Topic: N153-129

Wecoso LLC

Ultra-Lightweight Expeditionary Power System (U-LEPS)
USMC seeks to develop a renewable 1kW-class hybrid energy power source that will reduce the weight and volume by 50% versus currently deployed systems. West Coast Solutions (WCS) is meeting the challenge with the hybrid/solar Ultra-Lightweight Expeditionary Power System (U-LEPS). Our approach is anchored in our industry-leading, inherently safe, high energy density (150 Wh/kg) lithium-Ion batteries. Peak power handling capacity of U-LEPS is up to 2 kW with over 6400 Wh energy storage, meeting or exceeding the capabilities of existing systems. U-LEPS is inherently more robust and user-friendly than currently-fielded technology. Simulations, risk reduction tests, and engineering reviews have been accomplished to ensure requirements will be met. U-LEPS solves SWaP issues, saves fuel, and reduces convoys, thus reducing operational costs and, most importantly, saving lives.

Technology Category Alignment:

Electronics Integration
Energy storage
Power Control and Distribution
Power Generation/Energy Conversion
Survivability

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SYSCOM: MARCOR
Contract: M67854-17-C-6510
Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=M67854-17-C-6510

Department of the Navy SBIR/STTR Transition Program

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Ultra-Lightweight Expeditionary Power System (U-LEPS)
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WHO

SYSCOM: MARCOR

Sponsoring Program: PM Combat Support Systems (CSS), PdM Expeditionary Power Systems (EPS)

Transition Target: PfM LCES (Logistics Combat Element Systems), PM ES (Engineer Systems), Power Team

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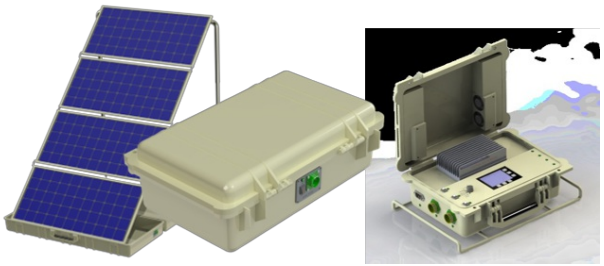

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Other transition opportunities:
-System (U-LEPS): hybrid solar/DC/AC expeditionary power system: CERDEC/ Power Integration

-Battery (U-LEB): high energy density, intrinsically safe, long cycle life, Lithium-Ion battery: various tactical communications power systems, including portable satellite terminals

-Controller: main controller electronics; accomplishes configurable, high efficiency, zero dropout power distribution: Aerospace Corporation PMMCE

Notes:
CERDEC - Communications-Electronics Research, Development and Engineering Center
GREENS II - Ground Renewable Expeditionary ENergy System
PMMCE - Precision Mirror Mechanism Control Electronics
U-LEB - Ultra-Lightweight Expeditionary Battery
U-LEPS - Ultra-Lightweight Expeditionary Power System

WHAT

Operational Need and Improvement:
By 2025 the USMC would like to reduce the weight and volume of currently deployed renewable hybrid systems in the 1kW power range by 50%.

This effort supports USMC Expeditionary Energy Strategy and Implementation Plan.

Specifications Required:
USMC is looking to improve current state of the art systems, they must:

- Reduce total weight to 350 lbs
- Reduce total volume to 22 ft ^3
- Rethink the construct of hybrid energy harvesting system
- Provide either 24VDC or 120VAC output
- Provide power both night and day in all weather environments

Technology Developed:
A 1 kW class, hybrid solar-generator-battery power system designed to be lightweight and robust. The Ultra-Lightweight Expeditionary Battery (U-LEB) has a unique design for the lithium-ion cells; therefore, causing the batteries to be 50% lighter in weight, giving a 50% improvement in specific energy density.

In addition, WCS implemented a novel light-weight, highly efficient architecture that vastly improved the robustness of the system by avoiding undesirable voltage fluctuations and dropouts on both the charge (solar) and discharge (load) sides of the system.

Warfighter Value:
Robust – safe and reliable in all environments and conops
Ultra-Lightweight Batteries – lighter, smaller, easier to transport; with more power
Modularity – easy to assemble, design is scalable, giving more options

WHEN

Contract Number: M67854-17-C-6510

Milestone	Risk Level	Measure of Success	Ending TRL	Date
MPPT Power Sharing Demo	Med	Greater than 90% power sharing efficiency demonstrated using representative SBM solar panels	4	2nd QTR FY18
12Ah LNCO Cell Development	Med	Compliant safety and performance demonstrated: energy capacity, power, UL impact, UL crush, over temperature, and over voltage	4	3rd QTR FY18
Critical Design Review Level Brass Board Design	Low	CDR Design Package including all supporting solid models, analyses, and risk reduction data	4	4th QTR FY18
Brass Board Test Demonstration	Low	Compliant U-LEPS operation demonstrated: maximum power charge/discharge, zero dropouts, endurance testing, solar/AC/DC inputs	5	3rd QTR FY19
Qualification of Productized U-LEB	Low	Full demonstration of MIL STD 810 and 416 compliant operation	6	4th QTR FY19

HOW

Projected Business Model:
- WCS provides customer interface, systems engineering, and implementation support
- Manufacturing is sourced and managed by WCS through specialized contract manufacturing partners
    - o e.g., U-LEB to be packaged by Spear Power Systems
- WCS continues to lead parallel and next generation development programs to support Continuous Product Improvement

Company Objectives:
- Program of record transition to USMC of U-LEPS system
- Transition of U-LEB technology to wider range of USMC and DoD Programs of record
- Adaptation of U-LEPS component technologies for custom Prime contractor applications
    - o e.g., solar-battery system for portable satellite ground terminals

Potential Commercial Applications:
- Off grid micro power systems
- Maritime emergency power systems
- Power for commercial perimeter security systems
- Electric vehicle charging
- Long cycle life battery banks

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