



PENTAGON ENERGY EXPO 2022





PENTAGON ENERGY EXPO 2022

Sustainable Strategic Energy Technology

Pentagon, Washington, DC
21-22 September 2022
0900-1600

Join OUSD A&S for a Joint Service exhibit of emerging technologies and energy community efforts to increase Joint Warfighters advantage in contested logistics environments, advance demand reduction technologies, increase energy resilience, and deliver more power with secure energy.

Participating Services/Sponsors



Showcasing over 100 exhibits in the following technology areas:

- General Energy
- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- Batteries / Energy Storage / Energy Distribution / Power Generation
- Alternative Energy Sources
- Software / Cybersecurity

Keep informed by visiting the Pentagon Energy Expo 2022 website.
<https://events.sa-meetings.com/PentagonEnergyExpo2022>





Introduction

The 2022 Pentagon Energy Expo will feature over 100 exhibits showcasing emerging energy-related capabilities intended to preserve U.S. Military dominance in future contested logistics environments.

With advancements in enemy weaponry and the maturation of the multi-domain era of warfare, it is imperative that the modern Joint Force develop the energy requirements to maintain unimpeded battle momentum, in all domains, when sustainment operations will be progressively challenged.

It is equally important for U.S. military installations to bolster and secure their energy resilience to project power and support the deployed Warfighter.

Energy is the key enabler that will keep the Joint Force in the fight to achieve decisive victory.



Exhibit Locations | Courtyard

Technology Types

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation
- ⦿ Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy

Display Types

- Static Display
- Table-top Display
- Poster Board

Exhibit Numbering

U.S. Army: 1–35

U.S. Marine Corps and U.S. Navy: 40–61

U.S. Air Force and U.S. Space Force: 70–76

OSD: 80–111

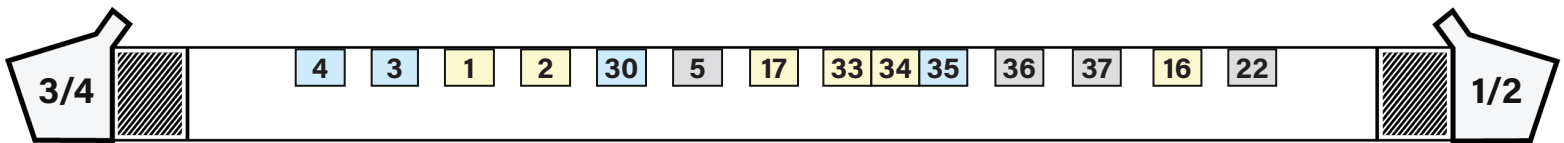
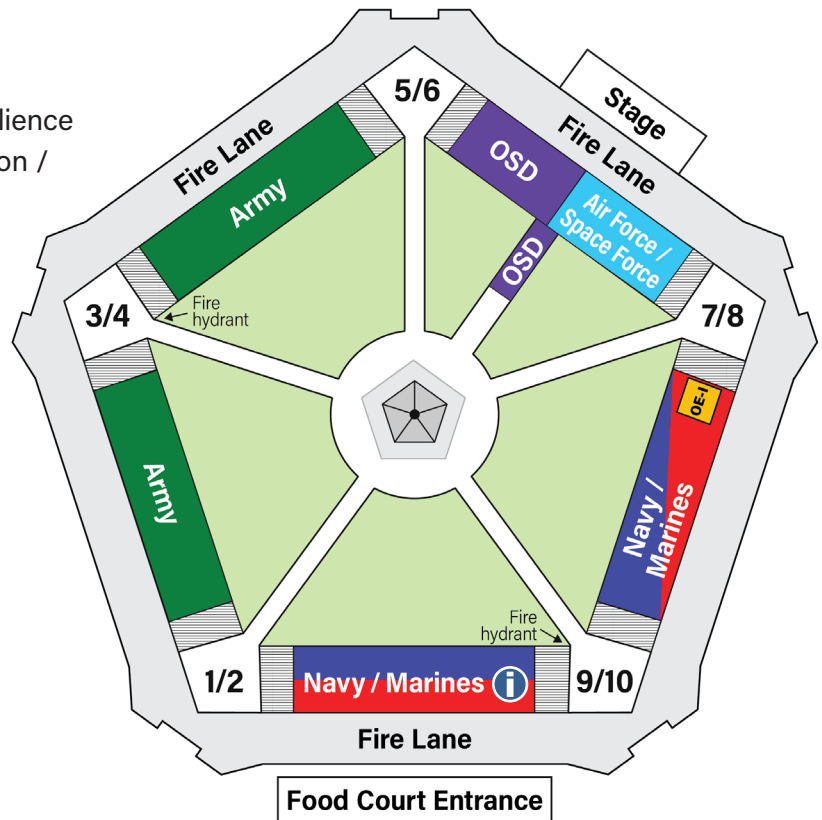


Exhibit #	Exhibit Title	Tech Type
4	On Board Vehicle Power (OBVP)	■
3	Advanced Hybrid Propulsion with OBVP	■
1	JLTV Anti Idle and Fuel Sense Technology	■
2	FMTV Anti-Idle Retrofit Kit	■
30	Vehicle Electrification Study	■
5	Li-ion 6T Form Factor Battery	◆
17	Alternative Energy for Autonomous Systems	⦿
33	Fully Electric Search and Rescue Watercraft	■
34	ICON: Robotic construction of energy efficient structures	▶
35	Defense Innovation Unit	▶
36	Nuclear Energy for Military Operations	⦿
37	Zero Emission Effort	⦿
16	Silicon Carbide SWAP Advantage for Combat Vehicles	⦿
22	Small Tactical Electric Power (STEP) Story Board	◆

Exhibit Locations

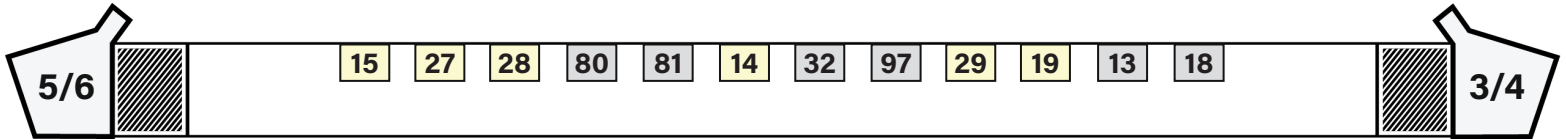


Exhibit #	Exhibit Title	Tech Type
15	Advanced Medium Mobile Power Sources Microgrid	◆
27	Tactical Energy Converter	◆
28	Power Extender Source	◆
80	Tactical Microgrid Standard (TMS)	◆
81	Secure Tactical Advance Mobile Power (STAMP)	◆
14	Tactical Charging Station	◆
32	Power Sensing for Energy Awareness	★
97	Naval Power Network Monitoring (NPNM)	●
29	ERDC-CERL Operational Energy	◆
19	Heat Driven Atmospheric Water Generator (Heat DAWG)	◆
13	Enhanced Power Pack (EPP) for 155 MM Towed Howitzer	◆
18	Solar Technologies to Prevent Premature Replacement of Tactical Vehicle and Generator Batteries	⦿

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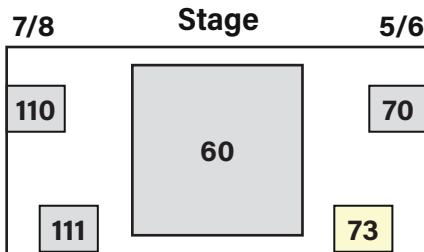


Exhibit #	Exhibit Title	Tech Type
110	Intelligent Power Management System (IPMS)	◆
111	Eliminate Burn Pits & Convert Waste to Fuel/ Electricity	⦿
60	H2 Stalker	⦿
70	Air Force Operational Energy	▶
73	Regenerative Solid Oxide Fuel Cells (SOFC)	⦿

Inner Courtyard Spoke

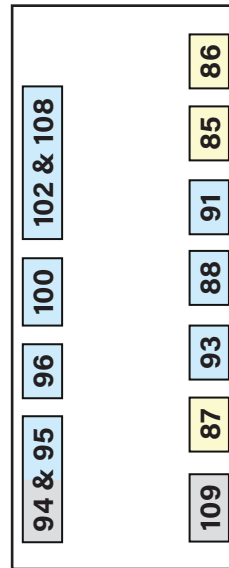
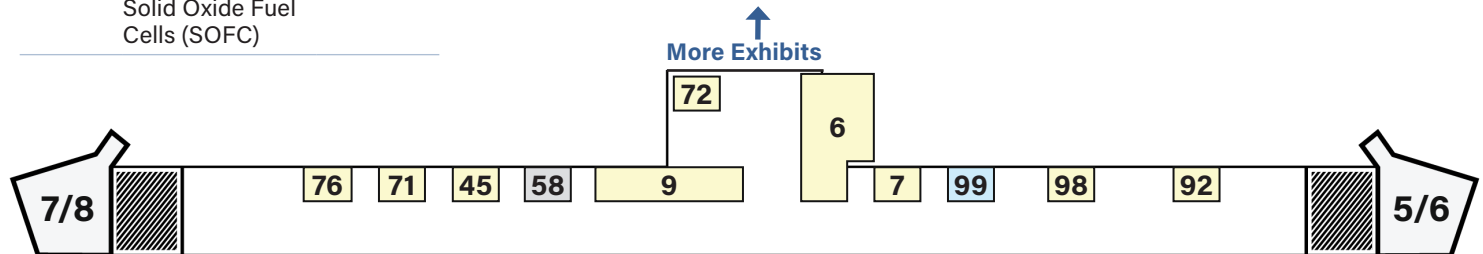


