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After review of each submission, we recognized four participants with the Hoover Institution Summer Policy Boot Camp Director's Award based on their outstanding work. The winning proposals demonstrate particular creativity in addressing complex policy issues.

We are proud to include these proposals written by the following winners of the 2025 Hoover Institution Summer Policy Boot Camp Director's Award.

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- Michael Cartier, *U.S. Naval Postgraduate School*
- Alon Mannor, *Reichman University*
- Peter Vartanian, *GéoPoly Global*

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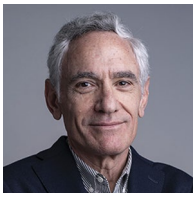

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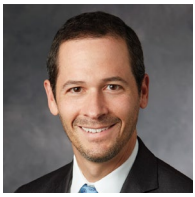

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Policy Recommendations to Bolster the United States Defense Industrial Base

Megan Cameron, Princeton University

The Issue

The United States Defense Industrial Base (DIB) is not prepared to support our nation's modern warfighting needs. The COVID-19 crisis and the Russian invasion of Ukraine highlighted critical weaknesses in our industrial capabilities, such as our dependence on other nations for crucial materials and products, as well as our stockpiles of weapons systems and munitions that are depleting far faster than they can be replenished.[1] With the United States now providing military aid on two separate fronts to both Ukraine and Israel, the DIB is stretched too thin to sufficiently mobilize in the case of a three-front war if armed conflict were to break out in Asia between China and Taiwan.

The first key obstacle that stands in the way of DIB modernization and development is budget instability. Congress's use of continuing resolutions for fifteen of the last sixteen years has created consistent uncertainty surrounding annual defense budget appropriations, which wastes time, slows the implementation of new initiatives, and strains the relationship between the Department of Defense (DOD) and its partners.[2] A second obstacle, convoluted and outdated regulations, also makes partnering with the DIB costly and inaccessible. This is a significant problem because many of the DOD's current initiatives to strengthen the DIB rely on the department's ability to foster and maintain these relationships. Finally, our reliance on interdependent global supply chains increases the risk of adversarial influence or interference in the form of a disruption or outright attack.

Current DOD industrial strategies have successfully identified clear, long-term priorities to guide policy development and investment in the DIB, particularly through the inaugural National Defense Industrial Strategy.[3] However, they focus primarily on the concept of generational change,[4] failing to include enough small-scale, actionable, and measurable solutions that can be accomplished immediately, making this grand vision for the future difficult to attain.[5] The health of the DIB plays a direct role in determining whether our military and the militaries of our allies can sustain a competitive advantage over our adversaries. As the focus of contemporary US defense strategy continues to shift toward great-power competition with China, it is crucial for the DOD to reevaluate the structure of the DIB with resiliency and adaptability in mind.[6] Time is of the essence, and it is imperative for the US to take aggressive action before entering another conflict.

Background

From the 2010s to the 2020s, the strategic focus of the federal government began to shift from counterterrorism to great-power competition, bringing greater attention to the weakened state of the DIB. In 2017, President Donald Trump signed Executive Order 13806, which called for an increased investment of attention and

resources into the DIB. It also identified significant harmful changes that have led the US manufacturing sector to become "fragile," raising concerns about the health of the DIB and its "ability to compete in the global marketplace."[7] Some of these changes include increasingly "unreliable cash flow to small businesses" being "driven by a range of issues from appropriations delays to commonly used contracting practices," as well as "regulations and business practices" that are "difficult to understand, costly to implement, and…often create barriers to doing business with the DOD."[8]

Additionally, signed in February 2021, President Biden's Executive Order 14017 "established a first-of-its-kind Supply Chain Disruptions Task Force" aimed at addressing "the challenges arising from a pandemic-affected economic recovery."[9] The Task Force worked "to monitor and address near-term supply chain challenges… and prepare response and mitigation efforts" for "potential supply chain constraints and bottlenecks."[10] The Executive Order also called for "a comprehensive review of supply chains in critical sectors, including the defense industrial base,"[11] which led to the publishing of a *100-Day Supply Chain Review Report* in June 2021.

These Executive Orders helped guide the development of the DOD's first-ever National Defense Industrial Strategy (NDIS), which was released in 2023 under President Biden and served as a culmination of the previous six years of Pentagon efforts to address DIB vulnerabilities. The document identifies four long-term priorities or areas for achievement to better coordinate a whole-of-government approach to DIB modernization, which include Resilient Supply Chains, Workforce Readiness, Flexible Acquisition, and Economic Deterrence.[12] It also details the risks posed to the US if those priorities are not fulfilled.

Available Course of Action

Based on the challenges outlined above, the recommended course of action for the federal government is to streamline and accelerate NDIS implementation to make partnering with the DOD more accessible for our allies and DIB companies. This would allow for incremental progress to be made toward the DOD's ambitious goals of maximizing US capabilities and readiness for a potential three-front conflict by increasing the DIB's surge capacity in the long term. Additionally, by opening the door for new DOD partnerships and strengthening current ones, the recommended course of action would allow for the successful implementation of changes that would help the US to reduce its reliance on adversarial nations for crucial products and materials, as well as increase visibility of critical supply chains.

