REQUEST FOR INFORMATION (RFI)

United States Marine Corps Expeditionary Energy Concepts (E2C) 2015

(Formerly known as the Experimental Forward Operating Base (ExFOB) demonstration)

OVERVIEW:

This announcement constitutes a Request for Information (RFI) notice for planning purposes.

This year's Expeditionary Energy Concepts demonstration (E2C 2015) will be held at Marine Corps Base Camp Lejeune, North Carolina, from 23 - 25 June 2015.

E2C '15 will focus on three technology areas:

- 1. Hybrid/electric all-terrain vehicles
- 2. Advanced batteries and energy storage technology
- 3. Fuel Cells (up to 10kW)

The due date for responses to this RFI is midnight EST on 6 March 2015.

ABOUT EXPEDITIONARY ENERGY CONCEPTS (E2C):

Created by the Commandant in 2009, E2C (formerly ExFOB) brings together stakeholders from across the Marine Corps requirements, acquisition, and technology development communities in a dynamic process to quickly evaluate technologies that reduce battlefield energy and water requirements and extend the operational reach of the Corps.

Once per year, the Marine Corps invites select industry participants to E2C to demonstrate off-the-shelf technologies with potential to address current Marine Corps energy, water, and waste capability gaps. *E2C is not a tradeshow*. During the week-long demonstration, a team of engineers will collect data on system performance and Marine operators will provide qualitative feedback on what they see. Following the demonstration, promising technologies may be evaluated in a controlled lab environment and then put into the hands of Marines for field testing in combat conditions. Lab and field evaluation results will inform Marine Corps requirements development.

E2C 2015 TECHNOLOGY FOCUS AREAS

E2C 2015 will focus on technologies that enable small unit distributed operations (e.g. distributed Company Landing Team operations). The following three technology areas are of interest:

1. Hybrid/Electric All-Terrain Vehicles

Small unit distributed operations require small, highly mobile, tactical vehicles that can travel for extended range without fuel resupply. Hybrid-electric and pure electric all-terrain vehicles offer significant fuel savings and have the potential to extend the operational reach of Marines on the move. The Marine Corps is interested in vehicles that meet the following specifications:

• Gross vehicle weight of 7,800 pounds or less (including 3 crew members, mission payload and shoring (if required))

- Internally transportable via MV-22 Osprey (length ≤ 200 inches (including tie-downs), width ≤ 60 inches, height ≤ 60.2 inches)
- 300+ mile range on unimproved road without fuel re-supply (pure electric vehicles with lesser range will be considered)
- Compatible with military fuels (JP-8, JP-5, F-24, diesel) (*only applies to hybrid-electric vehicles)

2. Advanced Batteries and Energy Storage Technology

Marines use batteries to power a wide range of equipment and platforms in training and on the battlefield. The Marine Corps is interested in batteries and energy storage solutions for specific military applications (described below) that offer significantly greater specific energy or volumetric energy density than the batteries used today. All batteries must be rechargeable and safe. Batteries in excess of 1kWhr must minimize propagation.

The Marine Corps is interested in solutions that generally exceed the following specifications:

Military Application	Energy	Energy Density
Direct replacement for the BB-2590 battery. The BB-XX90 format is a widely used for communications and counter IED operations.	>230Wh	>140Wh/kg
Novel energy storage solutions that provide similar functionality to the XX90 batteries but reduce bulk of the Modular Scalable Protective System (MSPS), increasing range of motion.	>150Wh	>125Wh/kg
Direct replacement for the lead acid NATO 6T battery. The 6T format is the 'under-the-hood' battery in USMC vehicles used to start the vehicle and power onboard hotel loads.	>1.6kWh	>50Wh/kg
Novel, scalable energy storage solutions for small hybrid power systems such as the GREENS High Energy Lithium Battery.	1-3kWh/ module	>72Wh/kg

3. Fuel Cells (up to 10kW)

Fuel cells will play a critical role in reducing future fuel requirements and achieving the Commandant's aggressive 2025 energy goals. The Marine Corps is interested in fuel cell power systems that meet the following specifications:

- Power output of up to 10kW (target output = 3kW)
- Operate on a safe solid or liquid fuel (including but not limited to: zinc, aluminum, JP-8, alternative fuels)
- Transportable via light tactical trailer (NSN: 2330015435794)
- Fuel savings over the 3kW Tactical Quiet Generator (~24% fuel efficiency at 100% load)

ADMINISTRATIVE DETAILS

<u>Submission Process</u>: To respond to this RFI, please complete the attached E2C Submission Form and send via e-mail to: <u>energy@usmc.mil</u>. Please do not attach marketing brochures, test reports, or other extraneous materials to your Submission Form as they will not be reviewed. If you have more than one system (or technology) to demonstrate, submit separate Submission Forms for each system (or technology).