Exhibit #	Exhibit Title	Tech Type
109	Hybrid Augmentation System (HAS)	◆
87	Efficient Microwave Array for Scalable Wireless Power Transfer (6.3 Study)	⦿
93	Small Unit Power, Electrification and Resilience (SUPER)	◆
88	Warfighter Alternative Energy Study (WAES)	▶
91	High Speed Logistics (HSL)	◆
85	Solar-Powered Phased Array Optimized for Thermal Performance and Mass-Specific Power (PRAM-2)	⦿
86	Refueling And Support Package - COMMS and Situational Awareness (RASP-CASA)	⦿
94	High Speed Rotating Machine (HSRM)	◆
95	Thermal & Power Systems - Thermal Energy Storage	◆
96	Battery Standardization Assessment	◆
100	Distributed Energy Provided THroughout the Seas (DEPTHS)	⦿
102	DoD Space Domain Energy Strategy & Space Nuclear Power (SNUP) Study	⦿
108	Space-To-Space Power Beaming (S2SPB)	⦿

More Exhibits



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76	Space Solar Power Incremental Demonstrations and Research (SSPIDR) A space based solar power harvesting and power beaming development effort	⦿
71	Vertical Pallet Stacker for Increased Aircraft Cargo Space	▶
45	Passive Propagation Resistant Li-Ion Battery Architecture for Undersea Applications	◆
58	Fuel Automated Reporting System (FARS)	★
9	Expeditionary Solid Waste Disposal System (ESWDS)	●
72	Integrated Liquid Hydrogen Energy Systems for Long Range Unmanned Aerial Vehicles	⦿
6	Energy Efficient Rigid Wall Module (E2RWM) Shelter	●
7	Improved Environmental Control Units (9/18/36K)	●
99	Low-Profile, Electric Nuclear Satellite (LENS)	⦿
98	eTHOR	■
92	Light Expeditionary Energy Agile Platform (LEEAP)	■

Exhibit Locations

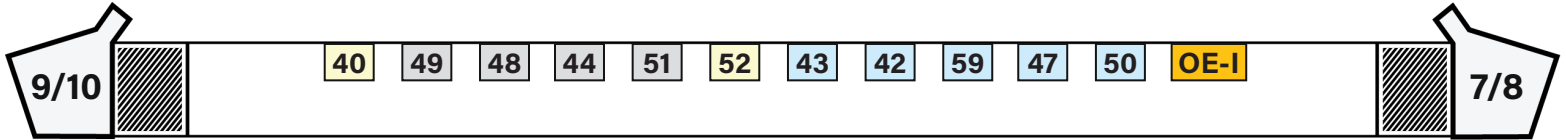


Exhibit #	Exhibit Title	Tech Type
40	Person-Portable Tactical Generator	◆
49	Expeditionary DC Power Distribution	◆
48	Squad Power Manager (SPM)	◆
44	Night Vision Goggle Rechargeable Battery	◆
51	Li6T Battery Top Cap	◆
52	Rechargeable Expeditionary Power Source (REPS)	◆
43	Power Dense Turbo-Compression Cooling System	▶
42	Power Generation and Propulsion with State-of-the-art Power Dense Electric Drivetrains	■
59	Fuel Quality Assurance	▶
47	Advanced Medium-Voltage, High-Power Charging Converter for Pulsed Power Applications	◆
50	Compact, Flexible Integrated Power Node Center for Direct Current Distribution	◆
	OE-I	

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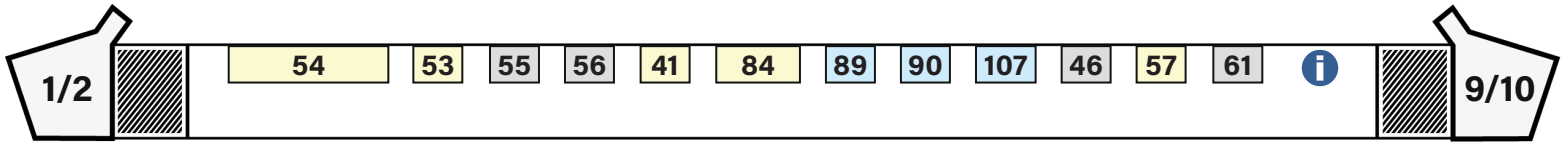


Exhibit #	Exhibit Title	Tech Type
54	Contested Logistics Energy Distribution	▶
53	USMC Last Tactical Mile (LTM)	▶
55	Contested Logistics-Distributed Fueling	▶
56	IPOWER Power and Energy Simulation and Analysis Software	★
41	Stalker UAS Fuel Cell	⦿
84	Hybrid Tiger Ultra-Persistent ISR	⦿
89	POTION: Energy Optimal Path Planning for UAVs	
90	Rectenna Integrated Onto UAV	■
107	Ultra UAS - Optimized ECU for Affordable Ultra-Long-Endurance ISR	▶
46	Common Affordable Safe Energy Storage (CASES)	◆
57	Scimitar Lithium Battery Container	◆
61	10 USC §2912 Authority Investments in Operational Energy Saving & Energy Demand Reduction Solutions	▶
i	Information	

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Exhibit Locations | Indoor Apex

Pentagon Metro Entrance, 2nd Floor

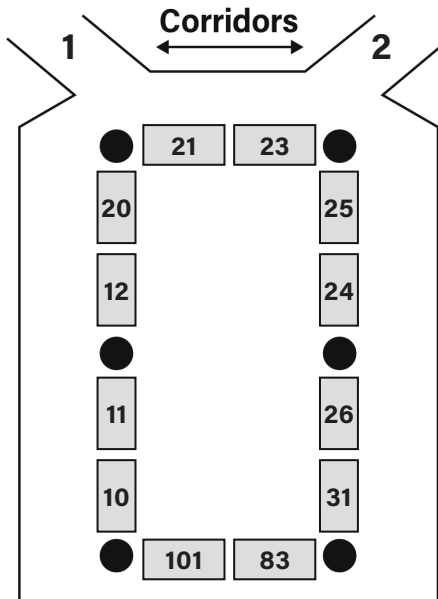
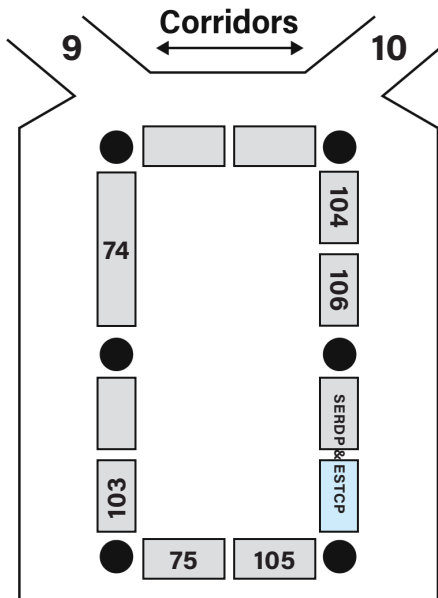


Exhibit #	Exhibit Title	Tech Type
10	Soldier Tactical Power	▶
11	Soldier Power Technologies	⦿
12	Efficient Compact Portable Power	◆
20	Advanced Aviation Battery	◆
21	Munitions Power Science & Technology	◆
23	Safe, Non-Flammable Rechargeable Batteries	◆
25	Smartly Optimizing Islanded Hybridized Power	◆
24	Retrofit Advanced Insulation Kits (RAIK) for Batteries in Extreme Cold Weather (ECW) Environments	◆
26	500-kilowatt (kW), Large Tactical Power (LTP) Solution	◆
31	The Army's Control Systems Governance Office	▶
83	Small Tactical Universal Battery Integration	◆
101	Metrology-Enabled RF Integration Technology (MERIT)	◆



103	National Renewable Energy Laboratory's HVPE III-V, Perovskite, & Power Beaming Technologies	◆
74	Eielson Air Force Base Microreactor Pilot Program	⦿
104	LEAP-M(Lithium ion EARly fault Predictive Monitoring	◆
106	Arctic Grid Energy Storage (AGES)	◆
	SERDP	
	ESTCP	
105	Dual-use Laser Power (DUAL) Program	◆
75	Nellis Air Force Base Solar Array Maintenance	▶

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JLTV Anti-Idle and Fuel Sense Technology

The JLTV anti-idle capability automatically cuts the engine during periods of extended idling while maintaining vehicle communications, electrical systems and HVAC operation. Engine power is automatically restored based on operator inputs or battery state of charge. This demand reduction technology reduces fuel consumption, extending mission range and duration, while improving silent watch capability and reducing carbon emissions.

Technology Type: Vehicle Electrification (Ground / Air / Sea) ■

Exhibit #01 | Display Format: Static Display



FMTV Anti-Idle Retrofit Kit

Tactical vehicles idle up to 70% of the time. The anti-idle retrofit kit enables cab climate control, onboard communications, and vehicle system accessories to run on battery power for 1 to 4 hours with the engine off. This capability can reduce fuel consumption by 20%, thereby reducing the emission of greenhouse gases, and reduce acoustic and thermal signatures for increased survivability.