A key component of this course of action would be for the president and Congress to fully utilize and expand the authorities granted by Title III of the Defense Production Act (DPA) to increase supply chain resilience, foster American innovation, and avoid further "appropriations-related delays."[13] Title III allows the president to provide "loan guarantees, loans, purchases, and purchase commitments, grants, and other financial assistance directly to private businesses."[14]

With these powers, the DPA possesses contemporary applications and several relevant avenues for change, as demonstrated by the significant increase in the "number and variety of DPA actions" used in 2020 after both President Trump and President Biden invoked its powers to respond to the COVID-19 crisis.[15]

In order to support this full execution of DPA authorities, Dr. Laura Taylor-Kale, the former assistant secretary for industrial base policy, outlined specific areas for reform within the act at a House Financial Services Committee hearing in May 2024. One example of the proposed reform is increasing the period of availability for DPA funds from a limit of five years to nonexpiring so the DOD can provide more robust financial assistance to DIB companies. According to Dr. Taylor-Kale, "purchase commitments, in particular, would help spur advanced material procurement and make DOD demand more predictable" for these partners.[16] Promptly recognizing this valuable potential in the DPA is particularly important as all but four of its provisions are set to expire on September 30, 2025, if congressional action is not soon taken to reauthorize it.[17]

Another key component of this course of action is for Congress to renew its commitment to return to regular order and pass on-time annual defense appropriations bills. As highlighted previously, budget instability is one of the biggest obstacles that prevents full cooperation between DIB companies and the DOD due to Congress's repeated use of continuing resolutions over the last sixteen years, including the "full-year" continuing resolution that was enacted on March 14, 2025, through September 30 to avoid a government shutdown.[18] A continuing resolution is needed any time Congress and the president do not reach an agreement on spending levels, so their use has become very common with the increasing partisanship and divisiveness that has been plaguing our country. Since fiscal year 1998, 138 continuing resolutions have been enacted by policymakers, which comes to an average of around five per year.[19]

Third, the DOD should adopt a tiered manufacturing system to establish a spectrum of procurement preferences that would help encourage coproduction among trusted allies. This system could be organized into three categories. The first, Highest Security, would prioritize US production of the most sensitive defense products like critical minerals and semiconductors through onshoring. The second, Moderate Security, would encourage competition for contracts among trusted allies to increase arrangements with partners in crucial areas like munitions production and shipbuilding that do not necessarily require highest-security-level protections. By implementing this system and easing restrictions, such as those outlined in International Traffic in Arms Regulations that control the manufacture, sale, and distribution of defense- and space-related products and services, would reduce confusion, delays, and unpredictability for foreign allies during the US technology transfer process and the export of other defense materials.

Finally, Congress and the DOD should cooperate to expand the use of multiyear procurement contracts. DIB companies and partners are generally unwilling to take financial risks without contracts because of the necessary capital investment and personnel requirements. Producers benefit from steady and predictable orders that are enabled by contracts, especially over the long term, so expanding the use of multiyear procurement would assist in incentivizing participation in DIB expansion efforts. According to the NDIS, this expansion must take into account the shifting nature of today's "evolving threat environment," which causes "priorities to shift." Traditional contract policies that "involve funding adjustments, competitive procurement principles, compliance, reporting, and oversight" can fortunately "be applied to mitigate risks" while ensuring that they are adapted "to meet speed and agility priorities." This adaptation can be modeled after the pathway for software acquisition, which uses "modern development practices" and "existing contracting authorities" to "execute rapid and iterative delivery of software capabilities."[20]

One of the primary weaknesses of the recommended course of action is the heavy short-term cost, which would easily demand a financial investment from the DOD with a magnitude in the billions of dollars, not millions.[21] The DOD would require more than a $38 billion increase to the federal defense budget for the 2025 fiscal year alone, followed by years of consistent, sustained investments of similar or greater magnitude.[22] This increase could potentially create a higher risk of financial waste, abuse, and price gouging at the hands of defense contractors. While instances of these abuses are reprehensible and deserving of full punishment under the law, cases of major fraud and price gouging are the exceptions, and cannot be accepted as an excuse for failing to invest in strengthening and modernizing the DIB.[23]

An alternative to this course of action would be to adopt a strategy of retrenchment similar to President Trump's current "America First" foreign policy framework, which has called for drastic reductions in US diplomatic and military commitments abroad. A potential strength associated with this strategy is the temporary alleviation of pressure on the DIB, which could reduce some of the immediate need for a large increase in the defense budget and allow for reductions in defense spending that would help to save taxpayer money and better mitigate the increased risk of fraud and abuse. Across both of his terms, President Trump has issued a series of Executive Orders that demonstrate his own commitment to modernizing the DIB in this way,[24] but the US "cannot address its supply chain vulnerabilities alone," and it is virtually impossible for the US to attempt to immediately "manufacture all needed products at home" without the assistance of allies.[25] This is why fully retreating from the world stage is not a viable course of action.

As the former Chairman of the Joint Chiefs of Staff Retired US General Mark A. Milley stated during a DOD appropriations Senate hearing in May 2023, "preventing great power war through readiness and deterrence is very expensive, but not as expensive as fighting a war and the only thing more expensive than fighting a war is losing a war."[26]

Actionable Recommendations

1. President and Congress: Reauthorize the DPA to fully utilize and expand the authorities granted by Title III through statute amendments and by increasing the period of availability for DPA funds.
2. Congress: Renew the commitment to return to regular order and pass on-time annual defense appropriations bills, avoiding the use of continuing resolutions
3. DOD: Adopt a tiered manufacturing system to establish a spectrum of procurement preferences that will combine onshoring for highest-security items, friend-shoring for medium-security items, and offshoring for lower-security items.
4. Congress and DOD: Expand the use of multiyear procurement contracts for the production of additional types of munitions to replenish depleting stockpiles