Notification of Decision: If your technology is of interest, the E2C Team will contact you with an invitation to participate in E2C '15 at Marine Corp Base Camp Lejeune, NC, from 23 - 25 June 2015. All companies will be notified of invitation/non-invitation decisions in late March. The E2C Team will decide which technologies to include in E2C '15 at its sole discretion, after considering factors such as the technical readiness level (TRL) of the technology, the performance characteristics of the technology, space and resources available at the demonstration site, and the interests of the Marine Corps. Please note that the decision to invite or non-invite a company is not a procurement decision, and disappointed applicants are not entitled to protest or appeal non-invite decisions.

<u>Additional Documentation Requirements</u>: Companies invited to participate in E2C '15 will be required to provide additional technical documentation to facilitate safety release approval and test plan development. Timely submission of this documentation is essential to ensure a safe and successful event. More information on required documentation will be provided with your invitation to the demo.

<u>Support Contractor Assistance</u>: Companies are advised that the E2C Team is supported by Government support contractors (which may include employees of Leidos, Mantech International, Pacific Rim Defense, SAIC and Vision Point Systems) who will review information submitted in response to this RFI for the purpose of providing technical advice to the E2C Team. Companies which submit Submission Forms in response to this RFI will be deemed to have waived any objection to the Government's use of support contractors to review their Submission Forms.

NOTE: This RFI is issued for the purpose of determining market capability of sources and does not constitute an Invitation for Bid (IFB), a Request for Proposal (RFP), a Request for Quote (RFQ) or an indication that the Government will contract for any of the items and/or services contained in this notice. No solicitation document exists. Responses may not include classified or proprietary material. Information with classified, 'Proprietary', 'Confidential', or other markings limiting distribution will not be reviewed. Responses to this notice will not be returned. No reimbursement will be made for any costs to provide information in response to this announcement or any follow-up information requests. Information or statements contained herein are not binding upon the Government.

Expeditionary Energy Concepts (E2C) 2015 Submission Form (Formerly known as the Experimental Forward Operating Base or ExFOB)

Submission Instructions: Complete the E2C '15 Submission Form and save as a Microsoft Word document. Send the .doc and a .jpg photo of your technology to energy@usmc.mil. The completed Submission Form must be received by midnight EST on 6 March 2015.

PART A - Name and Contact Information

1.	Technology Name:
2.	Company Name:
3.	Company Mailing Address:
4.	POC Name:
5.	POC E-mail:
6.	POC Phone:
7.	Company Website:
8.	Company CAGE code:

PART B - Technology Category (check one)

All-Terrain Vehicles (ATVs)	Batteries / Energy Storage	Fuel Cells

PART C - Technology Description

9.	9. Describe your technology and how it can reduce battlefield fuel and the operational reach of the Marine Corps.	d battery requirements and extend	
10.	10. Provide a physical description and summarize the technical specific	cations of your technology.	
	> For ATVs , include dimensions (in inches), gross vehicle weigh fueling (in miles), and fuel type. Indicate exportable power and rer recharging capabilities, if available.	· · ·	
	> For Batteries / Energy Storage , include dimensions (in inches), weight (in pounds), chemistry, number of cells, cell configuration, battery voltage (in Volts), charge rate, energy (in Watt hours), and energy density (in Watt hours per kilogram).		
	> For Fuel Cells , include dimensions (in inches), weight (in pour target output = 3kW), fuel type (including but not limited to: zinc, a and projected fuel savings over the 3kW Tactical Quiet Generator (load). Indicate push button start and water-neutral operation capab	aluminum, JP-8, alternative fuels), ~24% fuel efficiency at 100%	
11.	11. Indicate the Technology Readiness Level (TRL) of your technology definitions are included below for reference. Note: You must have TRL 6 or above) to participate in E2C '15.		
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12.	12. Have you shown/discussed your technology with anyone in federal services? If yes, provide POC name, phone, and e-mail.	state government or the military	

