



# Energy & Power COI



## Technology Taxonomy

### Power Generation/Energy Conversion:

Develop tactical, deployable power systems using conventional fuels, alternative fuels, and energy harvested from renewable/ambient sources.

### Energy Storage:

Improve electrical and electrochemical energy storage devices to decrease device size, weight, and cost as well as increase their capabilities in extreme temperatures and operating conditions.

### Power Control and Distribution:

Enable smart energy networks for platforms, forward operating bases, and facilities using modeling and simulation tools as well as new, greater capability and efficiency components.

### Thermal Transport and Control:

Efficiently manage heat and enable higher power density systems through advanced thermal science and technology: advanced components, system modeling, and adaptive or hybrid-cycle technologies.

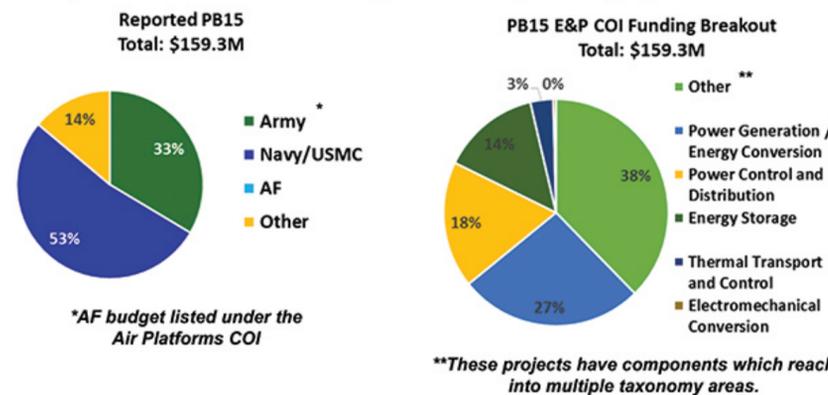
### Electromechanical Conversion:

Increase the power density, efficiency, and robustness of motors, generators, and actuators while also reducing their life cycle costs.

The Energy and Power Technology COI's purpose is to provide technologies to enable intelligent power & energy management to enhance operational effectiveness.

## What's driving E&P S&T?

- Operational capability and alignment with the US Department of Defense (DOD) *Operational Energy Strategy* and service energy strategies
- High cost of fuel resupply, in dollars and lives, demands increased efficiency
- Greater electric power demand required by advanced weapons and sensors
- Military unique systems not supported by commercial R&D require dedicated DOD S&T; DOD S&T essential to exploit/leverage emerging commercial R&D



## Gaps and Opportunities

- Integrated power and thermal management capable of handling increasing energy and power density needs across multiple systems and power ranges
- Integrated, intelligent power distribution and management
- Architectures, interfaces, and standards for reconfigurable power systems (energy networks / microgrids)
- More capable, higher power/temperature/efficiency power devices and components (e.g., wide bandgap electronics for continuous & pulse power)
- Improved energy storage, harvesting, and recovery systems

*There are some futuristic capabilities being considered that will require new perspectives and different focus for the E&P S&T Community*

- Power for UAS and loitering/reconfigurable munitions capabilities
- Platform-based, high repetition rate, very dense power and energy for next generation capabilities
- Power for Warfighter wearable augmentation
- Unlimited mission endurance without energy resupply requirements (through ultra-low power devices, extremely dense energy storage, and ubiquitous energy scavenging)

## Engagement Opportunities

### COI

- Defense Innovation Marketplace
- NDIA Annual Science & Engineering Technology Conference
- ARPA-E Annual Energy Innovation Summit

### ARMY

- Army-TARDEC / DoE-VTO Advanced Vehicle Power technology Alliance (AVPTA)
- Demonstration of production ready energy systems and devices at the annual Army Network Integration Exercise (NIE)
- Demonstration of prototype energy systems at the annual Army Expeditionary Warrior Experiment (AEWE)

### NAVY

- Energy System Technology Evaluation Program (ESTEP)

### MARINES

- Expeditionary Energy Concepts (E2C)

### AIR FORCE

- Air Force Basic Expeditionary Airfield Resources (BEAR)
- Annual May Energy Optimized Aircraft Steering Committee Meeting with Industry in Dayton, OH

## Warfighter Opportunity Areas

### Tactical Unit Energy Independence:

- Develop renewable and sustainable operational tactical unit power
- Modular systems for onsite assembly and maintenance
- Fuel flexibility, onsite fuel, and energy harvesting



### Autonomous Platform Power:

- Support long endurance, undersea, ground, or high and low altitude unmanned operations with power and energy solutions
- Includes power for propulsion, sensor packages, weapons, and autonomous operation



### Electric Weapons and High Power Sensors:

- Support the use of advanced sensor systems and electric weapons



### Adaptive Power Networks:

- Power networks for both mobile and fixed power installations
- Utilize a variety of power sources for load requirements ranging from platforms (Soldier, ship, aircraft, ground vehicle) to mobile FOBs and fixed installations



### Energy Optimized Platforms:

- Focus on platform electrical & thermal systems, components, and integration
- Support increased warfighter requirements while reducing the amount of necessary fuel
- Minimize platform thermal constraints