Technology Type: Vehicle Electrification (Ground / Air / Sea) ■

Exhibit #02 | Display Format: Static Display



Advanced Hybrid Propulsion with On Board Vehicle Power (OBVP)

This technology increases the capability of the Transmission Integral Generator (TIG) by adding a specialized clutch, 200kW Inverter, and Li-ion battery pack to turn the TIG into an electric motor, reducing fuel consumption by 35%, improving acceleration by 40%, enabling 10 miles of silent mobility and 14 hours of silent watch, and increasing power generation.

Technology Type: Vehicle Electrification (Ground / Air / Sea) ■

Exhibit #03 | Display Format: Poster Board



On Board Vehicle Power (OBVP)

OBVP is a highly mobile, lightweight, fast-forming vehicle hybrid power system with AC/DC microgrid capability. It provides high voltage power for applications such as missile defense, tactical command post activities, electric vehicle charging, and directed energy weapons. This capability improves overall fuel efficiency while reducing the sustainment burden of forward deployed formations, and reduces the demand for towed generators.

Technology Type: Vehicle Electrification (Ground / Air / Sea) ■

Exhibit #04 | Display Format: Poster Board

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy



Li-ion 6T Form Factor Battery

This battery design is a replacement for the standard vehicle lead acid batteries. It provides increased electrical power, faster recharge time for improved anti-idle applications, extended silent-watch time, extended life cycle, reduced weight, and improved battery durability in military applications. This technology will enable future anti-idle capabilities and hybrid electric vehicles that reduce fuel consumption and greenhouse gas emissions. Included in this exhibit will be various battery enclosures that have been designed to safely manage system during abuse/failure.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #05 | Display Format: Table-top Display



Energy Efficient Rigid Wall Module (E2RWM) Shelter

The Energy Efficient Rigid Wall Module (E2RWM) Shelter supplements current softwall Force Provider Expeditionary rapidly deployable Life Support Modules, and provides a 30 percent energy savings. Force Provider Expeditionary supports 150 personnel, to include billeting, administration, latrine, laundry, kitchen, dining, and shower activities. The rigid wall shelters reduce energy requirements for the modular base camp and provide improved quality of life.

Technology Type: Contingency Basing / Installation Energy Resilience ●

Exhibit #06 | Display Format: Static Display



Improved Environmental Control Units (9/18/36K)

Supports Network, Missile Defense, Medical and other major weapon systems by providing cooling, heating and dehumidification to protect Soldiers and C4ISR equipment from overheating or freezing. IECUs use environmentally approved refrigerants with zero ozone-depleting chemicals (ODCs), allowing conformance to U.S. and European laws and International treaties in addition to providing increased energy efficiency.

Technology Type: Contingency Basing / Installation Energy Resilience ●

Exhibit #07 | Display Format: Static Display



Expeditionary Solid Waste Disposal System (ESWDS)

This developmental system is capable of on-site disposal of 1000 pounds of non-hazardous, mixed solid waste per day for approximately 92% volume reduction. ESWDS supports the 150-person Force Provider Expeditionary module by providing a safer alternative to open burn pits and backhauling of waste. ESWDS is designed to be set up and maintained by non-MOS specific Soldiers using the Army's All Terrain 10K forklift.

Technology Type: Contingency Basing / Installation Energy Resilience ●

Exhibit #09 | Display Format: Static Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy

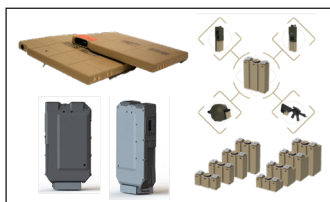


Soldier Tactical Power

The power requirement of the Soldier is steadily increasing. These technologies are designed to close the gap between power required and power available in order to increase operational reach at the Small Unit level. As these technologies improve, Soldiers will be able to operate continuously for 72 hours without needing additional resupply for power, extending mission duration and reducing logistical burdens.

Technology Type: General Energy ▶

Exhibit #10 | Display Format: Table-top Display

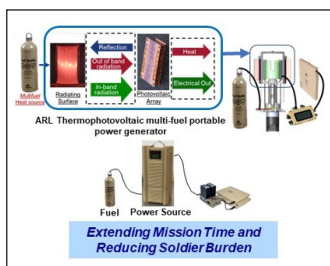


Soldier Power Technologies

This program is advancing the development of small, lightweight, long duration power and energy sources that increase Soldier lethality, situational awareness, and survivability by powering modern capabilities. These innovative power capabilities will lighten Soldier loads, extend mission duration, and reduce dependency on resupply.

Technology Type: Alternative Energy Sources ●

Exhibit #11 | Display Format: Table-top Display



Efficient Compact Portable Power

Efficient Compact Portable Power advances the development of component technologies and integrates strategies to enable multi-fuel, quiet, portable and wearable power generation to extend the mission of small units beyond battery-only operation.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #12 | Display Format: Table-top Display



Enhanced Power Pack (EPP) for 155 MM Towed Howitzer

The Enhanced Power Pack (EPP) is a 24–28 VDC lithium iron phosphate based battery pack that replaces current lead acid batteries for use in the 155 MM Towed Howitzer. The EPP affords a faster recharge rate, extends silent watch, and provides better operational reliability in extreme cold temperatures.

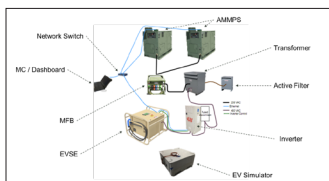
Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #13 | Display Format: Table-top Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
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Tactical Charging Station

This exhibit showcases the Tactical Charging Station (TCS) with techniques, tactics, and procedures for charging future electric and autonomous tactical vehicles (E&ATV). It Demonstrates a Tactical Microgrid Standard compliant solution for battlefield charging, enabling the "leap ahead" capability offered by future E&ATV in Multi-Domain Operations. The TCS can charge at up to 30kW, and accepts either 208 VAC (tactical generators & microgrids) or 600 VDC (exportable vehicle power).

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #14 | Display Format: Static Display

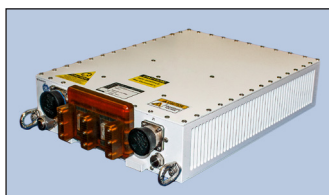


Advanced Medium Mobile Power Sources (AMMPS) Microgrid

AMMPS is a modernization program to replace 5kW, 10kW, 15kW, 30kW, and 60kW generators. The AMMPS family, on average, reduces fuel consumption by 21% over legacy generators. AMMPS generators can also be configured as a microgrid with the ability to tie together up to six AMMPS systems for 360 kW of reliable power. Combining the AMMPS in a microgrid can increase fuel savings by an additional 30% while reducing operating hours by 74%. This reduces wear, maintenance services, and further reduces fuel consumption, thereby mitigating climate impacts.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #15 | Display Format: Static Display



Silicon Carbide SWAP advantage for Combat Vehicles

Development of Silicon Carbide (SiC) power electronics allows for 10x increase in electrical power capabilities of Army equipment. Increased efficiency, faster semiconductor switching speeds, and higher operating temperatures lead to significant size reductions. Higher vehicle power levels enable advanced capabilities such as hybrid electric drives that reduce fuel consumption and powering directed energy weapons.

Technology Type: Alternative Energy Sources ●

Exhibit #16 | Display Format: Static Display

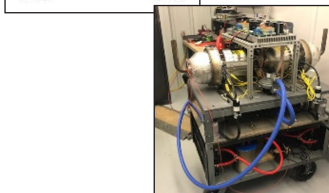


Alternative Energy for Autonomous Systems

This exhibit displays a thermal energy converter capable of greatly extending the range and endurance of autonomous hybrid-electric vehicles. This future capability demonstrates a hybrid-electric propulsion concept in which autonomous vehicles can operate from traditional and alternative energy sources to provide assured energy in logistically contested regions.

Technology Type: Alternative Energy Sources ●

Exhibit #17 | Display Format: Static Display



Technology Types Key

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- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy



Solar Technologies to Prevent Premature Replacement of Tactical Vehicle and Generator Batteries

Commercially available ruggedized, flexible, inexpensive, weather-proof solar panel systems can extend the life and performance of lead acid vehicle and generator batteries. Weather-proof solar panels, proven through a multi-year Army testing effort, can reduce battery expiration, reduce maintenance and replacement costs, and decrease battery supply transports.

Technology Type: Alternative Energy Sources ☉

Exhibit #18 | Display Format: Table-top Display

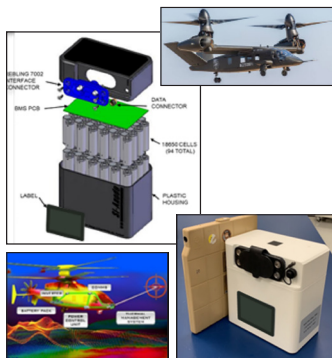


Heat Driven Atmospheric Water Generator (Heat DAWG)

The Heat DAWG is a new atmospheric water generation system that is powered by waste heat from a tactical generator. The Heat DAWG is undergoing research and development at the U.S. Army Engineer Research and Development Center in collaboration with Molecule, Inc. It can produce water at the point of need, reducing water resupply requirements, minimizing Soldier exposure on dangerous resupply convoys, and increasing operational reach and flexibility.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ♦

Exhibit #19 | Display Format: Static Display



Advanced Aviation Battery

The Advanced Aviation Battery uses next generation silicon anode lithium ion technology to improve energy and power performance over current aircraft batteries. The new batteries increase power and energy density, without increased size or weight while meeting aircraft safety requirements. These will help satisfy the ever-increasing electrical demands for both enduring fleets and future vertical lift.