13. Has your technology been tested in a military operational environment (training or deployment)? If yes, describe the nature of the test, date, location, military office(s) involved, and military POC
name, phone, and e-mail.
14. Do you foresee any issues integrating your technology into military platforms and/or an operational environment (i.e. sensitivity to extreme temperatures, water, sand etc.)?
15. Is your technology currently being used in the private sector? If yes, describe.
16. Summarize relevant test data for your technology, emphasizing projected fuel savings/battery weight reduction and/or efficiency improvement over existing USMC technology. DO NOT ATTACH COPIES OF TEST REPORTS.
17. Describe how you will demonstrate your technology at the E2C '15 demonstration. A dynamic demonstration is required. Include information regarding space (sq. ft.) and equipment required. NOTE: The E2C location is remote and shore power will not be available. If you require power you
will need to bring your own generator.

18. Attach a Material Safety Data Sheet (MSDS) for your technology if available. NOTE: Companies invited to participate in E2C '15 will be required to provide additional documentation to facilitate safety release approval.
19. Attach a .jpg photo of your technology. (CAD drawings and computer simulations are not sufficient).

Department of Defense Technology Readiness Levels, Defined*

Technology Readiness Level	Description
Basic principles observed and reported.	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include paper studies of a technology's basic properties.
2. Technology concept and/or application formulated.	Invention begins. Once basic principles are observed, practical applications can be invented. Applications are speculative and there may be no proof or detailed analysis to support the assumptions. Examples are limited to analytic studies.
3. Analytical and experimental critical function and/or characteristic proof of concept.	Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.
4. Component and/or breadboard validation in laboratory environment.	Basic technological components are integrated to establish that they will work together. This is relatively "low fidelity" compared to the eventual system. Examples include integration of "ad hoc" hardware in the laboratory.
5. Component and/or breadboard validation in relevant environment.	Fidelity of breadboard technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements so it can be tested in a simulated environment. Examples include "high fidelity" laboratory integration of components.
6. System/subsystem model or prototype demonstration in a relevant environment.	Representative model or prototype system, which is well beyond that of TRL 5, is tested in a relevant environment. Represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in simulated operational environment.
7. System prototype demonstration in an operational environment.	Prototype near, or at, planned operational system. Represents a major step up from TRL 6, requiring demonstration of an actual system prototype in an operational environment such as an aircraft, vehicle, or space. Examples include testing the prototype in a test bed aircraft.

8. Actual system completed and qualified	Technology has been proven to work in its final
through test and demonstration.	form and under expected conditions. In almost
	all cases, this TRL represents the end of true
	system development. Examples include
	developmental test and evaluation of the system
	in its intended weapon system to determine if it
	meets design specifications.
9. Actual system proven through successful	Actual application of the technology in its final
mission operations.	form and under mission conditions, such as
	those encountered in operational test and
	evaluation. Examples include using the system
	under operational mission conditions.

DEFINITIONS:

BREADBOARD: Integrated components that provide a representation of a system/subsystem and which can be used to determine concept feasibility and to develop technical data. Typically configured for laboratory use to demonstrate the technical principles of immediate interest. May resemble final system/subsystem in function only.

"HIGH FIDELITY": Addresses form, fit and function. High-fidelity laboratory environment would involve testing with equipment that can simulate and validate all system specifications within a laboratory setting.

"LOW FIDELITY": A representative of the component or system that has limited ability to provide anything but first order information about the end product. Low-fidelity assessments are used to provide trend analysis.

MODEL: A functional form of a system, generally reduced in scale, near or at operational specification. Models will be sufficiently hardened to allow demonstration of the technical and operational capabilities required of the final system.

OPERATIONAL ENVIRONMENT: Environment that addresses all of the operational requirements and specifications required of the final system to include platform/packaging.

PROTOTYPE: A physical or virtual model used to evaluate the technical or manufacturing feasibility or military utility of a particular technology or process, concept, end item or system.

RELEVANT ENVIRONMENT: Testing environment that simulates the key aspects of the operational environment.

SIMULATED OPERATIONAL ENVIRONMENTAL: Either 1) a real environment that can simulate all of the operational requirements and specifications required of the final system, or 2) a simulated environment that allows for testing of a virtual prototype; used in either case to determine whether a developmental system meets the operational requirements and specifications of the final system.

*Source: DoD Deskbook 5000.2-R, Appendix 6, Technology Readiness Levels and Their Definitions.