational environment could reduce fuel consumption by 16%.

Energy Efficient Outpost Modeling Consortium

Led by the Office of Naval Research (ONR), with partnership from the Department of Energy Building Technologies Office (DOE BTO), Navy Facilities Engineering Command Navy Expeditionary Program Office (NAVFAC NEPO), Army Communications-Electronics Research, Development and Engineering Center (CERDEC), and Naval Postgraduate School (NPS)

Reducing our Armed Force's reliance on fuel in combat directly improves warfighting capabilities making our troops more agile, lethal and flexible. The move towards increased use of renewables in the battlefield

is accompanied by a new set of challenges. Determining the optimal balance of energy resources, their integration into a microgrid, and their optimal operation is crucial to appreciably improving battlefield fuel consumption. In order to do this, the DoD requires new system-level energy modeling tools to aid in decision-making by mission planners and operational commanders. That is the objective of this program. During recent military operations in Iraq and Afghanistan, thousands of our troops have been killed or injured moving and protecting fuel in dangerous supply convoys around the battlefield. Much of this fuel supports energy needs at combat outposts. The integration of the three pillars of Energy Resources Planning Tool, Energy Resources Dashboard and Control, and Energy Efficiency Training, will result in a balanced combination of tool development and training which will significantly improve the energy efficiency of contingency bases in the near future as well as continue to highlight the importance of battlefield fuel consumption and conservation.