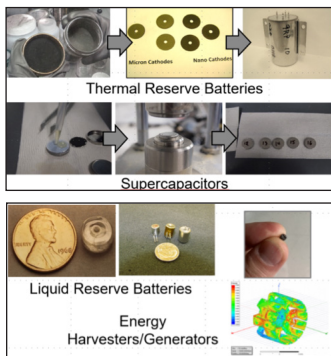
Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ♦

Exhibit #20 | Display Format: Table-top Display

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Munitions Power Science & Technology

This program advances the development of Thermal Reserve Batteries, Liquid Reserve Batteries, Supercapacitors, and Energy Harvesters/Generators to meet challenging gun-launched and hand-emplaced munitions power requirements. The program encompasses inclusion of advanced materials & manufacturing, prototype integration, and details of In-House Thermal Reserve Battery Design and Prototyping Capability at U.S. Army DEVCOM Armaments Center.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #21 | Display Format: Table-top Display

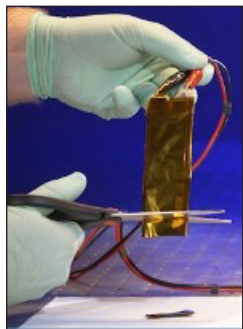


Small Tactical Electric Power (STEP) Story Board

The STEP will replace legacy 2kW and 3kW generator sets and provide improved tactical electric power capabilities. STEP generators will be compatible with modern intelligent control systems, renewable energy sources, and tactical storage with increased energy efficiency to reduce logistical demands.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #22 | Display Format: Table-top Display

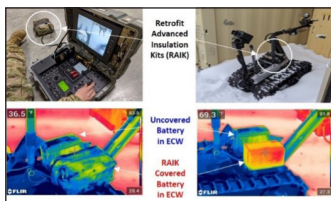


Safe, Non-Flammable Rechargeable Batteries

Aqueous lithium-ion batteries are a new type of battery chemistry offering new degrees of safety and damage tolerance. The aqueous (water-based) electrolyte is intrinsically non-flammable and can be used with most state-of-the-art battery electrodes to produce cells and packs that are non-flammable, deliver high energy density, and have a wide temperature operating range.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #23 | Display Format: Table-top Display



Retrofit Advanced Insulation Kits (RAIK) for Batteries in Extreme Cold Weather (ECW) Environments

The RAIK consists of non-powered advanced insulation covers to enhance the performance of fielded Li-ion batteries in ECW environments. The advanced insulation kits can be easily retrofitted onto existing Li-ion battery powered platforms to significantly extend battery run time in ECW environments and increase materiel readiness in Arctic domains.

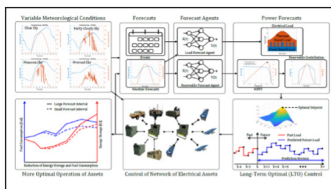
Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #24 | Display Format:

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- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy



Smartly Optimizing Islanded Hybridized Power

This technology improves local energy management between batteries, generators, and renewables through awareness of local atmospheric conditions resulting in decreased fuel usage, improved energy efficiency, reduced logistical demands, and improved mission effectiveness.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #25 | Display Format: Table-top Display

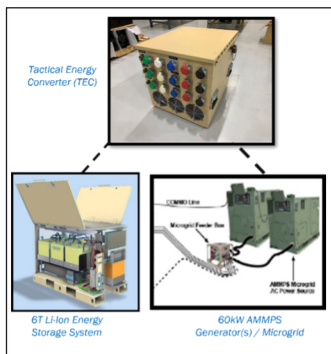


500-kilowatt (kW), Large Tactical Power (LTP) Solution

This mobile electric developmental effort will provide long-term power options in support of the Lower Tier Air & Missile Defense Sensor. The LTP generator will have increased system efficiency, reliability, mobility, and maintainability over the current the current generator. The Project Manager Expeditionary Energy & Sustainment Systems (PM E2S2) is working in collaboration with the Air & Missile Defense (AMD) Cross Functional Team to support this Army modernization priority effort.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #26 | Display Format: Poster Board

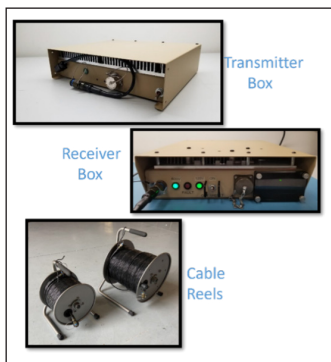


Tactical Energy Converter

The Tactical Energy Converter (TEC) System, in combination with a universal controller, enables a highly integrated hybrid microgrid or generator system. It monitors and supervises the operation of the inverter and energy storage system for microgrids or standalone power units. Lightweight and easy to setup, TEC can provide ancillary grid support or primary power in a joint, multi-domain battle space, improving fuel efficiency and reducing the carbon footprint.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #27 | Display Format: Static Display



Power Extender-Grid Source (PEGS)

The lightweight Power Extender-Grid Source (PEGS) allows standard AC devices to be powered by a reliable base microgrid using thin robust transmission lines that significantly increase the coverage area of the tactical microgrids. PEGS reduces the need for small generators powering remote loads (cameras, sensor, communication arrays). PEGS addresses the needs of the Warfighter to enhance mission capability outside the perimeter, while enhancing energy resilience and reducing fuel consumption.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #28 | Display Format: Static Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy



Engineer Research and Development Center's Construction Engineering Research Laboratory (ERDC-CERL) Operational Energy

The ERDC-CERL Operational Energy R&D effort develops energy support systems to work with program of record power generation and distribution equipment. The exhibit will discuss the following current projects:

- Energy Management
- Deployable Metering and Monitoring System
- Hybrid Systems - Energy Storage:
- Expeditionary Portable Power Unit (60 kW)
- Mouser Energy Tactical Inverter System (200kW)
- Lead Acid Energy Storage (30&120kW)
- Deployable Flow Battery (60 kW)

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #29 | Display Format: Static Display

Baseline Conventional powertrain	Electrified Anti-idle & highly electrified components
Hybrid (Battery Dominant) Electrified powertrain powered by battery & supplemental range extender	Hybrid Hybrid powertrain powered by battery & internal combustion engine or fuel cell

Vehicle Electrification Study

- Quantify impact of near term (2028) electrification alternative configurations
- Focus on sustainment and performance (e.g., fuel consumed, mission duration)
- Utilize Defense Planning Scenario-based analysis
- Provides basis for informed decision making by senior leaders

Technology Type: Vehicle Electrification (Ground / Air / Sea) ■

Exhibit #30 | Display Format: Poster Board



The Army's Control Systems Governance Office

Recent worldwide events have highlighted the importance of securing the systems that support our energy and critical infrastructure. The CSGO mission is to establish standardized procurement, installation, cybersecurity, assessment, mitigation, sustainment, and lifecycle management of Army Control Systems.

Technology Type: General Energy ►

Exhibit #31 | Display Format: Table-top Display

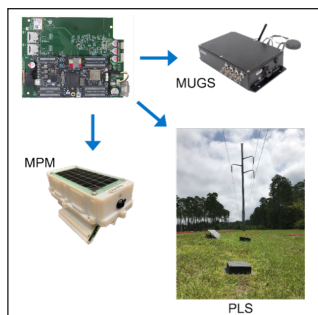
Power Sensing for Energy Awareness

Prototype 3-phase power sensor systems use Government-owned hardware and software modules for a variety of use cases:

- Mobile Power Meter (MPM): non-intrusive sensing of 3-phase power cables
- Power-Line Sensor (PLS): non-intrusive sensing of overhead power lines
- MUGS: used with COTS sensors in substations & power panels

Technology Type: Software / Cybersecurity ★

Exhibit # 32 | Display Type: Table-top Display



Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- General Energy



Fully Electric Search and Rescue Watercraft

This personal watercraft-sized vehicle with a fully electric propulsion system is capable of performing search and rescue / maritime reconnaissance operations and being transported on naval ships.

Technology Type: Vehicle Electrification (Ground / Air / Sea) ■

Exhibit #33 | Display Format: Static Display



Above: ICON's next generation Vulcan construction system



Above: 3D-printed barracks currently under construction on Fort Bliss, TX

Insert: Completed training barracks at Camp Swift in Bastrop, TX

ICON: Robotic construction of energy efficient structures

ICON video on loop showing the company's Vulcan construction system. Video contains footage of ICON projects in the field including:

1. The Texas Military Department and ICON partnering to design and 3D print an innovative training barracks at the Camp Swift Training Center in Bastrop, TX. As the largest 3D-printed structure in North America, the 3,800 sq.-ft. building can house up to 72 soldiers while they train for missions.
2. ICON and USMC soldiers 3D-printing a vehicle hide structure at Camp Pendleton in 2020.
3. Vulcan construction system printing residential homes.
4. ICON's work with NASA to develop an off world construction system for the Moon and Mars in support of the Artemis missions

Technology Type: General Energy ►

Exhibit #34 | Display Format: Static Display



Defense Innovation Unit

With 11 of the 14 modernization priorities being led by commercial industry, it is more critical than ever to identify, prototype and scale the non-traditional solutions across the country and that of our partners and allies.

