



DoD Efforts to Secure the Battery Defense Industrial Base: Conversation on Critical Minerals



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OSD Policy: De-risking supply chains to enhance deterrence while building climate resilience

Problems:

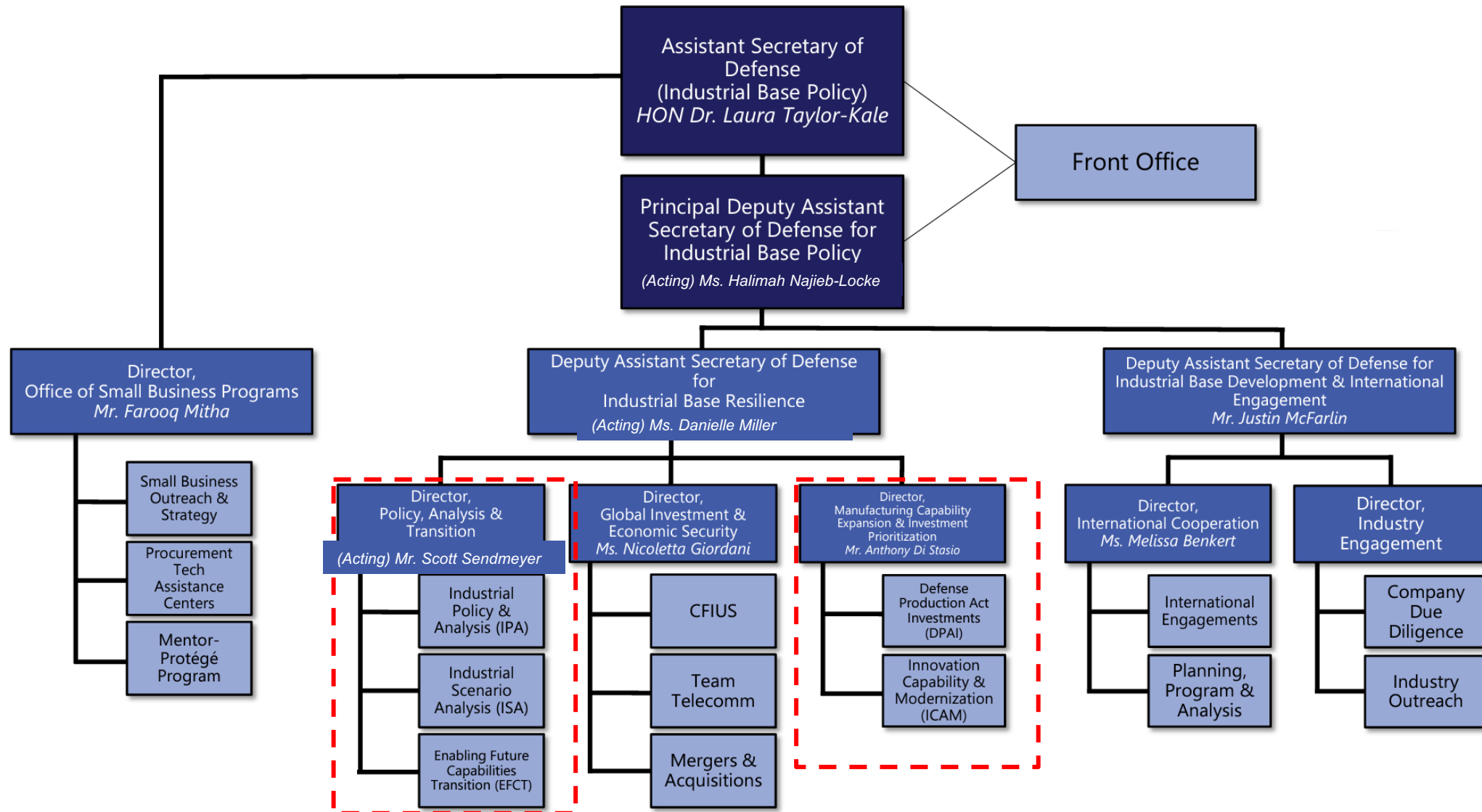
- New operational challenges from switch to traditional to clean energy sources and technologies
- Supply fragility for U.S. DIB resulting in potential risks to military capability
- Vulnerability to adversarial supply chains
- Lack of surge capacity / stockpile
- Weakness in Ally and partner DIBs