Endnotes

1. Department of Defense (DOD), *2023 National Defense Industrial Strategy*, October 2022, 8.
2. National Defense Industrial Association, *Vital Signs 2025: The Health and Readiness of the Defense Industrial Base*, February 2025, 25.
3. DOD, *2023 National Defense Industrial Strategy*, 10.
4. DOD, *2023 National Defense Industrial Strategy*, 9.
5. Elaine McCusker, "Pentagon's Industrial Strategy Describes the Problem, Not the Solution," *Defense News*, January 24, 2024.
6. Luke A. Nicastro, "The US Defense Industrial Base: Background and Issues for Congress," Congressional Research Service, 2024, 5.
7. Interagency Task Force in Fulfillment of Executive Order 13806, *Assessing and Strengthening the Manufacturing and Defense Industrial Base*, September 2018, 48.
8. DOD, *2023 National Defense Industrial Strategy*, 15.
9. The White House, "The Biden-Harris Plan to Revitalize American Manufacturing and Secure Critical Supply Chains in 2022," press release, February 2022.
10. The White House, "Readout of Supply Chain Disruptions Task Force Meeting," press release, March 2024.
11. DOD, *Securing Defense-Critical Supply Chains: An Action Plan Developed in Response to President Biden's Executive Order* 14017, February 2022, 2.
12. DOD, *2023 National Defense Industrial Strategy*, 10.
13. House Armed Services Committee, *Report of the Defense Critical Supply Chain Task Force*, July 22, 2024, 19.
14. Nicastro, "The US Defense Industrial Base," 21.
15. Nicastro, "The US Defense Industrial Base," 22.
16. Laura Taylor-Kale, "The Reauthorization of the Defense Production Act: DOD's Perspective," opening statement for House Financial Services Committee hearing: Subcommittee on National Security, Illicit Finance, and International Financial Institutions, May 8, 2024, 5.

17. Cameron M. Keys et al., "Reauthorizing the Defense Production Act," Congressional Research Service, June 25, 2025, 1.
18. Paige Mellerio, "Congress Passes 'Full-Year' Continuing Resolution Through September 30, 2025," National Association of Counties, March 18, 2025.
19. Peter G. Peterson Foundation, "Continuing Resolutions Are Stopgap Measures—But Now We Average Five a Year," March 25, 2025.
20. DOD, *2023 National Defense Industrial Strategy*, 38.
21. National Defense Industrial Association, *Vital Signs 2024: The Health and Readiness of the Defense Industrial Base*, April 2024, 51
22. John M. Donnelly, "Defense Spending Bills See Another Surge in Unrequested Items: Funding Sought for Unrequested Items at $38 Billion in Fiscal 2025," *Roll Call*, September 2024.
23. Seth G. Jones and Alexander Palmer, *Rebuilding the Arsenal of Democracy: The U.S. and Chinese Defense Industrial Bases in an Era of Great Power Competition*, Center for Strategic and International Studies Security Program," March 2024, 39-40.
24. Steven P. Bucci, "Regulatory Reform Is a Great Start, but Modernizing Defense Industry Will Require More," The Heritage Foundation, August 20, 2025.
25. The White House, *Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth: 100-Day Reviews Under Executive Order 14017*, June 2021, 12.
26. National Defense Industrial Association, *Vital Signs 2024*, 9.

Bibliography

Bucci, Steven P. "Regulatory Reform Is a Great Start, but Modernizing Defense Industry Will Require More." The Heritage Foundation, August 20, 2025. https://www.heritage.org/defense/commentary/regulatory-reform-great-start-modernizing-defense-industry-will-require-more.

Department of Defense. Securing Defense-Critical Supply Chains: An Action Plan Developed in Response to President Biden's Executive Order 14017. February 2022. https://media.defense.gov/2022/Feb/24/2002944158/-1/-1/1/DOD-EO-14017-REPORT-SECURING-DEFENSE-CRITICAL-SUPPLY-CHAINS.PDF.

Department of Defense. 2023 National Defense Industrial Strategy. October 2022. https://www.businessdefense.gov/docs/ndis/2023-NDIS.pdf.

Donnelly, John M. "Defense Spending Bills See Another Surge in Unrequested Items: Funding Sought for Unrequested Items at $38 Billion in Fiscal 2025." Roll Call, September 12, 2024. https://rollcall.com/2024/09/12/defense-spending-bills-see-another-surge-in-unrequested-items/#:~:text=Funding%20sought%20for%20unrequested%20items%20at%20$38,unpublicized%20database%20analyzed%20by%20CQ%20Roll%20Call.

House Armed Services Committee. Report of the Defense Critical Supply Chain Task Force. July 22, 2024. https://www.govinfo.gov/content/pkg/GOVPUB-Y4_AR5_2-PURL-gpo158428/pdf/GOVPUB-Y4_AR5_2-PURL-gpo158428.pdf.

Interagency Task Force in Fulfillment of Executive Order 13806. Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States. September 2018. https://media.defense.gov/2018/oct/05/2002048904/-1/-1/1/assessing-and-strengthening-the-manufacturing-and%20defense-industrial-base-and-supply-chain-resiliency.pdf.

Jones, Seth G., and Alexander Palmer. Rebuilding the Arsenal of Democracy: The U.S. and Chinese Defense Industrial Bases in an Era of Great Power Competition. Center for Strategic and International Studies Security Program. March 2024. https://csis-website-prod.s3.amazonaws.com/s3fs-public/2024-03/240306_Jones_Rebuilding_Democracy_0.pdf?VersionId=KkuViuhUaxBPHB0nc_FtQ.qufXNOgxUj

Keys, Cameron M., Adam G. Levin, and Alexendra G. Neenan. "Reauthorizing the Defense Production Act." Congressional Research Service, June 25, 2025. https://www.congress.gov/crs-product/IN12484.

McCusker, Elaine. "Pentagon's Industrial Strategy Describes the Problem, Not the Solution." Defense News, January 12, 2024. https://www.defensenews.com/opinion/2024/01/12/pentagons-industrial-strategy-describes-the-problem-not-the-solution/

Mellerio, Paige. "Congress Passes 'Full-Year' Continuing Resolution Through September 20, 2025." National Association of Counties, March 18, 2025. https://www.naco.org/news/congress-passes-full-year-continuing-resolution-through-september-30-2025.

National Defense Industrial Association. Vital Signs 2024: The Health and Readiness of the Defense Industrial Base. April 2024. https://www.ndia.org/-/media/sites/ndia/policy/vital-signs/2024/2024_vital_signs_final.pdf?download=1.