DIU, with our sister OSD organizations, National Security Innovation Network and National Security Innovation Capital help to identify the processes, outreach mechanisms to get the talent and technology needed to modernize the Department of Defense.

Technology Type: General Energy ►

Exhibit # 35 | Display Format: Poster board

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- General Energy



Nuclear Energy for Military Operations

Locally-sited nuclear reactors provide reliable, resilient, zero-emission energy to power operational needs. Advanced reactors provide abundant, zero-emission, 24/7 energy onsite. Fuel is self-contained for multiple years of operation; not dependent upon fuel delivery or external tankage, so not vulnerable to supply disruption. These reactors are also of minimal size and have minimal noise and emission signatures.

Technology Type: Table-top Display

Exhibit #36 | Display Format: Alternative Energy Sources ☉



Zero Emission Effort

AMC Leads the Army in Electric Vehicle Conversion to address climate change. All Installations will have at least 1 Electric Charging Station installed in FY22, with the goal of 100% Light Duty Non-Tactical Vehicles converted by 2026. AMC is currently Exploring new solar technologies for charging stations. 112 Non-Tactical Vehicles (NTV) are currently ZEV compliant.

Technology Type: Table-top Display

Exhibit #37 | Display Format: Alternative Energy Sources ☉

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- ☉ Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy

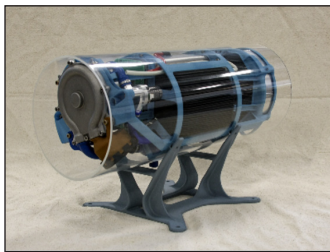


Person-Portable Tactical Generator

The CMCA Person-Portable Tactical Generator is a 2kW hybrid-capable generator set that runs on JP-8 logistics fuel and provides 28VDC power for small units. The low weight and small size could enable novel employment concepts in Expeditionary Advanced Base Operations (EABO).

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #40 | Display Format: Static Display



Stalker UAS Fuel Cell

Development of a lightweight hydrogen fuel cell to support unmanned systems (Stalker UAS) and small unit power. This state-of-the-art fuel cell provides enhanced capability to the Warfighter in terms of reach/endurance for unmanned systems with low signature. This is a collaboration with NRL and Northwest UAV funded by OSD DMS&T.

Technology Type: Alternative Energy Sources ●

Exhibit #41 | Display Format:

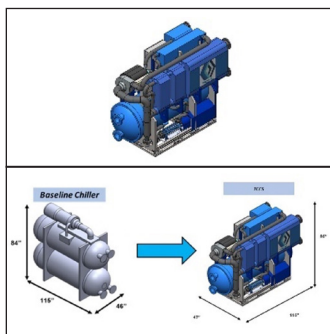


Power Generation and Propulsion with State-of-the-art Power Dense Electric Drivetrains

Power dense electric drivetrains are important towards the modernization of electric ships and future combatants. Our technology is necessary to support design, construction, and qualification of affordable power-dense electrical rotating machines (motors and generators) for shipboard application. This will be critical for integrated power systems both in commercial and military applications.

Technology Type: Vehicle Electrification (Ground / Air / Sea) ■

Exhibit #42 | Display Format: Poster Board



Power Dense Turbo-Compression Cooling System

The Turbo Compression Cooling System (TCCS) is a hybrid, thermally and/or electrically, driven chilled water system. The TCCS utilizes waste heat from the Shipboard Service Diesel Generator (SSDG) jacket water cooling system to generate cooling, thereby increasing the available electrical energy from the SSDG by 10%.

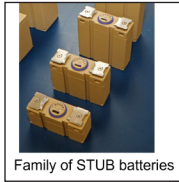
Technology Type: General Energy ►

Exhibit #43 | Display Format: Poster Board

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- General Energy



Family of STUB batteries



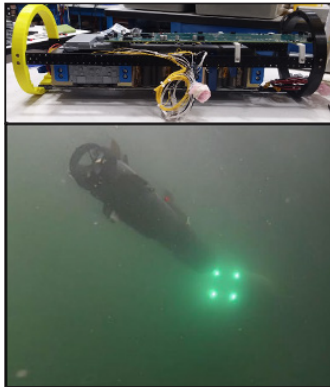
SBNVG on helmet with early prototype battery

Night Vision Goggle Rechargeable Battery

The USMC Squad Binocular Night Vision Goggle (SBNVG) uses disposable AA lithium batteries, resulting in significant unit costs and logistics challenges. Carderock is integrating the US Army rechargeable Small Tactical Universal Battery (STUB) with the SBNVG as a rechargeable alternative that improves SBNVG runtime and logistics in contested environments.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #44 | Display Format: Table-top Display

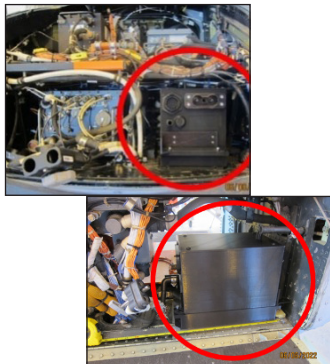


Passive Propagation Resistant Li-Ion Battery Architecture for Undersea Applications

The Navy is collaborating with NASA to transition a Passive Propagation Resistant Li-Ion battery architecture to undersea applications. To date, the Navy/NASA team has successfully demonstrated PPR within a representative IVER4 UUV hull. The PPR battery is the first PPR technology to pass the Navy's criteria for evaluating propagation resistant battery technologies for use in submarine-deployable applications. The IVER4 is the target vehicle for the first PPR battery integration and associated deployment from a submarine.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #45 | Display Format: Static Display



Common Affordable Safe Energy Storage (CASES)

Development of CASES batteries, a family of systems consisting of three distinct Li-ion capacity classes developed to be common across different Naval Aviation platforms. CASES batteries provide greater capacity for less weight, lower maintenance impacts, and lower procurement costs. The photos demonstrate a fit check of a mock-up CASES battery sitting within two variants of the H-1 (UH-1Y, AH-1Z).

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #46 | Display Format: Table-top Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy



Advanced Medium-Voltage, High-Power Charging Converter for Pulsed Power Applications

FAST-CAPACITOR CHARGER.

Advanced medium-voltage, high-power charging power converter for pulsed power applications at costs as low as 50 cents per watt. The DTI PowerMod™ Compact Power Supply provides up to 300 kJ/s. Can be operated in parallel for greater power delivery.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #47 | Display Format: Poster Board



Squad Power Manager (SPM)

The SPM is an existing US Army and emerging USMC Program of Record capability to provide automated power management and endpoint distribution to User items such as laptops, batteries, radios, and other portable electronics. Integrated energy metering enables energy-informed operations, and the device enables energy scavenging and harvesting.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #48 | Display Format: Table-top Display



Expeditionary DC Power Distribution

The expeditionary DCPD concept addresses a lack of standardized DC power distribution within USMC. The DCPD provides convenient, connectorized 28VDC power distribution for small unit power gear and enhances reliability, speed, and agility while reducing cost.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #49 | Display Format: Table-top Display



Compact, Flexible Integrated Power Node Center for Direct Current Distribution

Full-scale compact, modular, galvanically isolated, IPNC unit to supply mission-critical equipment with high-quality, uninterruptible air-cooled power. Fast power sharing among inputs and outputs for source and load redundancy and casualty recovery. Bi-directional module charges and discharges energy magazine.

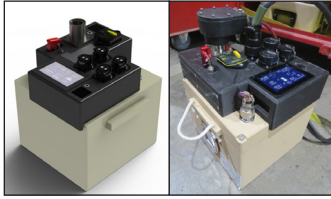
Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #50 | Display Format: Poster Board

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy



Li6T Battery Top Cap

The Li6T Battery top cap concept provides safe, silent, reliable power via convenient connectorized power outputs and enables small unit expeditionary capabilities. Integrated energy display enables Users to make energy-informed decisions. Enables plug-and-play hybridization with a variety of DC power sources.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #51 | Display Format: Table-top Display

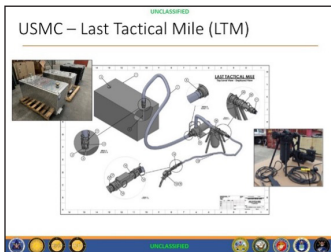


Rechargeable Expeditionary Power Source (REPS)

Development of a ruggedized enclosure for the Lithium 6T battery to support USMC expeditionary dismounted use of a service common form factor energy storage system to reduce costs associated with test and evaluation of bespoke battery systems. The Rechargeable Expeditionary Power Source (REPS) has been developed to support the USMC Small Unit Power (SUP) program.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #52 | Display Format: Static Display

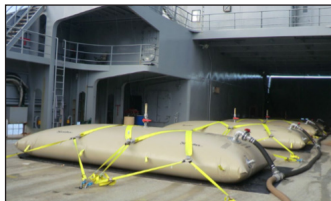


USMC Last Tactical Mile (LTM)

Development of expeditionary equipment that can be placed on existing USMC JLTV/MTVR platforms that enables JP8 fuel distribution in an austere environment. Pumping unit provides 50 GPM using on board vehicle power and filtration unit provides final product grade fuel for refueling vehicles.