Objectives:

- Advance U.S. climate and energy security priorities
- De-risk U.S. supply chains
- Increase/enhance supply
- Augment U.S. & Ally/partner production
- Increase deterrence and strengthen resilience by demonstrating collective action and investment



OASD(Industrial Base Policy) Organization Chart





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



National Defense Strategy Highlights

Released 27 October 2022

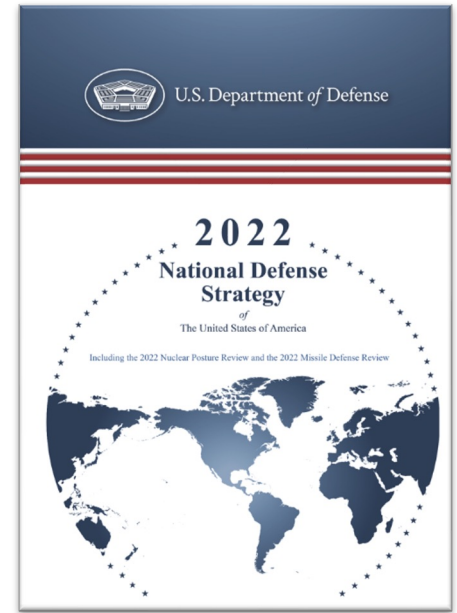


Industrial Base Security

- “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





Government & Industry Activity

Executive Order on America's Supply Chains

FEBRUARY 24, 2021

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



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



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

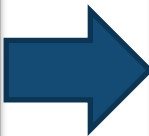
February 2022

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.



Li-BRIDGE

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

February 2023



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.



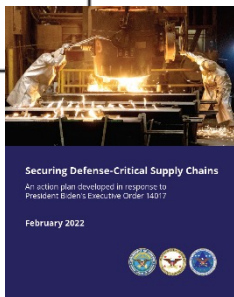
Department of Defense Strategic Objectives



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



Executive Order 14017: America's Supply Chains








BACKGROUND

President Biden signed **E.O. 14017, America's Supply Chains**, in February 2021. This order directed multiple agencies, including the DoD, to review critical supply chains.

"The United States needs resilient, diverse, and secure supply chains to ensure our economic prosperity and national security ... Resilient American supply chains will revitalize and rebuild domestic manufacturing capacity, maintain America's competitive edge in research and development, and create well-paying jobs."

IBP FOCUS SECTORS

-  Strategic and Critical Materials
-  Kinetic Capabilities
-  Energy Storage and Batteries
-  Castings and Forgings (C&F)
-  Microelectronics

