



DoD Efforts to Secure the Battery Defense Industrial Base



April 25, 2023

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Deputy Secretary of Defense - Wayne State University November 2021



"Battery technology and lithium-ion batteries specifically, are the lifeblood of electrification and the future auto industry, but batteries are also essential to thousands of military systems from handheld radios, to unmanned submersibles and to future capabilities like lasers, directed energy weapons, and hybrid electric tactical vehicles



Deputy Secretary of Defense
Kathleen H. Hicks

...A healthy battery supply chain is essential to the military. When it comes to batteries, America needs to lead the world. That means innovation, but it also means manufacturing, ensuring we have healthy supply chains to get what we need, when we need it...The problem, however, is that China presently dominates that supply chain."

~ Deputy Secretary of Defense Dr. Kathleen Hicks



Deputy Assistant Secretary of Defense For Industrial Base Resilience - DoD Lithium Battery Summit December 2022



“To strengthen our Defense Industrial Base, we must not only make smart investments, but just as importantly, we must send a strong and clear demand signal, so that industry invests in themselves. Throughout, we must become better customers and enable our industry partners to build viable and diverse businesses that support our growing needs. By improving our understanding of the where, when, why, and how we buy batteries, and by standardizing where it makes sense, we will increase our buying power...



...we also need to look at our acquisition and procurement policies, and how they impact the demand signals we send to industry and the implications for the Warfighter when our buying habits are inconsistent with our industrial security needs.”

~Deputy Assistant Secretary of Defense for Industrial Base Resilience
Ms. Halimah Najieb-Locke



Background & Global Trends



Global Battery Market

Rapidly growing demand for EVs Globally

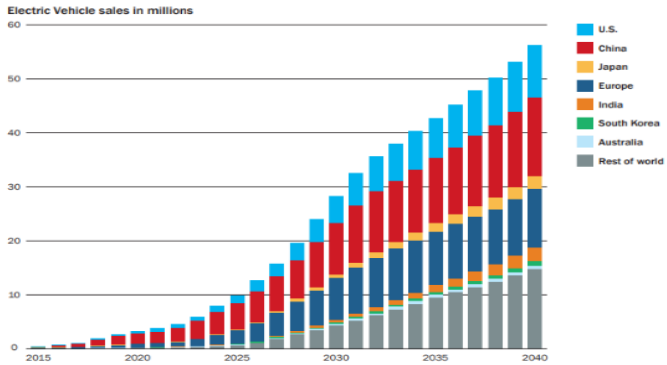
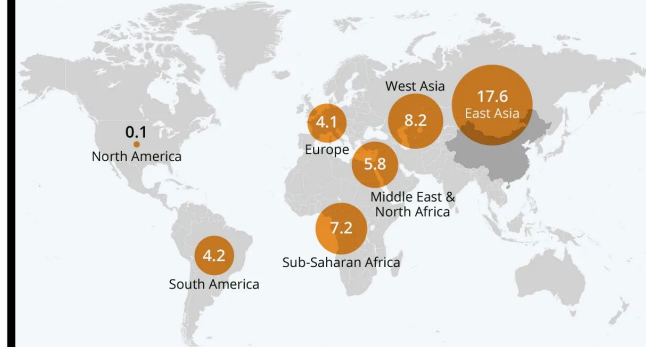


FIGURE 1. Annual Sales of Passenger EVs (Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs)). Source: BloombergNEF Long-Term Electric Vehicle Outlook 2019.³⁸

Belt Road Initiative & China's Dominance of Mineral & Material Processing

China's Belt and Road Investment Map

Chinese BRI investments by world region in 2020 (in billion U.S. dollars)



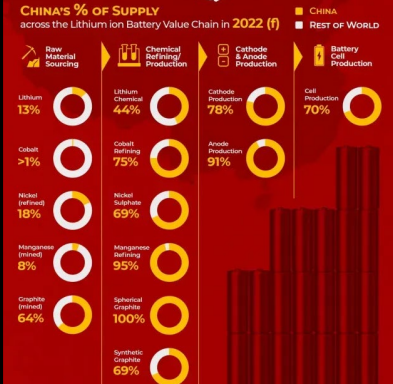
Source: Green Belt and Road Initiative Center (Central University of Finance and Economics Beijing)



statista

CHINA'S BATTERY SUPPLY CHAIN DOMINANCE

Benchmark offers insight on China's stronghold of the global lithium ion battery supply chain, by illustrating how the country dominates mining, metal refining, battery grade chemicals production, cathode & anode making and cell production.



