

REPORT

The essential role of energy storage for critical U.S. military applications

The USS Iwo Jima (LHD-7) sailing into Port Everglades in Fort Lauderdale, FL.

Introduction

Members of Battery Council International (BCI) produce roughly 150 million automotive batteries each year. And with some estimates for U.S. military vehicles approaching 400,000 across combat and non-combat ground machines, BCI member companies also are major suppliers to the Department of Defense and its fleet.

But BCI members make so much more than batteries that start Humvees or support tactical vehicles. They provide energy storage solutions for military base power grids on land, submarines at sea, and satellites.

America's military faces both the practical concerns of finding rugged and reliable batteries as well as the tactical need to find domestic supply chain partners that it can rely on. U.S. battery companies are helping the nation's military solve these challenges, building on a 125+ year track record of delivering reliable energy storage through onshore operations.

Furthermore, BCI members rely heavily on domestically sourced materials. Lead batteries feature an unmatched 99% recycling rate and represent a circular supply chain that does not depend on imported materials from foreign adversaries.

In 2025, the [Defense Logistics Agency published a report on the importance of batteries](#) in support of the nation's defense – and more importantly, the critical need to find trusted domestic partners and ensure a robust supply chain for these batteries.

BCI's members stand as ready partners to the U.S. military, and to America's allies around the world to help [power critical national security needs](#) in a time of increasing geopolitical uncertainty.



“Modern warfare requires batteries for small devices and large power generation systems that are portable on the battlefield. The absence of batteries and tactical energy storage in forward-deployed war reserves creates a critical gap when contingency operations begin...”

— Defense Logistics Agency, March 21, 2025

Aircraft and drones

Just as battery power is critical for starting a car or providing auxiliary power to supporting systems, military aircraft also require batteries to function safely and effectively. These batteries offer a high surge current for engine ignition, as well as power essential avionics, communication, and emergency measures in case of primary power failure.

Aircraft, helicopters, and unmanned aerial systems – often referred to as drones – present challenging energy requirements that must be met through advanced design, including superior power and performance, seamless aerobatic operation, zero maintenance, and exceptional reliability.

CASE STUDIES

BCI member EnerSys is a world leader in battery technologies suitable for [military aviation](#) and portable power systems including [military-grade drones](#). They offer a variety of energy storage solutions – including Thin Plate Pure Lead (TPPL), Nickel Cadmium (NiCd), and Lithium ion (Li ion) – designed for high-performance, high-reliability applications.

More than a decade ago, the Department of Defense engaged in a cost analysis that showed a transition to lead batteries in various aircraft would result in significant cost savings and reduced labor for the military – without sacrificing performance. EnerSys batteries were used as part of this effort to update battery systems in aircraft including the military's H-53 heavy-lift helicopters used by various branches of the U.S. military, EA-6B twin-engine warplanes, and the F-5E/F supersonic light fighter.

H-53 lifting hummer





This [image](#) of the International Space Station (ISS) was photographed by one of the crewmembers of the STS-105 mission from the Shuttle Orbiter Discovery after separating from the ISS.

Spacecraft and satellites

Batteries play a critical role in powering satellites and other spacecraft, and showcase the industry's true innovative potential. Batteries are used on spacecraft as a basic power sources, and are drawn down over time. Energy storage solutions are also used in conjunction with solar panels or other devices, recharging the battery in sunlight and then providing that extra energy later when needed.

Batteries used in satellites and other spacecraft are incredibly unique and specialized. Batteries are foundational long-term power sources for objects that often spend years in space, continuously operating and cycling thousands of times. The harsh environments of space as well as the stresses of rocket launch demand tough batteries that can last – all without interference from harsh chemicals, gasses, or other risks to sensitive onboard instruments.

CASE STUDIES

GS Yuasa, a BCI member company, has supplied satellites and other spacecraft with best-in-class batteries since the early 1990's. The company's technology is trusted by leaders in the satellite industry to provide reliability and the highest performance energy storage solutions for critical space applications, and on a total energy storage capacity basis, GS Yuasa is the [world leader in lithium-ion batteries](#) produced for space applications.