National Defense Industrial Association. Vital Signs 2025: The Health and Readiness of the Defense Industrial Base. February 2025. https://www.ndia.org/-/media/sites/ndia/policy/vital-signs/2025/vitalsign_2025_final.pdf?download=1

Nicastro, Luke A. "The U.S. Defense Industrial Base: Background and Issues for Congress." Congressional Research Service, September 23, 2024. https://crsreports.congress.gov/product/pdf/R/R47751

Peter G. Peterson Foundation. "Continuing Resolutions Are Stopgap Measures—But Now We Average Five a Year." March 25, 2025. https://www.pgpf.org/article/continuing-resolutions-were-designed-to-be-stopgap-measures-but-now-we-average-five-a-year/

Taylor-Kale, Laura. "The Reauthorization of the Defense Production Act: DoD's Perspective." Opening statement for House Financial Services Committee hearing: Subcommittee on National Security, Illicit Finance, and International Financial Institutions. May 8, 2024. https://www.congress.gov/118/meeting/house/117274/witnesses/HHRG-118-BA10-Wstate-Taylor-KaleL-20240508.pdf.

The White House. Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth: 100-Day Reviews Under Executive Order 14017. June 2021. https://bidenwhitehouse.archives.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf?utm_source=sfmc%E2%80%8B&utm_medium=email%E2%80%8B&utm_campaign=20210610_Global_Manufacturing_Economic_Update_June_Members

The White House. "The Biden-Harris Plan to Revitalize American Manufacturing and Secure Critical Supply Chains in 2022." Press release, February 24, 2024. https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2022/02/24/the-biden-harris-plan-to-revitalize-american-manufacturing-and-secure-critical-supply-chains-in-2022/

The White House. "Readout of Supply Chain Disruptions Task Force Meeting." Press release, March 28, 2024. https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2024/03/28/readout-of-supply-chain-disruptions-task-force-meeting/

A Republic of Volunteers: A Modern Model for Voluntary National Service

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The health of a democratic society may be measured by the quality of functions performed by private citizens. —Alexis de Tocqueville, Democracy in America

In 1831, Alexis de Tocqueville traveled across the United States and described a society defined by citizens who freely shouldered common burdens. He depicted a restless, egalitarian nation empowered by voluntary associations and a sense of civic duty. Nearly two centuries later, the same question remains: What binds Americans together as citizens if not a common respect for democratic ideals and the willingness to serve them?

Introduction

Early twenty-first-century America is marked by civic fragmentation. In a nation of immense wealth and power, too many Americans live as strangers. Online discourse has splintered into echo chambers, while geographic and social mobility has stagnated. Rebuilding the civic fabric Tocqueville admired requires bringing Americans together in common purpose, regardless of age, race, gender, income, or religious beliefs. Mandatory service has been perennially proposed as a way to create unity through common public service. Yet inducing service by coercion undercuts the spirit such a program intends to cultivate, and is broadly unpopular, is difficult to enforce, and risks generating resentment rather than civic renewal.[1] Moreover, with approximately 3.5 million Americans reaching adulthood each year, compelling millions to serve absent a national emergency would overwhelm existing programs with unwilling participants.[2]

In contrast, the United States sustains a constellation of voluntary opportunities, including the armed forces, Peace Corps, and AmeriCorps. However, those programs are fragmented, underfunded, and too small to meet national needs. If the goal is to inspire broad participation and strengthen civic bonds, then the path forward is clear: a voluntary system with a unified framework, stronger incentives, and billets sufficient to welcome all who wish to serve. By incentivizing rather than mandating national **service**, the US can strengthen civic unity, fill critical workforce shortages, and cultivate a generation united by shared experiences.

Contemporary Challenges

America faces a civic cohesion deficit, including political polarization, declining trust, and weakening social bonds. In 1984, 49 percent of Americans agreed that "most people can be trusted," a statistic that declined to 29 percent by 2014.[3] Public trust in government plummeted from over 75 percent during the Kennedy administration to 22 percent in 2024.[4] Polarization has deepened as well, with 58 percent of Americans

holding negative views of the opposing party, up from 19 percent in 1994.[5] This lack of trust has tangible effects beyond incivility, including the election of more-radical candidates and a measurable increase in political violence.[6]

At the same time, the US struggles with persistent personnel shortages in public service. The military has experienced particularly devastating shortfalls in manning, with the Army missing its recruiting goal by 25 percent in fiscal year 2022.[7] As of 2025, the Peace Corps could fill only 45 percent of its billets.[8] Likewise, AmeriCorps' nationwide volunteer programs remain chronically underfilled.[9] One in eight K–12 teaching positions is vacant or staffed by an uncertified teacher.[10] America's open labor market is one of its greatest economic strengths, but careers in fields such as finance and law consistently outbid public service salaries, leaving educators, aid workers, and military servicemembers at a disadvantage.[11] Civic roles thus expand or contract according to private market fluctuations rather than public need.[12]

National Service as a Solution

Declining public trust and cohesion has multiple causes, including political polarization, social media fragmentation, scandals, and economic inequality. There have been a range of proposed solutions to these problems, including ranked-choice voting, digital literacy campaigns, increased transparency in government, and a plethora of proposals to deal with wealth inequality. Likewise, personnel shortages in the public sector have been linked with low compensation, a lack of prestige, and fear of physical harm. Efforts to improve compensation programs, promote service as a prestigious career option, and increase awareness of the realities of public service careers are just a few options to address these challenges. However, none of these solutions can address the deep erosion of civic unity alone.

A program of national service can be a crucial part of the solution, offering a proven means of fostering civic trust and building durable habits of public engagement. Studies show that 72 percent of AmeriCorps alumni continue volunteering in their communities, a 25 percentage point difference with those who considered service but did not join.[13] Similarly, 70 percent report more positive views of people with different backgrounds.[14] Veterans also consistently report higher rates of civic involvement than non-veterans.[15] Moreover, as the RAND Corporation found, new military benefits between 2004 and 2008 boosted recruitment by 20 percent, while a third of Army recruits in 2018 cited healthcare, tuition assistance, and the GI Bill as decisive incentives for service.[16]

Volunteer Programs in 2025: What Is Missing?