BENCHMARK

For further information on Benchmark Mineral Intelligence products, please contact info@benchmarkminerals.com.

China's Dominance of Global Cell Production

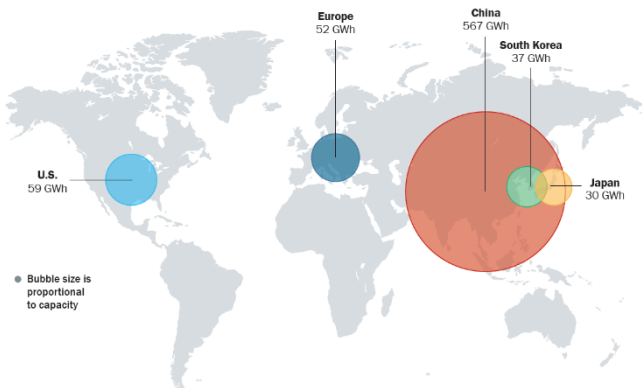


FIGURE 6. Cell manufacturing capacity by country or region. Source: "Lithium-Ion Battery Megafactory Assessment", Benchmark Mineral Intelligence, March 2021.³⁹

Active investment in EV's and EV batteries right now is >\$515B by 2030¹

1. Paul Lienert and Tina Bellon. "Exclusive: Global carmakers now target \$515 billion for EVs, Batteries." Reuters November 2021. <https://www.reuters.com/business/autos-transportation/exclusive-global-carmakers-now-target-515-billion-evs-batteries-2021-11-10/>, accessed 10 December 2021



Federal Initiatives



Federal Consortium for Advanced Batteries (FCAB) Inception



- February 2020: DOE and DoD brought together ~30 people from federal agencies that fund research in batteries. Group was interested in re-convening and formalizing.
- September 2020: Charter was signed among 4 agencies to formalize the group. Leadership team from the agencies convened monthly to set and execute the strategy for the group.
- November 2020: Developed quarterly cadence for meetings among interested agencies for information exchange. Membership increases.
- February 2021: E.O. 14017 required report on critical minerals and batteries to be sent to the White House in 100 days. Communication channels established through FCAB supported lead author agencies.



Federal Consortium for Advanced Batteries (FCAB) & National Blueprint



National Blueprint for Lithium Batteries 2021-2030



Strategy signed June 2021



FCAB Charter signed Sept 2020

GOALS TO ACHIEVE OUR VISION



1 Secure access to raw and refined materials and discover alternates for critical minerals for commercial and defense applications



2 Support the growth of a U.S. materials-processing base able to meet domestic battery manufacturing demand



3 Stimulate the U.S. electrode, cell, and pack manufacturing sectors



4 Enable U.S. end-of-life reuse and critical materials recycling at scale and a full competitive value chain in the U.S.



5 Maintain and advance U.S. battery technology leadership by strongly supporting scientific R&D, STEM education, and workforce development



Bipartisan Infrastructure Law (BIL) FY22-FY26 funding appropriated Nov 2021

Office	BIL Section	Funds
VTO	SEC. 40207. Battery Processing and Manufacturing	\$6,135M
VTO	SEC. 40208. Electric Drive Vehicle Battery Recycling and Second-Life Applications Program	\$ 200M
AMO	SEC. 40209. Advanced Energy Manufacturing and Recycling Grant Program	\$ 750M
OCED	SEC. 41201. Office of Clean Energy Demonstrations (Energy Storage Demonstration Pilot Grant Program, Section 41001)	\$ 355M
FECM	SEC. 40205. Rare Earth Elements Demonstration Facility	\$ 140M
FECM	SEC. 41003. Mineral security projects	\$ 600M
LPO	SEC. 40401. Department of Energy Loan Programs	\$ 0M



DOE Awards \$2.8B October, 2022



FCAB Organization & Framework



Charter signed September 2020
for 5 years

Executive Steering Group: Charter Agencies Meets 2 – 3x/yr.