STRATEGIC ENABLERS

Cyber Posture – Small Business
Workforce – Manufacturing



Defense Essential Elements

1 IA 1A											13 IIIA 3A	14 IVA 4A	15 VA 5A	16 VIA 6A	17 VIIA 7A	18 VIIIA 8A	
1 H Hydrogen (1.00784;1.00811)															2 He Helium 4.002602(2)		
3 Li Lithium (6.938;6.997)	4 Be Beryllium 9.012;9.31(5)											5 B Boron (10.806;10.821)	6 C Carbon (12.0096;12.0116)	7 N Nitrogen (14.00643;14.00728)	8 O Oxygen (15.99903;15.99977)	9 F Fluorine (18.998403163(6))	10 Ne Neon 20.1797(6)
11 Na Sodium 22.98976928(2)	12 Mg Magnesium (24.304;24.307)	3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8 VIII 8	9 VIII 8	10 VIII 8	11 IB 1B	12 IIB 2B	13 Al Aluminum 26.9815386(8)	14 Si Silicon (28.085;28.086)	15 P Phosphorus 30.973761998(5)	16 S Sulfur (32.059;32.078)	17 Cl Chlorine (35.446;35.457)	18 Ar Argon 39.948(1)
19 K Potassium 39.0983(1)	20 Ca Calcium 40.078(4)	21 Sc Scandium 44.955908(5)	22 Ti Titanium 47.867(1)	23 V Vanadium 50.9415(1)	24 Cr Chromium 51.9961(6)	25 Mn Manganese 54.938045(5)	26 Fe Iron 55.845(2)	27 Co Cobalt 58.933194(4)	28 Ni Nickel 58.6934(4)	29 Cu Copper 63.546(3)	30 Zn Zinc 65.38(2)	31 Ga Gallium 69.723(1)	32 Ge Germanium 72.630(8)	33 As Arsenic 74.921595(6)	34 Se Selenium 78.971(8)	35 Br Bromine (79.901;79.907)	36 Kr Krypton 83.798(2)
37 Rb Rubidium 85.4678(3)	38 Sr Strontium 87.62(1)	39 Y Yttrium 88.90584(2)	40 Zr Zirconium 91.224(2)	41 Nb Niobium 92.90638(2)	42 Mo Molybdenum 95.95(1)	43 Tc Technetium <98>	44 Ru Ruthenium 101.07(2)	45 Rh Rhodium 102.90550(2)	46 Pd Palladium 106.42(1)	47 Ag Silver 107.8682(2)	48 Cd Cadmium 112.414(4)	49 In Indium 114.818(1)	50 Sn Tin 118.710(7)	51 Sb Antimony 121.760(1)	52 Te Tellurium 127.60(3)	53 I Iodine 126.90447(3)	54 Xe Xenon 131.293(6)
55 Cs Cesium 132.90545196(6)	56 Ba Barium 137.327(7)	57-71 Lanthanide Series	72 Hf Hafnium 178.49(2)	73 Ta Tantalum 180.94788(2)	74 W Tungsten 183.84(1)	75 Re Rhenium 186.207(1)	76 Os Osmium 190.23(3)	77 Ir Iridium 192.22(2)	78 Pt Platinum 195.084(9)	79 Au Gold 196.966569(5)	80 Hg Mercury 200.592(3)	81 Tl Thallium (204.382;204.385)	82 Pb Lead 207.2(1)	83 Bi Bismuth 208.98040(1)	84 Po Polonium <209>	85 At Astatine <210>	86 Rn Radon <222>
87 Fr Francium <223>	88 Ra Radium <226>	89-103 Actinide Series	104 Rf Rutherfordium <261>	105 Db Dubnium <268>	106 Sg Seaborgium <271>	107 Bh Bohrium <272>	108 Hs Hassium <270>	109 Mt Meitnerium <276>	110 Ds Darmstadtium <281>	111 Rg Roentgenium <289>	112 Cn Copernicium <285>	113 Uut Ununtrium unknown	114 Fl Flerovium <289>	115 Uup Ununpentium unknown	116 Lv Livermorium <293>	117 Uus Ununseptium unknown	118 Uuo Ununoctium unknown
		57 La Lanthanum 138.90547(7)	58 Ce Cerium 140.118(1)	59 Pr Praseodymium 140.90766(2)	60 Nd Neodymium 144.242(3)	61 Pm Promethium <145>	62 Sm Samarium 150.36(2)	63 Eu Europium 151.964(1)	64 Gd Gadolinium 157.25(3)	65 Tb Terbium 158.92535(2)	66 Dy Dysprosium 162.500(1)	67 Ho Holmium 164.93033(2)	68 Er Erbium 167.259(3)	69 Tm Thulium 168.93422(2)	70 Yb Ytterbium 173.054(5)	71 Lu Lutetium 174.9668(1)	
		89 Ac Actinium <227>	90 Th Thorium 232.0377(4)	91 Pa Protactinium 231.03688(2)	92 U Uranium 238.02891(3)	93 Np Neptunium <237>	94 Pu Plutonium <244>	95 Am Americium <243>	96 Cm Curium <247>	97 Bk Berkelium <247>	98 Cf Californium <251>	99 Es Einsteinium <252>	100 Fm Fermium <257>	101 Md Mendelevium <258>	102 No Nobelium <259>	103 Lr Lawrencium <262>	

■ Batteries / Energy Storage
 ■ Microelectronics
 ■ Kinetic Capabilities
 ■ Castings and Forgings
 ■ Rare Earths



Importance of Strategic Materials for National Security



S&CMs are critical to U.S. national security due to their importance for a wide range of applications throughout the defense industrial base and economy.

- Access to strategic materials is critical to the modern U.S. advanced economy because strategic materials are necessary for many industries including electronics, energy storage, vehicles, infrastructure, computing, and more.
- Nearly all DoD systems contain strategic materials which enable enhanced performance.
 - Example: Rare Earth Elements (REEs) are one group of strategic materials.
 - While REEs are necessary for DOD capabilities, the DOD has limited influence on REE markets due to limited demand share.