The US hosts a patchwork of volunteer programs, but funding and management are inconsistent and billets too limited. Without stronger incentives and expanded billets, they cannot meet the needs they were designed to serve. A reformed program must provide a unified framework for service, improved incentives for participation, and a larger number of positions for eligible volunteers.

A modern Voluntary National Service Program would establish a two-year track with optional four-year tracks, consolidating existing programs under a single framework. Two-year tracks would include Peace Corps assignments and AmeriCorps initiatives such as Teach for America, conservation, disaster response, and elder support. Four-year tracks would include the armed forces, emergency medical technician (EMT) and healthcare apprenticeships, community policing volunteer initiatives, firefighting training programs, and infrastructure programs. Applicants would undergo standardized assessments and then select their track and program preferences, which managers would match to national needs.

Clear and improved incentives would be a critical part of expanding participation in the Voluntary National Service Program. Amidst debates over universal college tuition assistance and loan forgiveness, applying the GI Bill model to the two-year track program would be an ideal compromise, offering two years of paid college tuition in exchange for a two-year term of public service. Other financial incentives for the two-year track could include counting the term of service toward Public Service Loan Forgiveness (PSLF) eligibility, exempting service stipends from taxation, providing childcare assistance to eligible volunteers, and even establishing a permanent public service tax credit for those who complete their service. While financial incentives can broaden the applicant pool, they are less compelling for higher-income families for whom cost is not a primary concern. To ensure participation across all socioeconomic groups, the program must also support pathways to prestigious professional careers. Incentives could include preferential admission to public and participating private undergraduate and graduate schools, as well as preferential or noncompetitive eligibility for judicial clerkships, government fellowships, foreign service officer programs, congressional staff roles, and other positions across the government. Four-year track participants would qualify for all two-year track benefits plus GI Bill and equivalent tuition programs, more extensive salary and benefits packages, professional certifications, and direct career on-ramps.

Mass participation in public service requires expanding the number of positions available. If the stronger incentives program induces even 5 percent of those reaching adulthood each year to serve, approximately 180,000 new participants would join these programs annually. While the military has no shortage of positions to fill, nonmilitary public service programs are too small to accommodate a significant influx of volunteers. In 1966, the Peace Corps had over fifteen thousand volunteers in active service, a number that had plummeted to only twenty-six hundred as of April 2024.[17] Expanding the number of billets can be accomplished at relatively low cost, even with the expanded incentives outlined above. With a $1 billion budget (only 0.014 percent of federal outlays), AmeriCorps supports approximately two hundred thousand volunteers in its participating programs.[18] These programs should be exponentially enlarged, building upon initiatives like the Service for America Act and former Senator John McCain's proposal for a new Civilian Conservation Corps to allow every willing and eligible American an opportunity to serve.

Conclusion

The US has no shortage of economic wealth or military power but suffers from a cohesion deficit. Expanding voluntary service offers a direct remedy. For the cost of a fraction of one percent of the federal budget, Washington could build an institution that broadens opportunity and unites citizens across lines of class, race, and ideology while providing for the public good. Tocqueville's observed spirit of civic responsibility was rooted in voluntary association rather than compulsion. A Voluntary National Service Program can renew that tradition, bringing Americans together across lines of division, restoring trust in institutions, and channeling America's dynamism and restlessness into schools, hospitals, forests, communities, and national defense, proving that freely chosen public service remains at the core of American democracy.

Endnotes

1. Conor Friedersdorf, "The Case Against Universal National Service," The Atlantic, June 26, 2013, https://www.theatlantic.com/politics/archive/2013/06/the-case-against-universal-national-service/277230/; and David R. Henderson, "The Draft Is Still a Bad Idea," Hoover Institution, July 3, 2024, https://www.hoover.org/research/draft-still-bad-idea.
2. National Center for Health Statistics, "Births and Natality," Centers for Disease Control, June 5, 2025, https://www.cdc.gov/nchs/fastats/births.htm.
3. Laura Silver et al., "Americans' Trust in One Another," Pew Research Center, May 8, 2025, https://www.pewresearch.org/2025/05/08/americans-trust-in-one-another/.
4. Claudia Deane, "Americans' Deepening Mistrust of Institutions," Pew Research Cener Trend Magazine, October 17, 2024, https://www.pew.org/en/trend/archive/fall-2024/americans-deepening-mistrust-of-institutions.
5. Silver et al., "Americans' Trust in One Another."
6. Drew DeSilver, "The Polarization in Today's Congress Has Roots That Go Back Decades," Pew Research Center, March 10, 2022, https://www.pewresearch.org/short-reads/2022/03/10/the-polarization-in-todays-congress-has-roots-that-go-back-decades/; and Ned Parker and Peter Eisler, "New Cases of Political Violence Roil US Ahead of Contentious Election," Reuters, October 21, 2024, https://www.reuters.com/world/us/new-cases-political-violence-roil-us-ahead-contentious-election-2024-10-21/.
7. Peter R. Mansoor, "Military Recruiting Shortfalls—A Recurring Challenge," Hoover Institution, January 28, 2025, https://www.hoover.org/research/military-recruiting-shortfalls-recurring-challenge.
8. Nick M. Brown, "The Peace Corps," In Focus no. IF12873, Congressional Research Service, 2025, https://www.congress.gov/crs-product/IF12873.
9. AmeriCorps, *FY 2025 Congressional Budget Justification*, n.d., 12.
10. "Most US Public Elementary and Secondary Schools Faced Hiring Challenges for the Start of the 2024–25 Academic Year," NAEP Press Release, National Center for Education Statistics, October 17, 2024, https://nces.ed.gov/whatsnew/press_releases/10_17_2024.asp.

11. "Labor Force Statistics from the Current Population Survey," US Bureau of Labor Statistics, January 29, 2025, https://www.bls.gov/cps/cpsaat39.htm.