Leadership Group: Chair, Charter Agencies, Task Group Leads Meets monthly

Li-Bridge Public-Private Alliance

Other Federal Groups
(i.e. CMWG, IAPG, DPA, ABMI)

<u>General Members</u>		<u>Active Task Groups</u>		
		<u>Year 1 (FY21) Start</u>	<u>Year 2 (FY22) Add</u>	<u>Year 3 (FY23) Add</u>
<ul style="list-style-type: none"> • DOC • DOD • DOE • DOI • DOS • DOT • EOP • EPA 	<ul style="list-style-type: none"> • EXIM Bank • ITC • NASA • ODNI / FBI • OGA • USAID • USTDA • US Treasury 	<ol style="list-style-type: none"> 1. <i>Federal Domestic Strategy for Batteries (completed)</i> 2. <i>Advanced Battery Tech Transfer & Standards (#9)</i> 3. <i>Intellectual Property and Knowledge Protection (#9)</i> 4. Domestic and Global Markets 5. Enabling Federal Policies & Authorities 	<ol style="list-style-type: none"> 6. Minerals, Refining & Materials 7. Cell & Pack 8. Reuse & Recycling 9. Innovation, IP, & Tech Transfer 	<ol style="list-style-type: none"> 10. Workforce

Meets quarterly

16 Agencies
over 56 Offices


Meets as needed



LiBridge Public Private Alliance



Argonne NATIONAL LABORATORY RESEARCH



Li-Bridge

Bridging the U.S. Lithium Battery Supply Chain Gap

As widespread electrification drives demand for lithium-based batteries to power electric vehicles and stationary storage, the domestic battery supply chain must expand.

Li-Bridge is a public-private alliance committed to accelerating the development of a robust and secure domestic supply chain for lithium-based batteries.

Argonne leads coordination of Li-Bridge by serving as the facilitator between private industry and the Federal Consortium for Advanced Batteries, which released a [National Blueprint for Lithium Batteries, 2021 – 2030](#). The Blueprint aims to put the U.S. on a path to long-term competitiveness in the global battery value chain.

Convenor Organizations

Argonne will work with DOE national labs across the country to meet national Blueprint goals. In addition, private industry participation will be facilitated through an alliance with three U.S.-based convenor organizations:

- [NAATBatt International](#)
- [New York Battery and Energy Storage Technology Consortium \(NY-BEST\)](#)
- [New Energy Nexus](#)

Argonne NATIONAL LABORATORY RESEARCH WORK WITH US COMMUNITY ABOUT US


PRESS RELEASE | ARGONNE NATIONAL LABORATORY

Li-Bridge outlines steps for U.S. to double annual lithium battery revenues to \$33 billion and provide 100,000 jobs by 2030

FEBRUARY 15, 2023

A public-private alliance, convened by the U.S. Department of Energy and managed by Argonne National Laboratory, released an action plan to accelerate the creation of a robust domestic manufacturing base and supply chain for lithium-based batteries.

- News
- Media Contacts
- Experts Guide
- Press Releases
- Feature Stories



LI-BRIDGE

Building a Robust and Resilient U.S. Lithium Battery Supply Chain

February 2023



Executive Order 14017 on America's Supply Chains



February 2021



FEBRUARY 24, 2021

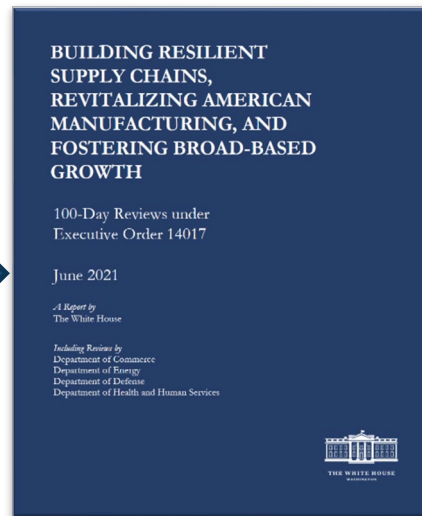
Executive Order on America's Supply Chains

BRIEFING ROOM | PRESIDENTIAL ACTIONS

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. Policy. The United States needs resilient, diverse, and secure supply chains to ensure our economic prosperity and national security. Pandemics and other biological threats, cyber-attacks, climate shocks and extreme weather events, terrorist attacks, geopolitical and economic competition, and other conditions can reduce critical manufacturing capacity and the availability and integrity of critical goods, products, and services. Resilient American supply chains will revitalize and rebuild domestic manufacturing capacity, maintain America's competitive edge in research and development, and create

Interagency 100 Day Report: June 2021



BUILDING RESILIENT SUPPLY CHAINS, REVITALIZING AMERICAN MANUFACTURING, AND FOSTERING BROAD-BASED GROWTH

100-Day Reviews under Executive Order 14017

June 2021

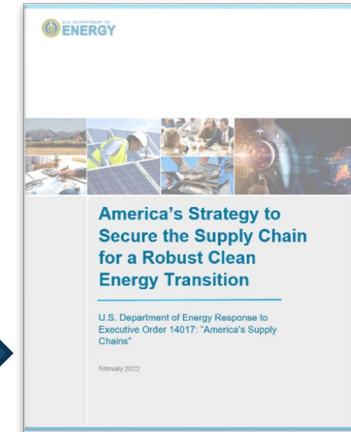
A Report by The White House

Including Reviews by Department of Commerce, Department of Energy, Department of Defense, Department of Health and Human Services