To date, GS Yuasa has manufactured thousands of large format lithium-ion cells for satellites and spacecraft, with relationships across some of the most respected aerospace and defense companies in the world. Among the space programs that GS Yuasa has supported is Northrup Grumman's (formerly Orbital Sciences Corporation) Commercial Orbital Transportation Services (COTS) program. Now, Northrup Grumman's Cygnus vehicle is a commercial resupply (CRS) vehicle for the International

Space Station. GS Yuasa also supported NASA during the critical main battery replacement of the International Space Station.

As of January 2023, the power systems of more than 200 satellites have relied on GS Yuasa's Li-ion cell technology for a total of more than 4.5MWh of energy storage flown and over 550 million working cell hours without anomaly or failure.

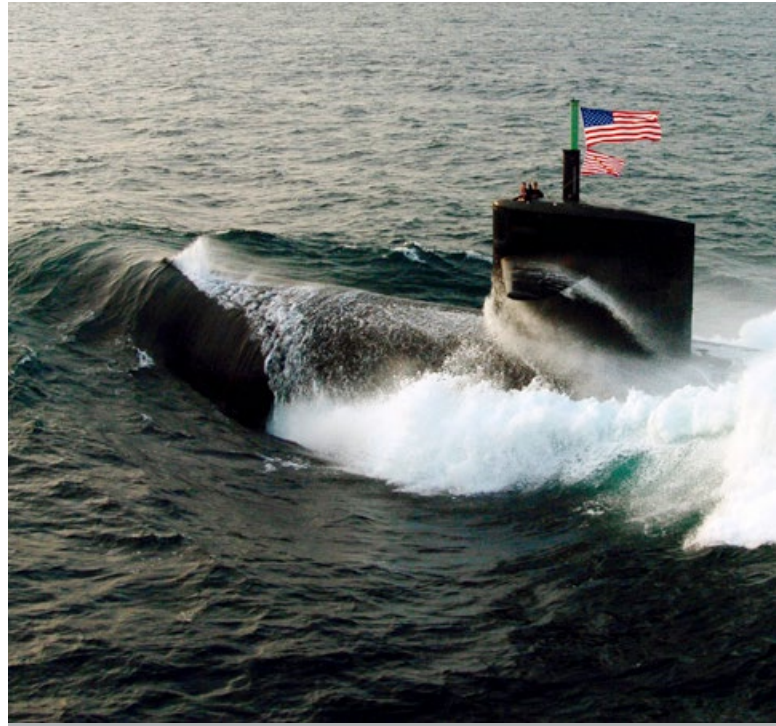
For its part, EnerSys also supplies specialty systems for spacecraft with roughly 7 billion cell hours of space operation – without a single mission failure to date. This includes EnerSys® [batteries that power the Roman Space Telescope](#), as well as the inaugural launch of the Artemis I moon-orbiting mission in 2022 that surpassed even the Apollo missions to set a new record for distance from the earth at nearly 270,000 miles.

Submarines and underwater surveillance

Batteries are critical to the safety and reliable operation of submarines. It's simply not possible to power a submerged vessel with fossil fuels, given the confined spaces and limited oxygen on board. That's why for more than 100 years, motors that rely on battery power have been synonymous with the U.S. Navy and its latest submarine technology.

The heavy lead batteries that powered many World War II submersibles were seen as ideal sources of ballast as well as reliable and safe power. The durability, domestically abundant materials and proven track record of lead batteries in military applications make this energy storage technology the leading source for submarine power in the modern military.

Sonobuoys are also indispensable tools for the military, providing forward-deployed acoustic sensing that traditional hull-mounted sonars cannot match. These deployable sensors – dropped from aircraft, helicopters, surface ships, and submarines – form a dynamic undersea surveillance network that protects our nation's fleet. The only practical way of powering sonobuoy technologies is the use of batteries.



The USS Albuquerque SSN-706 in the North Arabian Sea.

CASE STUDIES

BCI members EnerSys and Stryten Energy share the submarine backup power business for the U.S. nuclear submarine fleet.

In 2023, the two firms were jointly awarded five-year contracts by the nation's military for submarine valve regulated lead acid (SVRLA) batteries.

Stryten's [E-Series SVRLA AGM battery technology](#) is cost-effective, virtually maintenance-free and meets the U.S. Navy's stringent requirements for both performance and safety. Stryten Energy was the first to develop and qualify VRLA technology for the submarine application, introducing the current SVRLA product that meets the performance requirements of the U.S. Navy. Stryten coordinated with the U.S. Navy to engineer the product and convert the entire fleet from traditional flooded to VRLA technology.

