

# Department of the Navy SBIR/STTR Transition Program

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MCSC-PRR-2431

Topic # N153-129

Ultra-Lightweight Expeditionary Power System (U-LEPS)

Wecoso LLC

## 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

**TPOC:**  
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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:**

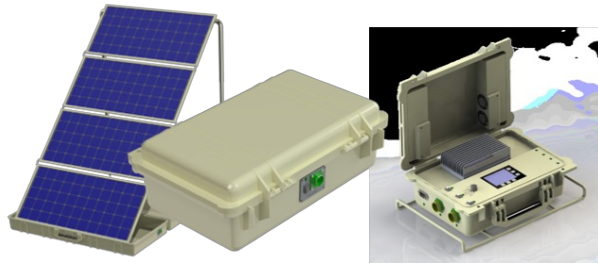
CERDEC - Communications-Electronics Research, Development and Engineering Center

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



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## 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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