

Department of the Navy SBIR/STTR Transition Program

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MCSC-PRR-2432

Topic # N153-129

Man Portable Wind Energy System

Windlift

WHO

SYSCOM: MARCOR

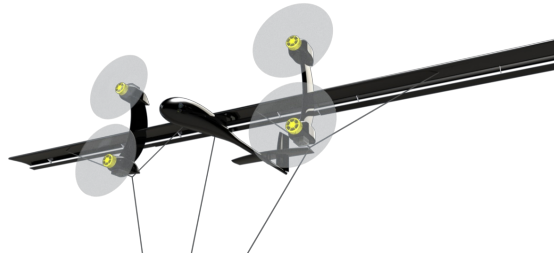
Sponsoring Program: LCES - PM
Engineer Systems - Power Systems Team

Transition Target: Intelligent Power Systems

TPOC:
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Other transition opportunities: The Windlift MPWES is well suited for a wide variety of operational energy programs and has received interest from joint technology development programs at the Army, Air Force, OSD, SOCOM, the Coast Guard, and the Office of Naval Research. The Windlift System has many potential variations in addition to the man portable system, including a trailer mounted system and a larger system deployed from a 40' shipping container. Additional applications of the technology include expeditionary medical facilities, housing operations, and persistent floating platforms for surveillance and communications.

Notes: Windlift's Man Portable Wind Energy System (MPWES) in flight. The center line coming down from the wings is an electrified tether connected to the battery system on the ground (not shown). The outer lines support the lift force of the wing.



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WHAT

Operational Need and Improvement: The US Marine Corps (USMC) seeks the development of technology that can reduce the weight and volume of currently deployed renewable hybrid systems. For renewable energy systems to be effective in tactical environments, they must be able to reliably provide power no matter the environmental or transportation conditions (MIL-STD-810G). Current renewable energy systems are bulky. If these systems can see a reduction in weight and volume by at least 50%, then the adoption of renewable energy systems can be increased greatly.

Specifications Required: Specifications Required: Develop a renewable energy hybrid system that weights under 500 lbs and that reliably produces at least 1kW of power. To support USMC applications, a nominal 24VDC output (MILSTD- 1275D) or a 120VAC output (MIL-STD-1332B) is required. Proposed system concepts should also be able to provide power both night and day.

Technology Developed: The Windlift MPWES is an airborne wind energy generator that uses an autonomous, tethered UAV to generate up to 6 kW of electricity. The system will deliver an average electrical output of 2 kW in class 2 winds and will integrate with battery storage and a backup petroleum generator to provide continuous on-site electricity. The system, with battery, weighs only 440 lbs, making the energy density (Watts/lb) at least seven times the current state-of-the-art solar systems deployed by the USMC. The Windlift MPWES will also provide a 150-500 foot platform for persistent surveillance and communications.

Warfighter Value: The fully developed hybrid microgrid system will provide seamlessly integrated electrical power to forward operating units. Users can expect to offset most of their electrical generator fuel needs, greatly reducing the need for resupply. The new ability to capture high levels of wind energy with a lightweight mobile platform gives warfighters greater energy independence and flexibility when faced with logistical constraints. MPWES will also provide reliability and resiliency with its integrated petroleum generator, ensuring consistent energy production.

WHEN

Contract Number: M67854-18-C-6517 **Ending on:** January 24, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Airborne Wind Energy proof of concept	Low	Validate concept of system in virtual environment	TRL 3	1st QTR FY18
Design, build and validate electrical components	Med	Separately validate motor, flight, generation, battery storage	TRL 5	3rd QTR FY18
Demonstrate system operation in relevant but controlled environment	High	Demonstrate takeoff and landing, controlled flight, and power production with towed testing	TRL 6	4th QTR FY19
Demonstrate power in operational conditions	High	Demonstrate power producing flight under "native wind" conditions and deliver prototype	TRL 7	1st QTR FY20
First milspec system delivered for testing and evaluation	High	System meets power targets, can be set up and taken down in 30 minutes by soldiers with minimal training, can survive in most weather conditions	TRL 8	1st QTR FY22

HOW

Projected Business Model: Windlift will be responsible for assembling the MPWES, and can begin low rate initial production 6 months after a Phase III SBIR award. Windlift's initial production focus will be composite manufacturing, final assembly and quality assurance testing. Advanced machine learning algorithms will allow the system to continue optimizing performance in a wide range of environmental conditions. When greater economies of scale are achieved, Windlift will expand into non-military markets.

Company Objectives: Windlift is working to improve the military's ability to project and sustain combat power forward. Windlift's MPWES combines airborne wind and petroleum generators into a plug and play platform that will allow forward deployed troops to sustain missions where fuel delivery is currently risky and expensive. The technology can ultimately reduce resupply casualties, save taxpayer money, and provide an elevated platform for communications, signals intelligence, and persistent surveillance.

Potential Commercial Applications: Windlift's expeditionary renewable energy systems provide valuable options for various organizations that require remote off-grid or microgrid electricity. This system can bring entirely new capabilities to commercial markets, and can integrate with surveillance, GPS, and communications technologies. As economies of scale are achieved, Windlift Systems will compete in additional markets including disaster relief, weather monitoring, agriculture, mining, and mobile communications. Ultimately, Windlift systems can provide the lowest cost utility-scale power with deep-water off-shore wind farms connected to urban coastal communities.

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