As for EnerSys, its [Hawker®](#) submarine batteries use proprietary thin plate pure lead, exceeding even the highest needs of the military in many situations. These batteries serve

as both standby batteries in nuclear-powered submarines. These lead batteries are sealed, maintenance-free and at the leading edge of energy storage technology. EnerSys developed this cutting-edge energy storage technology in partnership with the U.S. Navy specifically to meet its needs.

Regarding sonobuoys, Navitas systems (a subsidiary of East Penn Manufacturing) is the key partner for Lockheed Martin in delivering the AN/SSQ-125A series Sonobuoy. This market-leading product embodies the state of the art in sonobuoy technology, allowing for best-in-class delivery of real-time detection, localization, classification, and tracking of potential submarine threats across vast ocean areas.

Navitas Systems provides the most advanced Li-Ion technology to power the most advanced signaling device. Navitas developed this cutting-edge power solution specifically for the Navy's strict flight safety, high power, and energy requirements. This will ensure the Navy maintains its ability to track and identify critical underseas threats.

Backup power for military bases

A Battery Energy Storage System (BESS) stores energy for later use. A BESS consists of multiple integrated components that function collectively as a large-scale rechargeable battery, capable of storing and discharging energy for essential applications – such as operating key communications infrastructure, tactical controls, or other critical systems.

Downtime is not an option for the U.S. military, even in peacetime. Batteries supplied by BCI members ensure that our soldiers in every branch of service and in all corners of the world can continue to protect American interests.



A microgrid at Otis Air National Guard Base, Cape Cod, provides the U.S. Department of Defense with reliable, secure power for essential military infrastructure.

CASE STUDIES

Stryten Energy, Clarios, East Penn Manufacturing, and other BCI members are suppliers of storage units, battery racks, and related accessories to the U.S. military. These include stationary batteries that provide critical backup power for data centers, telecom installations, and military bases around the world.

BCI members have also partnered with the U.S. military on grid storage solutions for forward operations using existing supplies of military-owned lead batteries to create

rechargeable microgrids. This includes an innovative project at the U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL) in Fort Leonard Wood, Mo and a microgrid project at [Otis Air National Guard Base](#), Cape Cod.

These projects, together with future developments, have the potential to significantly enhance America's energy security through sustainable backup power systems.



Next generation battery technology for warfighters

Modern military needs go far beyond just a rucksack and a rifle, with high-tech tools that help support U.S. soldiers that are in harm's way. That means batteries are a critical component, powering everything from soldier-portable systems such as video and radio devices to tactical tech like night vision goggles and sensors, as well as advancements in ground vehicles and aviation.

Energy storage solutions for deployed soldiers must meet the highest of standards – including high performance, unmatched reliability, low weight, and best-in-class safety. U.S. battery manufacturers are advancing technologies that not only meet these demands but are in-line with the future of supply chain security.

CASE STUDIES

Stryten Energy and EnerSys are working with the Defense Innovation Unit to develop lithium battery prototypes as part of the U.S. Department of Defense's Family of Advanced Standard Batteries (FAStBat) project.

"Not only will FAStBat accelerate the adoption of domestic commercial technologies by DOD Programs of Record, but these formats will also be foundational as we build interoperable solutions with our allies and partners," says

Eric Shields, Senior Battery Advisor for Industrial Base Policy, Office of the Under Secretary of Defense for Acquisition & Sustainment, about the program.

Additionally, East Penn Manufacturing's Navitas has special expertise in providing advanced lithium battery solutions for [niche military applications](#) which are high-performance and heavy-duty in nature and require special features for the needs of modern soldiers.

BATTERY COUNCIL INTERNATIONAL Recently celebrating its 100th anniversary, BCI was formed in 1924 and joins together battery manufacturers and recyclers, marketers and retailers, suppliers of raw materials and equipment, and battery distributors from across North America and around the world. BCI members are committed to responsible manufacturing and recycling processes, and serve as a unified voice for environmental, health and safety stewardship.

Learn more at BatteryCouncil.org

Visit BatteryCouncil.org/sources to view source information.
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