12. Mansoor, "Military Recruiting Shortfalls."

13. LaMonica Shelton, Brooke Nicholas, Lillian Dote, and Robert Grimm Jr., *AmeriCorps: Changing Lives, Changing America*, Corporation for National and Community Service, May 2007, 2, https://core.ac.uk/download/71339993.pdf.

14. Eric Friedman, Brian Freeman, Benjamin Phillips et al., *AmeriCorps Alumni Outcomes: Final Survey Technical Report*, Corporation for National and Community Service, 2016, 31, https://www.abtglobal.com/sites/default/files/migrated_files/6379c2e9-cbb2-4bf9-ad01-098e8b05395f.pdf.

15. Sven E. Wilson and William Ruger, "Military Service, Combat Experience, and Civic Participation," Armed Forces and Society 47, no. 3 (2020): 551–85, https://doi.org/10.1177/0095327X20934885.

16. Beth J. Asch, Paul Eaton, James Hosek, Paco Martorell, Curtis Simon, and John T. Warner, "Cash Incentives and Military Enlistment, Attrition, and Reenlistment," RAND, May 14, 2010, https://www.rand.org/pubs/monographs/MG950.html; and Todd C. Helmus, S. Rebecca Zimmerman, Marek N. Posard et al., "Life as a Private: A Study of the Motivations and Experiences of Junior Enlisted Personnel in the US Army," RAND, May 14, 2018, https://www.rand.org/pubs/research_reports/RR2252.html.

17. Mark A. Green, "Where Have All the Peace Corps Volunteers Gone?," Stubborn Things (blog), Wilson Center, October 15, 2024, https://www.wilsoncenter.org/blog-post/where-have-all-peace-corps-volunteers-gone.

18. "The Budget and Economic Outlook: 2025 to 2035," Congressional Budget Office, January 17, 2025, https://www.cbo.gov/publication/61172; and Hannah Fingerhut, "AmeriCorps Cuts Prompt Two Dozen States to Sue Trump Administration," AP News, April 29, 2025, https://apnews.com/article/americorps-lawsuit-trump-doge-efd7e461acc932beaa56c3e2c4fd927d.

FOIA Accelerate: A Governance-First NLP Pilot to Cut the Federal FOIA Backlog

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The Freedom of Information Act (FOIA) is the legal mechanism by which citizens, journalists, businesses, and civil society groups gain access to records held by the federal government. FOIA underpins democratic accountability by ensuring that government actions cannot remain opaque to those they govern. Yet FOIA is straining under unprecedented demand. In Fiscal Year (FY) 2024, federal agencies received more than 1.5 million FOIA requests, a record high, while backlogs rose substantially across departments.[1] Agencies such as the Department of Homeland Security (DHS) process very large caseloads and contribute a sizable share of the backlog.[2]

This problem brings serious consequences: Requesters wait months or years for responses; litigation over delays drains agency resources; and public trust is weakened when transparency mechanisms falter.

Even though investments in portals and hiring have increased, the upward trend has not been reversed. The bottleneck is not only staffing but also the absence of modern, auditable tools to triage, route, redact, and summarize records at scale.[3]

This proposal recommends FOIA Accelerate, a governance-first pilot that deploys conservative natural language processing (NLP) in four targeted applications:

1. An intake routing classifier
2. Personally identifiable information (PII)-aware redaction suggestions for human review
3. Near-duplicate request and record clustering
4. Plain-language summaries for complex documents

The pilot mandates human sign-off on every automated suggestion, publishes model cards and evaluation results, and aligns with National Institute of Standards and Technology Artificial Intelligence Risk Management Framework (NIST AI RMF) and Office of Management and Budget (OMB) Circular A-130. If successful, FOIA Accelerate should reduce backlogs by at least 25 percent and improve mean time to first response by roughly 20 percent in pilot components, while preserving legal safeguards 3 (for explanation on metrics, see Appendix A).[4]

Problem and Evidence

FOIA is a cornerstone of governmental transparency, but the system is under strain. The federal government's FOIA ecosystem received well over one million requests in recent years. FY2024 marked a new record, and agencies reported larger backlogs compared with previous years.[1] Many agencies report increasing volumes of complex, cross-component requests and documents stored across emails, chat logs, cloud stores, and other distributed repositories, which increase search and review costs.

Moreover, coordinated requester campaigns and duplicative submissions multiply workload without commensurate informational benefit. Some agencies report that a relatively small set of high-volume components account for a large fraction of pending requests, stressing centralized FOIA teams.[2]

Even though staffing increases and better intake portals improved marginally, it did not alter the structural problem: FOIA processing remains labor-intensive and repetitious.[3]

Private vendors and state agencies have begun experimenting with AI-assisted processing; industry blog posts and practitioner reports describe redaction and search automation tools in the wild.[5]

Investigative outlets (e.g., MuckRock) have documented that federal agencies are testing AI in FOIA processing and that transparency about these pilots is uneven.[5] [6] Independent reporting and program materials from records professionals also document both potential and risks, including overredaction, privacy exposure, and accountability gaps if proprietary systems are adopted without auditability.[7]

The net result is predictable: slower response times, higher litigation exposure, and diminished public trust.

A policy intervention that couples modest, auditable NLP with human oversight can address the mechanical workload and free FOIA officers to focus on legal judgments and exemptions.