Technology Type: General Energy ►

Exhibit #53 | Display Format: Static Display



Contested Logistics-Energy Distribution

Development of four Transportable Collapsible Bladder Deck (TCB/d) 3750 gallon bladders filled with water on the deck of a Logistics Surface Vessel manifold together in series. This commercially available system enables non-fuel carrying vessels to become fuel carriers, expand the asset's mission statement, and operate as a fuel resupply point to other surface vessels and/or to ship-to-shore bulk fuel delivery.

Technology Type: General Energy ►

Exhibit #54 | Display Format: Static Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- General Energy

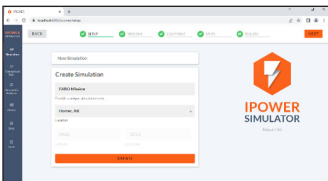


Contested Logistics-Distributed Fueling

The Seabased Petroleum Distribution System (SPDS) is a joint bulk fuel over-the-shore delivery system to replace and improve on the legacy OPDS capabilities while improving operational effectiveness in contested maritime environments. The comprehensive system, with organic hose, power and fuel storage, is designed to minimize shore support for deployment.

Technology Type: General Energy ▶

Exhibit #55 | Display Format: Table-top Display



IPOWER Power and Energy Simulation and Analysis Software

IPOWER is software that simulates energy use, storage, harvesting, and sharing by Warfighters on a mission. It has a simple and intuitive interface, so users can quickly and easily analyze complex scenarios to understand how equipment, tactics, and the environment influence energy on the battlefield. It fulfills a critical need for quantitative analysis to drive energy-related decisions.

Technology Type: Software / Cybersecurity ★

Exhibit #56 | Display Format: Table-top Display



Scimitar Lithium Battery Container

The Scimitar lithium battery container family is a composite battery storage concept that mitigates against the effects of lithium battery venting and fires, enabling safer transportation of high energy battery technologies aboard Naval platforms. One version is intended for storage and transport, while the other is capable of power input and output.

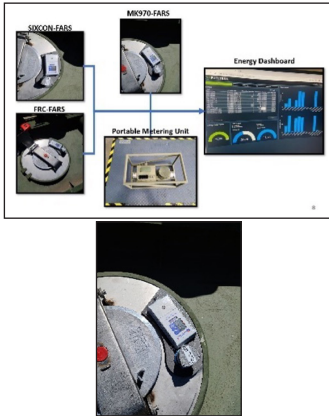
Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #57 | Display Format: Static Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy

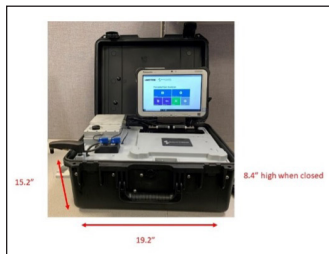


Fuel Automated Reporting System (FARS)

Fuel is a high priority resource that Marine Corps Logistic Enterprise (MCLE) distributes for support of warfighting functions. The FARS project creates a digitally automated reporting environment accessible globally on how much fuel is distributed, consumed, and projected. It accomplishes this by providing MCLE near-real-time access of bulk fuel levels from various assets using an iridium communications platform for data transfer to a web-based dashboard.

Technology Type: Software / Cybersecurity ★

Exhibit #58 | Display Format: Table-top Display



Fuel Quality Assurance

Portable Fluid Analyzer Plus provides on-site analysis of fuel, lube oil and hydraulics with a fully integrated instrument. Analysis applicable to organic fuel stores, locally sourced fuels and scavenged fuels. Fuel types include JP8, JP5, diesel, gasoline and biofuels. Instrument also analyzes lube oil and hydraulics to give commanders immediate onsite information as to mission readiness of assets.

Technology Type: General Energy ►

Exhibit #59 | Display Format: Poster Board



H2 Stalker

The prototype H2 Stalker VXE30 is a Group II (<55lb) unmanned air system (UAS) that is electrically powered by an efficient 1200+ watt hydrogen fuel cell power plant. The UAS provides significant improvement in persistence for intelligence, surveillance, and reconnaissance (ISR) missions without the use of launch and recovery equipment. Powered by gaseous hydrogen and exhausting water as the only byproduct, this system can be refueled through completely renewable sources.

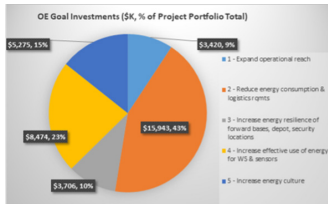
Technology Type: Alternative Energy Sources ●

Exhibit #60 | Display Format: Table-top Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- General Energy



10 USC § 2912 Authority Investments in Operational Energy Saving & Energy Demand Reduction Solutions

Navy and USMC exercised authority in 10 USC § 2912 to invest in innovative and transitionable solutions to address strategic DoD and Naval operational energy goals in energy supportability and demand reduction, contested logistics, and supply chain that will generate additional operational savings, reduce energy requirement, and increase capability.

Technology Type: General Energy ►

Exhibit #61 | Display Format: Table-top Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- General Energy

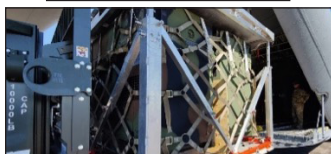


Air Force Operational Energy

As the Department of Defense's largest energy consumer, the Air Force depends on aviation fuel to remain successful. At Air Force Operational Energy, we help mitigate operational risk to the Warfighter and optimize how the Air Force uses fuel by developing and championing energy-informed solutions. We look for ways to increase efficiency and decrease fuel supply chain vulnerabilities through new technologies, data solutions, and innovative process improvements. Our goal is to fly smarter, not less.

Technology Type: General Energy/Energy Optimization ►

Exhibit #70 | Display Format: Table-top Display

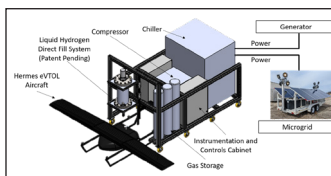


Vertical Pallet Stacker for Increased Aircraft Cargo Space

Designed and certified for C-17 Globemaster III, C-5 Galaxy, and C-130 Hercules use, the Vertical Pallet Stacker is an aluminum frame that provides a second level of storage on top of a standard cargo pallet, enabling up to 3,000 pounds of cargo per pallet space to be placed on the top pallet. This allows Airmen to take advantage of the often underutilized vertical space in an aircraft's cargo bay, increasing cargo capacity and decreasing required transport sorties.

Technology Type: General Energy/Energy Optimization ►

Exhibit #71 | Display Format: Static Display

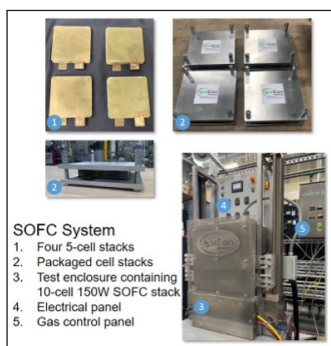


Integrated Liquid Hydrogen Energy Systems for Long Range Unmanned Aerial Vehicles

Phase II Air Force STTR Flight Demonstration project of an integrated flight vehicle, liquid H₂ and fuel cell storage and microgrid.

Technology Type: Alternative Energy Sources ●

Exhibit #72 | Display Format: Static Display



Regenerative Solid Oxide Fuel Cells (SOFC)

When paired, Solid Oxide Fuel Cell (SOFC) and Solid Oxide Cell Electrolysis Cell (SOCE) can be used to make a regenerative SOFC system that can sustain high power operations (on the order of 1kW or more) than a battery system. The SOFC system it emits no nitrogen oxides or particulates with the exhaust gas This system can run on hydrogen and ammonia. The SOCE system can to generate ultra high purity oxygen (O₂) by electrolyzing carbon dioxide.

Technology Type: Alternative Energy Sources ●

Exhibit #73 | Display Format: Static Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- General Energy



Eielson Air Force Base Microreactor Pilot Program

The DAF began investigating the potential for a microreactor at an Air Force Installation in 2016 and announced Eielson Air Force Base (AFB) as the pilot location in October 2021. The pilot program will help DAF identify how best to use and integrate micro-reactor technologies in future energy resilience initiatives that support mission assurance. The DAF views microreactors as a promising technology capable of operating independently from the commercial grid and providing an extra layer of energy redundancy and resilience for mission assurance.

Technology Type: Alternative Energy Sources ●

Exhibit #74 | Display Format: Table-top Display

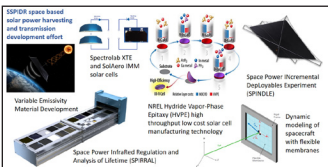


Nellis Air Force Base Solar Array Maintenance

Nellis AFB is utilizing robots to clean their solar panels, reducing water consumption and promoting mission assurance through energy and water resilience. The robots use under a half a cup of water to clean each panel, which is approximately 90 percent less than traditional cleaning methods, making this solution optimal for solar systems built in desert conditions.

Technology Type: General Energy ►

Exhibit #75 | Display Format: Table-top Display



Space Solar Power Incremental Demonstrations and Research (SSPIDR)

A space based solar power harvesting and power beaming development effort

The SSPIDR program is an AFRL effort to establish means to wirelessly deliver ~100kW of electricity, traceable to 1,000kW, on demand wherever needed regardless of the time, weather, or presence of supply lines. This is being done by developing a unified space based solar power harvesting and RF power beaming system. To accomplish this feat, the AFRL is driving and integrating advances in energy generation, deployable structures, RF power beaming, thermal management, and structural monitoring.