THE WHITE HOUSE



DOE One Year Report: February 2022

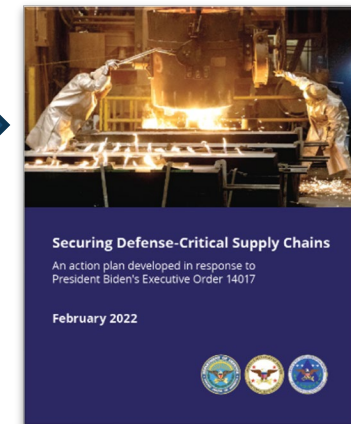


ENERGY

America's Strategy to Secure the Supply Chain for a Robust Clean Energy Transition

U.S. Department of Energy Response to Executive Order 14017: "America's Supply Chains"


February 2022



Securing Defense-Critical Supply Chains

An action plan developed in response to President Biden's Executive Order 14017

February 2022



DoD One Year Report: February 2022



Defense Initiatives



National Defense Strategy Highlights

Released 27 October 2022

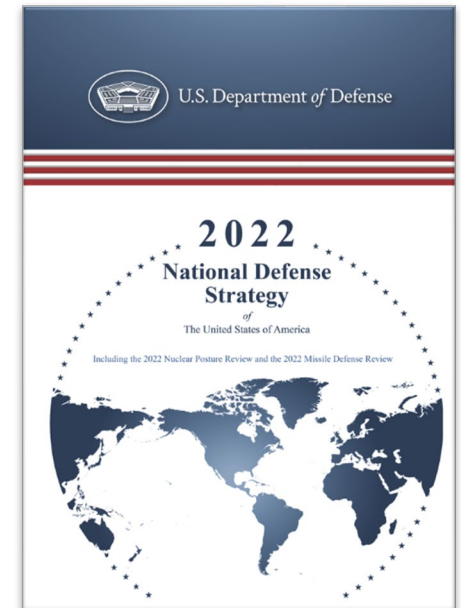


Industrial Base Security

- “Our work will prioritize closer coordination with U.S. interagency, state, local, tribal, and territorial partners, as well as with the private sector, **starting with the defense industrial base**”
- “We will design transition pathways to...and partner to **equip the defense industrial base** to support more relevant modernization efforts.”
- “The Department will **strengthen our defense industrial base...**”
- “We will prioritize joint effortsto **fortify the defense industrial base.**”

Battery Enabled Weapon Systems in the National Defense Strategy

- **Space**
- Long-range strike
- Hypersonics
- Autonomous systems
- Directed Energy
- Clean energy technology
- Renewable energy generation and storage





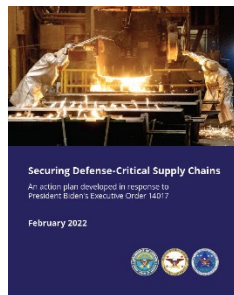
Department of Defense Strategic Objectives



Securing Defense-Critical Supply Chains: An action plan developed in response to President Biden's Executive Order 14017 February 2022

		China's Supply Chain Dominance	Custom Design Standards	Acquisition Policy	Supply Chain Data	Infrastructure	Organization & Structure
Internal	Rec B1.1: Develop a defense-specific lithium battery strategy	✓	✓	✓	✓	✓	✓
	Rec B1.2: Develop a prioritized plan to resolve battery infrastructure and analytic gaps				✓	✓	✓
	Rec B1.3: Use DoD investment authorities to leverage commercial investments	✓					
Interagency	Rec B2.1: Work with the DOE and interagency partners on integrated investment plans				✓		
	Rec B2.2: Coordinate recycling initiatives with DOE	✓					
International	Rec B3.1: Enhance interoperability and supply chain coordination	✓	✓				
Industry	Rec B4.1: Standardize and aggregate battery demand		✓			✓	

- ✓ Complete
- ▲ Actively being worked
- ▲ Planning underway



DoD Battery Strategic Objectives

1. Provide DoD program offices with safe, effective, affordable, and standard energy storage options
2. Ensure access to battery systems when the supply chain is threatened
3. Reduce the total time required to develop, certify, and field safe advanced energy storage-enabled systems
4. Reduce the logistics burden associated with fielding and sustaining advanced batteries to the warfighter
5. Support the Department's climate objectives to achieve enduring readiness

