

2015 SECNAV Innovation Award Honorable Mention: Marine Corps Expeditionary Energy Office (E2O)



By DON Innovation

The Marine Corps Expeditionary Energy Office (E2O) initiatives crosscut the Marine Corps and set the example for the services in the pursuit of energy excellence [Modeling & Simulation, Dismounted Energy Technologies, Service Energy Wargame, and Persistent Intelligence, Surveillance, and Reconnaissance (ISR)]. E2O's leadership and efforts to transform the Marine Corps and instill an expeditionary energy ethos has resulted in a pivotal shift in the way that the Naval Service positions itself for operational reach in a new era of global engagement. Specifically, the E2O embarked on a paradigm challenging war game that not only created scenario-backed Energy Supportability and Risk Analyses but, in aggregate, created the momentum to more closely examine ship-to-shore fuel movement across the services.

E2O's work on energy-focused feedback to unit leadership at the Marine Corps Air Ground Combat Center yielded positive results, including significant fuel efficiency increases and un-refueled range increases of hundreds of miles per vehicle by harnessing low cost non-materiel solutions. Integrating separate innovative capabilities, E2O embarked on projects to increase operational reach in the Naval Expeditionary Strike Group-based Marine Expeditionary Brigade (MEB), mechanized combat units, and dismounted Marines. This operational focus led to the development of programs, to include Energy Command and Control, Joint Infantry Company

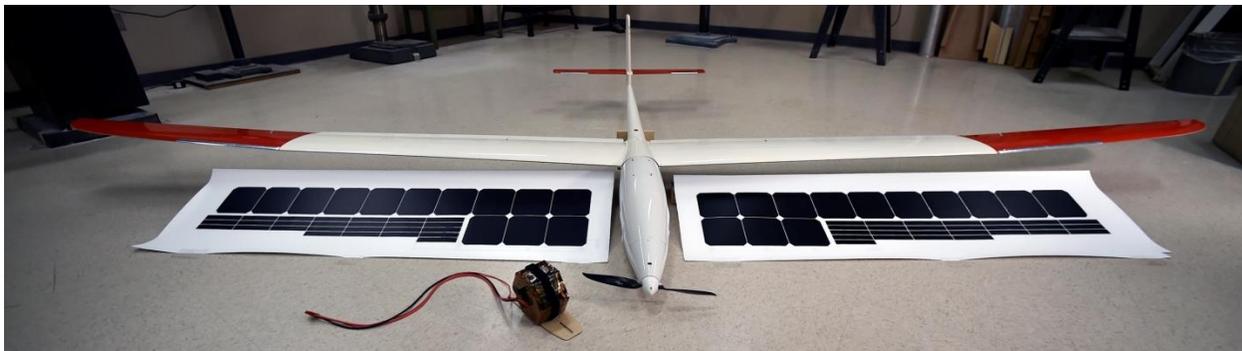
Prototype, and Autonomous Unmanned Aerial Vehicle, to name a few. The leadership of these projects in 2015 was pivotal to operational demonstrations and the use of new capabilities throughout the services in 2016 and beyond.

Over the course of the past year, E2O tested radical battlefield energy systems with the aim of increasing operational reach and self-sustainability of Marine Expeditionary Forces (MEFs). E2O led the services in its modeling and simulation capability; these capabilities are now being drawn into the Joint space for use across the services. Some of these Models included MAGTF Power and Energy Model (MPEM), USMC adapted HOMER, Marine Corps Power and Energy Investment Model (MCPEIM), Logistics Analysis and Wargame Support Tool (LAWST) and Synthetic Theater Operations Research Model-Energy (STORM-E).

Other major achievements for E2O in 2015 were:

- Developed the Expeditionary Energy Concepts (E2C) (formerly ExFOB) process to identify, evaluate, and accelerate fielding of technologies that will close gaps in the Expeditionary Energy, Water, and Waste Initial Capabilities Document (ICD). It was a beacon of cross collaboration with the services and organizations such as Defense Advanced Research Projects Agency (DARPA) and Advanced Research Projects Agency-Energy (ARPA-E), as well as national labs and special operations. E2C follow on efforts coupling LEDs, liners, hybrid systems, and more efficient Environmental Control Units (ECUs) have shown an 83% savings over the Program of Record (PoR), a significant reduction per year for Battalion level Combat Operations Centers deployed in Afghanistan.

- In coordination with Naval Research Laboratory (NRL), is developing a photo-voltaic capability that is nearing world record-breaking efficiency. This technology can be applied to dismounted operations, distributed ground power, Unmanned Aerial Vehicles (UAVs) and installation power.



- In coordination with NRL, is developing a UAV that will provide a persistent ISR capability that will drastically reduce logistics requirements and maintenance requirements of UAVs and provide a persistent ISR capability with zero fuel requirements to dismounted warfighters.

- Led the Operational Reach 15 (OR-15) war game, which informed the Naval Energy Strategy and Expeditionary Force-21 by highlighting energy-related risks to the operational reach of the Expeditionary Strike Group-based MEB.

- Led the joint (Army and Marine Corps) effort to develop hybrid power requirements and technologies.
- Led the evaluation of potential micro-grid technologies, which resulted in 80+ systems being purchased for use and evaluation in three MEFs and informed the Army's Mobile Electric Micro-grid effort.
- In coordination with the Navy, and as part of the OR-15 war game, conducted the Energy Key Performance Parameter Supportability Analyses for five naval weapon systems, the Joint Light Tactical Vehicle [JLTV], Ship to Shore Connector [SSC], Surface Connector X Replacement [SC(X)R], dock landing ship replacement [LX(R)], and LHA-8 amphibious assault ship to inform requirements development.
- Initiated an innovative project called Energy Command and Control, which gives commanders unit-wide energy performance feedback to extend the operational reach of the Marine Air-Ground Task Force (MAGTF) through non-material innovation.
- Implemented mobile power sources to achieve noteworthy fuel efficiency improvement.
- Developed Enhanced Efficiency Environmental Control Units (E3CU) to achieve major power efficiency improvement.
- Implemented deployable, renewable energy alternative modules and ground renewable expeditionary energy systems (SPACES and GREENS) to reduce logistics burden and increase self-sustainability. For example, patrol bases in Afghanistan showed a significant reduction in fuel consumption when using GREENS.
- Developed hybridization and other fuel economy improvement Engineering Change Proposals for Medium Tactical Vehicle Replacements (MTVRs) to reduce the total ownership cost and increase the fuel efficiency. The end result was a gain of several miles for each MTVR using the same fuel.
- Reduced fuel and battery requirements, reduced load of dismounted warfighters, improved shelters, and decreased logistical resupply requirements for forward deployed warfighters in austere environments.
- The Joint Infantry Company Prototype will increase the self-sustainability and operational reach of dismounted Marines and Soldiers, while decreasing the Size, Weight, and Power (SWaP) of dismounted warfighter systems.

