REQUEST FOR INFORMATION (RFI)
United States Marine Corps
Experimental Forward Operating Base (ExFOB) 2014

OVERVIEW:

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

The next Experimental Forward Operating Base demonstration (ExFOB 2014) will be held at Marine Corps Base Camp Pendleton, California, from 12 – 16 May 2014. The focus of ExFOB 2014 is ***TACTICAL ENERGY HARVESTING***. The **due date for responses** to this RFI is **midnight EST on 21 February 2014.**

ABOUT EXFOB:

Created by the Commandant in 2009, ExFOB brings together stakeholders from across the Marine Corps requirements, acquisition, and technology development communities in a dynamic process to quickly evaluate and deploy technologies that reduce battlefield energy and water requirements.

Once per year, the Marine Corps invites select industry participants to ExFOB to demonstrate off-the-shelf technologies with potential to address current Marine Corps capability gaps. ExFOB 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 will 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 requirements development and may ultimately lead to fielding of systems in support of a more combat-effective fighting force.

TACTICAL ENERGY HARVESTING:

The Marine Corps is pursuing a range of material solutions to reduce battlefield energy and water requirements. In current operations, there are a number of untapped energy streams that, if harnessed, could enable Marines to get more out of every gallon of fuel they use. The Marine Corps ExFOB team is conducting market research on currently available technologies that can harvest energy from Marines on patrol and from generators, extending the operational reach of the Corps. Specific energy harvesting scenarios and examples of potential technologies of interest are as follows:

1. Marines on Patrol

- Scenario: Harvest energy from a ~160 lb. Marine carrying a 50-90 lb. pack moving at a rate of 2-6 miles per hour. The harvested energy should flow back into a standard BB2590 battery (or similar).
- Examples of Harvesting Technologies:
    - Kinetic energy (knee brace, backpack)
    - Energy from body heat
    - Nano technology in fabric
    - Vibration technology
    - Wearable solar

NOTE: It is not the intent of this RFI to identify solar technologies that would compete with on-going efforts such as the Improved Solar Panel program. Any solar technology submitted in response to this RFI must be lightweight, wearable, and generate a minimum of 20 Watts per lb. We will not accept ground-deployed systems.

2. Generators

- Scenario: Harvest energy from USMC tactical quiet generators (TQGs) (size: 10/30/60kW) operating for 8 hours per day at pre-determined loads. Participants should expect generator waste heat temperatures of approximately 500 degrees Fahrenheit or below and flow rates of approximately 50 standard cubic feet per minute (scfm). Exact generator waste heat temperatures and flow rates will be provided prior to the event. Generators may be provided for companies demonstrating generator waste heat recovery technologies. However, permanent modifications to Government Furnished Equipment WILL NOT be permitted.
- Examples of Harvesting Technologies:
    - Waste heat recovery & conversion to power/water
    - Waste heat recovery for climate control

3. Other

- While the ExFOB team is primarily interested in technologies that harvest energy from Marines on the move and from standard issue generators, we are open to other energy harvesting technologies for specific applications.

SUBMISSION PROCESS AND DUE DATE:

To respond to this RFI, please complete the attached ExFOB Submission Form and send via e-mail to: energy@usmc.mil. Please do not attach marketing brochures, test reports, or other extraneous materials to your Submission Form as they will not be reviewed. The due date for responses to this RFI is midnight EST on 21 February 2014.

If your technology is of interest, the ExFOB Team will contact you with an invitation to participate in ExFOB 2014 at Marine Corp Base Camp Pendleton, CA, from 12 through 16 May 2014. All companies will be notified of invitation/non-invitation decisions in mid-March.

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 at this time. All information received in response to this notice that is marked Proprietary will be handled accordingly. Responses may not include Classified material. 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 contained herein is based on the best information available at the time for publication, is subject to revision, and is not binding upon the Government.

Experimental Forward Operating Base (ExFOB) 2014 Submission Form

Submission Instructions: Complete the ExFOB 2014 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 21 February 2014.

PART A - Name and Contact Information

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

PART B - Energy Harvesting Category

__ Energy Harvesting from Marines on Patrol	__ Energy Harvesting from Generators	__ Other

PART C - Technology Description

8. Describe your technology and how it can reduce Marine Corps battlefield energy, water, and battery requirements.
9. Provide a physical description of your technology (size, weight, cube).

10. Summarize the technical specifications of your technology (power, voltage, efficiency).

11. Indicate the Technology Readiness Level (TRL) of your technology. Department of Defense TRL definitions are included below as reference. Note: You must have a working prototype.

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12. Have you shown/discussed your technology with anyone in federal/state government or the military services? If yes, provide POC name/phone/e-mail.

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/e-mail.

14. Do you foresee any issues integrating your technology into military platforms and/or an operational environment (i.e. 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/water/battery 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 ExFOB 2014. A dynamic demonstration is required. Include information regarding space (sq. ft.) and equipment required. NOTE: The ExFOB location is remote and shore power may not be available. Generators may be provided for companies demonstrating generator waste heat recovery technologies. However, permanent modifications to Government Furnished Equipment WILL NOT be permitted.
18. 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
1. 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 mission operations.	Actual application of the technology in its final 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.*