DoD Battery Strategy Signed February 2023



Recent Industry Engagements, Lessons, and Outcomes



- 1. Demand** - Without a well communicated demand signal (3, 5, 10 years) industry cannot establish key supply relationships or make large internal investments
 - **DoD Battery Demand Signal briefing is planned in June**
- 2. Acquisition Policy** - DoD's focus on cost in acquisition has driven DoD battery companies to seek lowest-cost higher risk solutions
 - **OSD is evaluating standardization and policy changes in the FAR and DFAR to strengthen supply chain security**
- 3. Domestic Ecosystem** - Industry lacks domestic choices for battery components and cells (Anodes, cathodes, foils, separators, tab leads, BMS systems, pouch material, and electrolyte)
 - **Federal and industry investments in this area is rapidly changing this picture in North America (BIL/IRA/DPA Title III)**
- 4. Workforce** - Industry is concerned about sufficient workforce given the projected exponential growth in domestic production
 - **Workforce development initiatives/investments are beginning through multiple avenues FCAB / LiBridge / DPA / others**



Battery Strategies and Defense Innovation Unit Solicitations



FCAB

EXECUTIVE SUMMARY NATIONAL STRATEGY FOR LITHIUM 2021-2030

Securing Defense- Lithium
An action plan developed President Biden's Executive Order
February 2022

DEPARTMENT OF DEFENSE LITHIUM BATTERY STRATEGY 2023-2030
Under Secretary of Defense for Acquisition & Sustainment
February 2023

DISTRIBUTION C: Distribution authorized to U.S. Government and four contractors. Administration (11/17) Other requests for this document shall be referred to OSD/IO Industrial Base Policy. Assurances



DEFENSE INNOVATION UNIT

NEWS | 12 FEBRUARY 2023

Department of Defense to Prototype Commercial Batteries To Electrify Future Military Platforms

DEFENSE INNOVATION UNIT

WORK WITH US - COMMERCIAL COMPANIES - SUBMIT SOLUTION

Family of Advanced Standard Batteries (FAStBat)

Responses Due By: 2023-02-20 23:59:00 US/Lastest Time
[View CIO Procedure](#)

Project Description

Problem Statement:
As the need for reliable energy storage technologies grows, the Department of Defense (DoD) faces complex supply chain challenges, like resource dependency concerns, variable procurement priorities, and high costs that contribute to lifecycle management challenges for DoD batteries. Establishing access to reliable and robust sources of rechargeable batteries and supporting the growth of domestic battery manufacturing capacity is of critical importance to the defense industrial base.

Desired Solution Attributes:
The DoD seeks high capacity, commercially relevant, and rechargeable battery cells that meet the performance needs of a variety of military battery packs. Solutions should allocate programmatic complexity by standardizing battery packs for use in systems and platforms across the Services, by coordinating this and other battery effort the DoD will strengthen the battery industrial base through aggregation and standardization of demand and support the growth of domestic manufacturing capacity for rechargeable battery cells and packs.

The selected vendor(s) will partner with the DoD to develop rechargeable cells, battery packs, or both to enable systems on the following platforms: the discussed (but lighter, ground vehicle, solution, and more applications). The target will vary performance (MIL-PRF) and developmental form factors for each solution include (but are not limited to):

GOAL 3 Stimulate the U.S. electrode, cell, and pack manufacturing sectors

NEAR-TERM OBJECTIVES (2025)

2. Dedicate resources to expedite the scale-up and commercialization of novel technologies and manufacturing techniques
3. Develop form-fit-function battery standards for defense, EV, and grid applications

LONG-TERM OBJECTIVES (2030)

1. Meet critical defense battery demand with multiple-source domestic suppliers



DoD Battery Landscape



The coming 5 years will be characterized by:

- DoD investments in standardization, facilities, and analytics
- Efforts to improve acquisition and standardization policy
- Improvements to DoD lithium battery safety processes
- Increased interagency coordination
- Increased allied interoperability and battery standardization initiatives.
- Increased industry engagement and coordination
- Increased adoption of standard formats by DoD Programs of Record
- Increased focus on battery supply chain security



FEDERAL REGISTER
The Daily Journal of the United States Government





Summary

DoD is working closely with Interagency partners (Energy, Commerce, State, and others) to advance battery supply chain security initiatives and maximize use of government authorities, investments, and policy efforts.

Efforts to coordinate with allies and partners and with industry are underway across the federal government and through LiBridge

Battery security is both an economic and national security issue