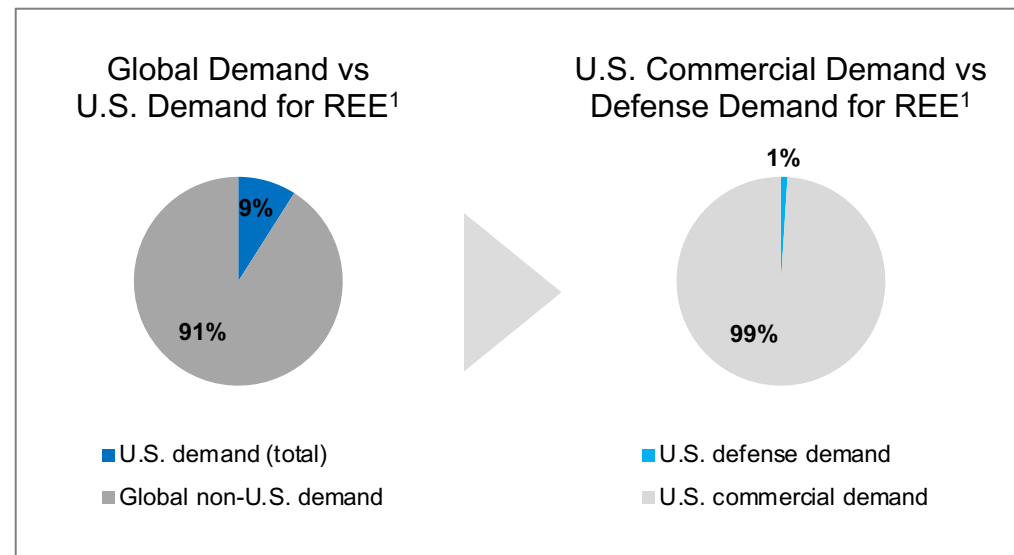
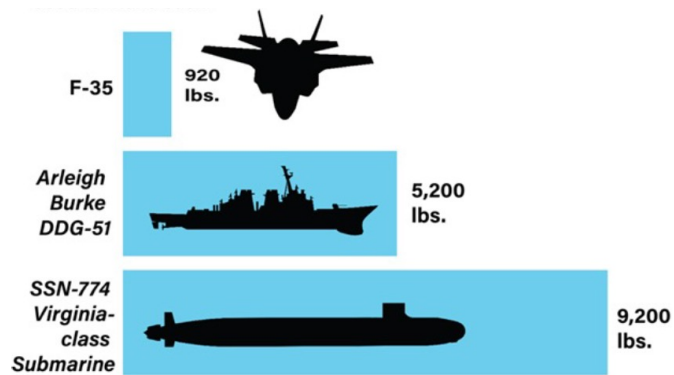


Image data source: CRS "Rare Earth Elements in National Defense: Background, Oversight Issues, and Options for Congress" December 2013

1. Source: GAO Report. "Rare Earth Materials." February 2016.



Beyond DOD Authorities: Federal and International Stakeholders

While the DOD has impactful authorities, coordination across the U.S. government and with close allies is needed to comprehensively address S&CM vulnerabilities.

U.S. Government Stakeholders in Strategic Materials Policy

President	Congress	Interagency	Non-Federal Stakeholders
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Tools to Secure Strategic Materials Supply Chains

Policy	Investment	Stockpiling	International Partnerships
Shape industry, domestic, and international dynamics	Expand production, research, and workforce	Reduce U.S. vulnerability to near-term supply disruptions	Support suppliers in partner nations and promote best practices
<u>Examples</u> <ul style="list-style-type: none"> DOD acquisition policies Trade policies Tax incentives Permitting 	<u>Examples</u> <ul style="list-style-type: none"> DPA Title III IBAS DOE Loans CHIPS Act EXIM, DFC 	<u>Examples</u> <ul style="list-style-type: none"> National Defense Stockpile Memorandum of Agreement on Joint Stockpiling 	<u>Examples</u> <ul style="list-style-type: none"> Minerals Security Partnership International Energy Agency Bilateral efforts