Technology Type: Alternative Energy Sources ●

Exhibit #76 | Display Format: Static Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- General Energy



Tactical Microgrid Standard (TMS)

TMS is an interoperability standard for Joint Service Intelligent Power Systems and was developed under an Operational Energy Capability Improvement Fund (OECIF) / Operational Energy Prototype Fund (OEPF) effort. TMS provides the backbone for power systems to work together to form fuel efficient, resilient, cyber-secure and adaptable tactical microgrids. TMS is moving forward for Military Standard ratification by Program Manager Expeditionary Energy and Sustainment Systems (E2S2). TMS exhibit will consist of TMS overview, demonstration of TMS tools, and TMS compliant systems.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #80 | Display Format: Table-top Display

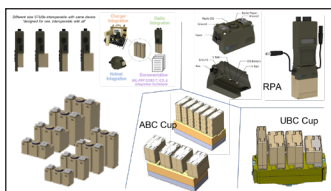


Secure Tactical Advance Mobile Power (STAMP)

STAMP demonstrates the military utility of "Universal Battlefield Power" through the integration of power generation, distribution, battery storage, metering, control systems, and On Board Vehicle Power (OBVP) from mobile tactical platforms into an AC/DC microgrid that increases energy resilience while reducing fuel consumption and greenhouse gas emissions. The STAMP enhances mobility and affords greater flexibility to tactical units to execute distributed operations across logistically contested environments. Exhibit will provide live and static demonstration of STAMP components.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #81 | Display Format: Static Display

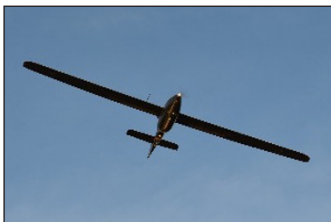


Small Tactical Universal Battery Integration

The Small Tactical Universal Battery family is the standard and interoperable energy storage solution for Soldier-borne electronic devices. Standardizing power sources for the Soldier is a significant modernization effort to power modern Soldier capabilities which have greater energy and power requirements without increasing Soldier load and battery weight.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #83 | Display Format:



Hybrid Tiger Ultra-Persistent ISR

The Hybrid Tiger is a multi-day Group II UAS capable of supporting a range of missions, from persistent ISR over a multi-day operation, to extreme range search and identification. The system incorporates a diversity of energy sources, including: H2, Solar, and Thermal Soaring.

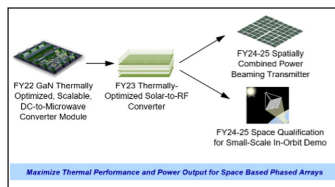
Technology Type: Alternative Energy Sources ●

Exhibit #84 | Display Format: Static Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy



Solar-Powered Phased Array Optimized for Thermal Performance and Mass-Specific Power (PRAM-2)

NRL is developing a solar-to-microwave converter module with optimized thermal performance for space-to-Earth power beaming. The module could reduce the cost-per-Watt of solar-power satellites, which can break the Warfighter's chain of dependence on vulnerable fuel convoys.

Technology Type: Alternative Energy Sources ☼

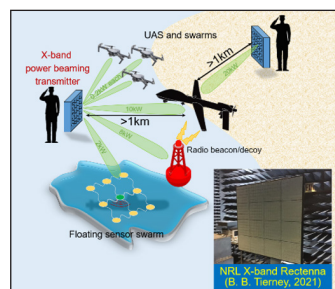
Exhibit #85 | Display Format: Static Display

Refueling And Support Package - COMMS and Situational Awareness (RASP-CASA)

RASP-CASA will demonstrate a prototype hydrogen production and storage system designed for shipboard use and high altitude balloons using hydrogen lift gas to carry a mission-relevant payload.

Technology Type: Alternative Energy Sources ☼

Exhibit #86 | Display Format: Static Display

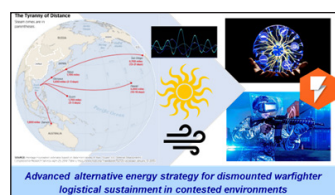


Efficient Microwave Array for Scalable Wireless Power Transfer (6.3 Study)

The Naval Research Laboratory is developing a low-cost, high-efficiency microwave wireless power transfer system. The key development is a scalable array of high-efficiency magnetrons operating at X-band (8–12 GHz) for low atmospheric losses, even in adverse weather conditions. Payoffs: Persistent UAV missions, power in difficult-to-access areas.

Technology Type: Alternative Energy Sources ☼

Exhibit #87 | Display Format: Static Display

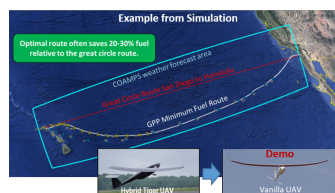


Warfighter Alternative Energy Study (WAES)

The study helps to close the INDOPACOM dismounted power, energy, and logistics challenges by recommending policy changes. It leverages past work and incorporates new information to create a holistic picture of the available energy on the battlefield.

Technology Type: General Energy ▶

Exhibit #88 | Display Format: Poster Board



POTION: Energy Optimal Path Planning for UAVs

The POTION software developed by NPS and NRL uses weather forecasts and a vehicle energy model to improve the energy awareness of UAV operators. It identifies the energy-optimal (minimum fuel) path to the mission area and estimates the amount of fuel needed to return, so operators can maximize time on station while flying efficiently and confidently.

Technology Type:

Exhibit #89 | Display Format: Poster Board

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- ☼ Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy



Rectenna Integrated Onto UAV

Rectenna capable of electrifying unmanned vehicles (air and ground) using millimeter electromagnetic radiation (w-band). Has the potential to transform the way systems are energized and reduce the traditional logistic burdens of hydrocarbons.

Technology Type: Vehicle Electrification (Ground / Air / Sea) ■

Exhibit #90 | Display Format: Poster Board

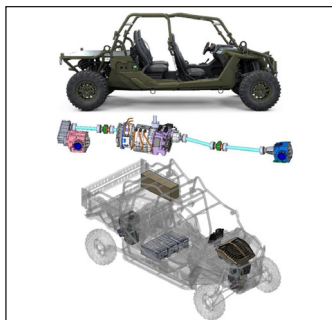


High Speed Logistics (HSL)

Agent-based simulation approach will be used to identify capability gaps, compare materiel and non-materiel alternatives, and analyze requirements for future logistics.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #91 | Display Format: Poster Board



Light Expeditionary Energy Agile Platform (LEEAP)

Development of High Power and Hybrid Electric variants of the USMC and USSOCOM side by side tactical vehicle. These variants will support the integration of existing C2 and ancillary payloads to these platforms. The power upgrades will also increase the persistence through improved system efficiency and provide spare capacity for future, more power intensive payloads.

Technology Type: Vehicle Electrification (Ground / Air / Sea) ■

Exhibit #92 | Display Format: Static Display



Small Unit Power, Electrification and Resilience (SUPER)

SUPER extends Unmanned Logistic Systems (ULS) applications for the purpose of creating energy dispersive solutions from vehicle-formed micro-grids to support electrification of assets within small units. SUPER is anticipated to support Marine Corps Logistics Enterprise (MCLE) with informed energy sustainment for Forward Arming and Refueling Points (FARPs), Marine Air Defense Integrated Systems (MADIS) and Consolidated Supply Support Activities (CSSAs) in the context of Expeditionary Advance Base Operations (EABO).

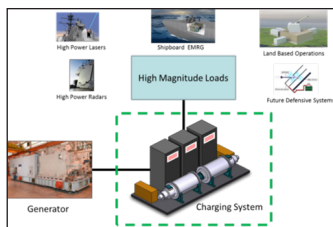
Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #93 | Display Format: Poster Board

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy

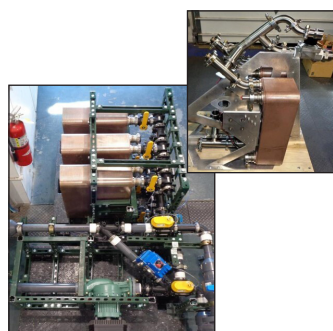


High Speed Rotating Machine (HSRM)

Rotating machines with kinetic energy storage (flywheels) offer advantages over chemical batteries for high power load buffering scenarios. They can be built with life of platform longevity and taken to a zero-energy state when not needed and be built entirely of domestic materials. This can result in a size, weight, and performance advantage as compared to other forms of storage.

Technology Type:

Exhibit #94 | Display Format: Table-top Display

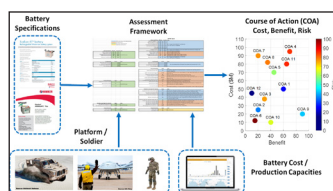


Thermal & Power Systems - Thermal Energy Storage

Thermal energy storage (TES) is being developed as a competitive method of providing cooling and thermal management for scaled directed energy systems. This developmental program is building modular TES, coupled with laser load emulation and power sources, to demonstrate complete end to end coupled power and thermal system behavior under load dynamics consistent with directed energy.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #95 | Display Format: Poster Board



Battery Standardization Assessment

Identify and characterize the technical, business/financial, and logistics/sustainment benefits and risks for current and proposed DoD advanced battery standardization approaches. Output products will help inform DoD battery investment recommendations and multiple future strategies.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #96 | Display Format: Poster Board



Naval Power Network Monitoring (NPNM)

NPNM will instrument Power Systems (PS) of Afloat and Ashore Systems of Interest (SOIs). NPNM capabilities support energy conservation and mitigates climate change risk by providing data and matured processes, procedures, and equipment to improve operating practices, reduce cost, and increase operational power resilience. Data from installed SOI PS sensors will be analyzed to determine power profiles that identify and classify SOI PS anomalies for large scale adoption of independent Naval SOI PS monitoring.