Policy Recommendation

This proposal recommends the Department of Justice's (DOJ) Office of Information Policy (OIP), in coordination with OMB and a small set of pilot agencies, authorize a twelve-month FOIA Accelerate pilot focusing on four narrowly scoped NLP applications:

1. Routing classifier: a lightweight, supervised classifier trained on historical intake logs to suggest the correct component or to flag multicomponent requests at intake. Correct routing on day one reduces handoffs and idle time.
2. PII-aware redaction suggestions: a conservative PII detector composed of pattern matchers and named-entity recognition (NER) that surfaces candidate spans and justification text for human reviewers. The system should favor recall (see glossary for recall definition) for sensitive identifiers and require human approval for every redaction.
3. Deduplication clustering: semantic clustering of requests and candidate-responsive records to collapse redundant effort where many near-duplicate requests target the same records.
4. Plain-language summaries: Retrieval-grounded, citation-preserving extractive summaries of technical documents to reduce clarification rounds and help FOIA officers triage long documents.[7]

Key governance features:
Every automated suggestion is advisory and must be approved by a human; systems must publish machine-readable model cards and a risk registry; output and reviewer actions are immutable-logged for audit; the pilot aligns with NIST AI RMF and the Generative AI profile; and OMB Circular A-130 requirements for privacy and records management are observed.[8] These safeguards respond directly to practitioner concerns reported in news and professional outlets.

In line with GAO's findings on tech-driven backlog reduction and DOJ/OIP FY2024 statistics showing record-high demand, the pilot aims to cut participating offices' backlogs by at least 25 percent and reduce mean time to first response by ~20 percent over twelve months, focusing on intake/routing, deduplication, and evidence-preserving redaction (see Appendix A).[3] [4]

This proposal recommends launching, with DHS, Veterans Affairs, Health and Human Services, and the Department of State, four high-volume departments with diverse record types and measurable backlogs, which together provide rigorous test beds for first-party identity records, health/regulatory records, and complex historical correspondence (see Appendix B).[9]

Implementation Plan
The pilot proceeds in four phases.

- Phase 0 (Month 0–1): Governance. DOJ OIP issues a pilot charter; convenes an ethics/FOIA+AI board with agency FOIA officers, privacy counsel, and civil liberties advisors; and completes privacy impact assessments.
- Phase 1 (Month 1–3): Data and Baselines. Agencies provide sanitized, anonymized intake logs and example responsive documents where feasible; the team builds labeled routing sets (5–10K items) and constructs synthetic PII corpora and gold-standard redaction samples for evaluation.
- Phase 2 (Month 3–6): A Minimum Viable Product (i.e. the most basic version with just enough core features to be usable) Development: Engineers ship baseline modules (term frequency–inverse document frequency (TF-IDF)/logistic routing, regular expressions–named-entity recognition (regex+NER) redaction, TF-IDF deduplication clustering, extractive summarizer). Models are kept small and auditable (e.g., DistilBERT only where necessary) and deployed in Federal Risk and Authorization Management Program (FedRAMP) environments or agency graphic processing unit (GPU) clusters.

  To ensure transparency and replicability, we provide a public-facing prototype repository ("FOIA Accelerate Repo") with modular code for routing, redaction, deduplication, and summarization, along with synthetic sample data and a demo notebook. This resource illustrates feasibility without using any sensitive government data.[10]

- Phase 3 (Month 6–12): Live Pilot and quality assurance (QA). Roll out the systems internally with A/B sampling, require human review for every case, run weekly QA sampling, and publish anonymized metrics on a public dashboard. An independent third-party reviewer (e.g., NARA/OGIS or GAO) conducts quarterly audits.
- Exit (Month 12): Independent evaluation determines whether to scale, pivot, or sunset the program.

Procurement can leverage small business set-asides or other transaction authority to speed implementation.

Costs and Benefits

Estimated cost (twelve months): $1.0–$2.0 million across three agencies. Major line items: engineering and integration ($600K), secure compute and hosting ($300K), annotation/labeling ($200K), privacy and legal compliance ($200K), program management and evaluator fees ($200K).

Benefits include measurable backlog reduction (even a 25 percent decline translates to tens of thousands of cases), fewer FOIA lawsuit filings and associated costs, improved processing time, and a public demonstration of responsible AI adoption. The open-source evaluation artifacts and model cards reduce vendor lock-in and enable state/local replication. Intangible benefits include improved public trust and a lower risk of errant disclosures through human oversight.

Evaluation Metrics

Success metrics should be both quantitative and qualitative.

Quantitative:

- Backlog reduction ≥25% in pilot components within twelve months
- Mean time-to-first-response reduced ≥20%
- Routing top-1 accuracy ≥90% on labeled test sets
- PII redaction audit: precision ≥95%, recall ≥90% on gold samples
- Deduplication collapse ratio: percent of redundant effort eliminated ≥30%

Qualitative:

- FOIA officer and requester satisfaction surveys
- Independent auditor (OGIS/GAO) report on process fidelity, error rates, and fairness checks

Quarterly anonymized dashboards should be published, subject to privacy constraints, to ensure public accountability.

Conclusion

FOIA Accelerate is a conservative, governance-first application of NLP to a pressing administrative problem.

By restricting automation to clearly delimited tasks, requiring human review at every step, publishing open evaluations, and aligning with existing governance frameworks, the federal government can reduce backlog, improve timeliness, and preserve legal safeguards.

The accompanying FOIA Accelerate repository (see endnote 10) provides a proof-of-concept baseline, enabling agencies, researchers, and auditors to examine the approach and replicate tests on synthetic data.

The pilot emphasizes auditability and replicability rather than speculative performance claims. Success would demonstrate that AI could strengthen democratic transparency without ceding human accountability.