Technology Type: Contingency Basing / Installation Energy Resilience ●

Exhibit #97 | Display Format: Table-top Display



Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy

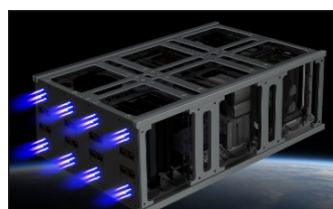


Electric Tactical Humanitarian Operations Response (eTHOR)

eTHOR will provide a network of electric vehicles capable of storage, transport, delivery, and exportation of energy in a contested environment. In addition, the system is an agile 5G network infrastructure, deploying and extending 5G's low latency, high bandwidth capabilities to the expeditionary force enabling unmanned systems, artificial intelligence, and all domain command and control. The goal of the system is to increase the efficiency of energy logistics in a contested environment and provide sufficient network communications to enable the future force.

Technology Type: Vehicle Electrification (Ground / Air / Sea) ■

Exhibit #98 | Display Format: Static Display



Low-Profile, Electric Nuclear Satellite (LENS)

Development of a highly-maneuverable, small-satellite that integrates a next-generation radioisotope power system with precision thrusters. The small asset – without deployable solar panels – will 1) enable low-cost, high-resolution ISR through VLEO missions and 2) increase Space Domain Awareness by enabling close proximity operations.

Technology Type: Alternative Energy Sources ●

Exhibit #99 | Display Format: Poster Board



Distributed Energy Provided Throughout the Seas (DEPTHs)

Development of a pre-deployed maritime power network that integrates a next-generation radioisotope power system with power over fiber distribution technology. DEPTHs provides long-endurance and flexible power that improves the warfighter's access to critical data by increasing the lifecycle of sensor and sensing assets (such as UUVs) to over five years. Additionally, DEPTHs enables the long-endurance deployment of sensors and sensing assets in austere environments—such as the Arctic.

Technology Type: Alternative Energy Sources ●

Exhibit #100 | Display Format: Poster Board

Metrology-Enabled RF Integration Technology (MERIT)

Demonstration of Metrology-Enabled Beam Formation at km-Range for Intermediate-Scale Arrays which enables operations and mitigates contingency energy deficits. New energy capabilities allow scaled power solutions in all-weather conditions world wide.

Technology Type: Alternative Energy Sources ●

Exhibit #101 | Display Format: Table-top Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy



DoD Space Domain Energy Strategy & Space Nuclear Power (SNUP) Study

A complete study in space power and affordability options with a space power roadmap.

Technology Type: Alternative Energy Sources ☉

Exhibit #102 | Display Format: Poster Board

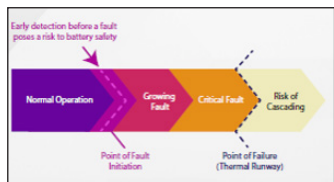
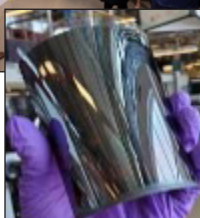


National Renewable Energy Laboratory's HVPE III-V, Perovskite, & Power Beaming Technologies

Advanced photovoltaics and energy technologies to support the warfighter

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #103 | Display Format: Table-top Display

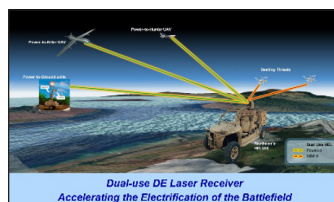


LEAP-M(Lithium ion EARly fault Predictive Monitoring

The LEAP-M project delivers a validated technology for the early detection of internal shorts in Li-ion battery cells. The technology is cell chemistry agnostic, working on highly parallel and highly series battery designs developed into a castellated PCB for ease of integration. Cells can be screened in a matter of minutes for internal shorts which are several orders of magnitude smaller than shorts which can cause a battery failure or thermal runaway.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #104 | Display Format: Table-top Display



Dual-use Laser Power (DUAL) Program

A dual-use DE Laser receiver solution, that captures and converts light from DE lasers will accelerate electrification of the battlefield by delivering wireless operational energy to deployed ISR platforms and communication networks, while delivering DoD additional new return on investment for current and future DE laser investments.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #105 | Display Format: Table-top Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- ☉ Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy

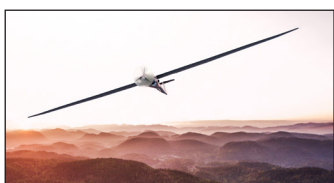


Arctic Grid Energy Storage (AGES)

High performance operational energy microgrid capability with generator and battery storage for extreme cold weather are required for the Department of Defense (DoD) to remain competitive in the Arctic. The Joint Force requires continuous, reliable power for sustained Arctic operations down to -60°F (-51°C) with an emphasis on reducing generator fuel resupply risks, providing scalable, flexible, and high-power quality for high energy demands, and demonstrating a resilient operational microgrid capability.

Technology Type: Batteries / Energy Storage / Energy Distribution / Power Generation ◆

Exhibit #106 | Display Format: Table-top Display

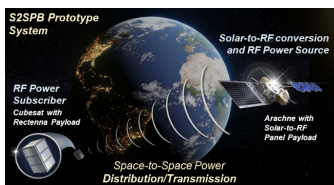


Ultra UAS - Optimized ECU for Affordable Ultra-Long-Endurance ISR

Description Unavailable – CUI

Technology Type: General Energy ►

Exhibit #107 | Display Format: Poster Board



Space-To-Space Power Beaming (S2SPB)

Space-To-Space Power Beaming (S2SPB) will a subscale prototype of a space-to-space power beaming system with the ability to generate, distribute, and receive power wirelessly using novel free-space Radio Frequency (RF) power beaming capabilities while in orbit. The S2SPB effort directly supports the Space Force's Space Solar Power Initiative (SSPI) and the Air Force Research Laboratory's Space Solar Power Incremental Demonstrations & Research (SSPIDR) Project. S2SPB provides a path forward to revolutionize the current space power architecture with prototype space-based power beaming system scalable to a MW class system as the Solar-to-RF panel is scaled to power supply systems consisting of large arrays of Solar-to-RF panels and power users with rectenna arrays both terrestrial and on-orbit. S2SPB ushers in a new paradigm for space system architects where space-based power system can support multiple power subscribers without the usual "bring your own power" constraints.

Technology Type: Alternative Energy Sources ●

Exhibit #108 | Display Format: Poster Board



Technology Types Key



Vehicle Electrification (Ground / Air / Sea)

Contingency Basing / Installation Energy Resilience

Batteries / Energy Storage / Energy Distribution / Power Generation



Alternative Energy Sources



Software / Cybersecurity



General Energy

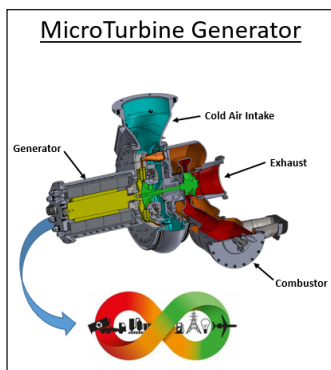


Hybrid Augmentation System (HAS)

Increased usage of battery-based expeditionary power system like the HAS is crucial to Transformational Overmatch and conduct of Multi-Domain Operations. The HAS increases operational capability while reducing sustainment demands and supporting DoD's Climate Adaptation Plan. The scalability and modularity features inherent to the HAS system architecture allows for tailoring to meet specific power requirements.

Technology Type: Batteries/Energy Storage ◆

Exhibit #109 | Display Format: Table-top Display



Intelligent Power Management System (IPMS)

Intelligent Power Management System (IPMS) Addressing DoD's hard problem of platforms and warfighters suffering from a lack of sufficient, clean electric power. IPMS is a scalable, micro turbine-based generator system. The Intelligent Power Management System wraps the novel core engine in a power distribution system that manages load and available electricity for the warfighter, providing sufficient power when and where it is needed most.

Technology Type: Batteries/Energy Storage/Energy Distribution/Power Generation ◆

Exhibit #110 | Display Format: Table-top Display



Eliminate Burn Pits & Convert Waste to Fuel/Electricity

Eliminate Burn Pits & Convert Waste to Fuel/Electricity — The Inclined Rotary Gasifier (IRG) Waste to Energy System (W2E) converts shredded waste at a base into a clean gas fuel that can be used to power generators and a microgrid.

Technology Type: Alternative Energy Sources ●

Exhibit #111 | Display Format: Table-top Display

Technology Types Key

- Vehicle Electrification (Ground / Air / Sea)
- Contingency Basing / Installation Energy Resilience
- ◆ Batteries / Energy Storage / Energy Distribution / Power Generation

- Alternative Energy Sources
- ★ Software / Cybersecurity
- ▶ General Energy



Participating Services/Sponsors