Appendix A: Assumptions, Targets, and Cost Model (Pilot Year) Baselines

- Government-wide demand reached ~1.5M FOIA requests in FY2024, with major departments experiencing 30%+ increases over FY2023. Large requesters such as DHS and VA reported substantial increases and sizable backlogs.[2 9]
- Target 1: Backlog reduction ≥25%. Evidence from document-processing automation shows productivity gains above 100% in classification and redaction tasks; GAO attributes persistent FOIA backlogs partly to technology gaps. To be conservative, this paper targets a 25% reduction.[3 5]
- Target 2: Mean time to first response improvement ~20%. Automated routing and deduplication reduce time in queue. DOJ reports ongoing timeliness challenges despite improvements, so a 20% average improvement is ambitious but grounded.
- Cost model. Peer agency reports (e.g., FDIC FY2023: 13 FTE, $2.48M cost) illustrate typical FOIA cost scales. Pilot budget line items include engineering and integration (~$600K), secure compute and hosting (~$300K), annotation/labeling (~$200K), compliance (~$200K), program management (~$200K).
- Total: $1–$2M across three agencies, well within reported program costs.[8]

Appendix B: Pilot Agency Selection Rationale

- Criteria: high volume, diverse record types, multiple components, measurable backlogs, transparent reporting
- DHS: Highest volume; ~142,000 backlog at end of FY2024
- VA: One of the largest numeric increases in requests in FY2024; many first-party health records (e.g., under VHA)
- HHS: Complex health/regulatory records; backlog strategies reported in FY2024 report
- State: Large, complex, historically backlogged sets; steady litigation; suitable for citation-preserving review

Glossary of Terms

- Personally Identifiable Information (PII): Information that can be used to distinguish or trace an individual's identity, either alone or when combined with other information that is linked or linkable to a specific individual
- Regex (regular expression): Pattern-matching rules for text, used here for detecting PII
- TF-IDF: Term frequency–inverse document frequency, a statistical way to weigh word importance
- NER: Named-entity recognition, an NLP method to detect people, dates, IDs
- Recall: The fraction of true positives found; prioritized to avoid missing sensitive information. A recall-first stance (find everything that might be responsive/ sensitive, then filter) aligns with FOIA's exemptions and harm tests. See OIP guidance on backlog reduction and timeliness metrics that still preserve statutory requirements: https://www.justice.gov/oip/oip-guidance/guidance-backlog-reduction-plans
- Precision: The fraction of predictions that are correct; balanced against recall
- BM25: A retrieval algorithm for finding relevant documents
- NARA: National Archives and Records Administration, records steward
- OGIS: Office of Government Information Services, FOIA ombudsman
- GAO: Government Accountability Office, congressional watchdog agency
- NIST AI RMF: National Institute of Standards and Technology Artificial Intelligence Risk Management Framework. The NIST AI Risk Management Framework (AI RMF) is a voluntary, flexible guideline from the National Institute of Standards and Technology (NIST) that helps organizations identify, assess, and manage risks in artificial intelligence (AI) systems
- Natural Language Processing: is a field merging computer science and linguistics, enabling computers to understand, interpret, and generate human language (text and speech)
- DOJ: The U.S. Department of Justice
- DOJ OIP: The United States Department of Justice Office of Information Policy, the U.S. government office responsible for overseeing and guiding federal agencies on their compliance with the Freedom of Information Act and the Privacy Act
- VA: The U.S. Department of Veterans Affairs, a government agency that provides services to veterans
- VHA: The Veterans Health Administration, the largest integrated healthcare system in the U.S., responsible for providing medical and social support services to eligible American military veterans
- FDIC: Federal Deposit Insurance Corporation, is an independent government agency that maintains stability and public confidence in the nation's financial system by insuring deposits in the event of a bank failure
- FDIC FTE: refers to the Full-Time Equivalent (FTE) staffing levels at the Federal Deposit Insurance Corporation. FTE is a unit of measurement used in budgeting, human resources, and project management to count the number of employees based on total hours worked.

Endnotes

1. *2024 Annual FOIA Report Summary*, U.S. Department of Justice, Office of Information Policy, April 28, 2025, https://www.justice.gov/oip/media/1398111/dl?inline

2. *Fiscal Year 2024 Freedom of Information Act Report to the Attorney General of the United States and the Director of the Office of Government Information Services*, U.S. Department of Homeland Security, March 2025, https://www.dhs.gov/sites/default/files/2025-05/0505_25-PRIV-FOIA-Annual-Report-FY-2024-PDF.pdf

3. *Freedom of Information Act: Additional Guidance and Reliable Data Can Help Address Agency* Backlogs, U.S. Government Accountability Office, GAO-24-106535, March 7, 2024, https://www.gao.gov/products/gao-24-106535; also see the detailed report that's linked there: https://www.gao.gov/assets/gao-24-106535.pdf; and *Summary of Agency Chief FOIA Officer Reports for 2024 and Assessment of Agency Progress in FOIA Administration with OIP Guidance for Further Improvement,* U.S. Department of Justice, n.d., https://www.justice.gov/oip/media/1372771/dl?inline

4. "Agency Fiscal Year 2024 Annual Report Data Published on FOIA.gov," U.S. Department of Justice, Office of Information Policy, https://www.justice.gov/oip/blog/agency-fiscal-year-2024-annual-report-data-published-foiagov; also, FOIA.gov provides downloadable reports that are the canonical baseline for measuring requests and other relevant metrics: https://www.foia.gov/reports.html

5. Mike Ryan, "AI-Assisted Redaction: How FOIA/PA Offices Can Increase Throughput, Reduce Over/Under Redaction," Hyperscience blog, June 20, 2023, https://www.hyperscience.ai/blog/ai-assisted-redaction-how-foia-pa-offices-can-increase-throughput-reduce-over-under-redaction/; and Maggie Dougherty, "How Federal Agencies Responded to Our Requests About AI Use in FOIA," MuckRock, May 7, 2025, https://www.muckrock.com/news/archives/2025/may/07/how-federal-agencies-responded-to-our-requests-about-ai-use-in-foia/

6. Lewis Kamb, "Some U.S. Government Agencies Are Testing Out AI to Help Fulfill Public Records Requests," NBC News, August 1, 2023, https://www.nbcnews.com/news/us-news/federal-agencies-testing-ai-foia-concerns-rcna97313

7. Shalanda D. Young, "Advancing Governance, Innovation, and Risk Management for Agency Use of Artificial Intelligence," Office of Management and Budget, OMB M-24-10, March 28, 2024, https://www.whitehouse.gov/wp-content/uploads/2024/03/M-24-10-Advancing-Governance-Innovation-and-Risk-Management-for-Agency-Use-of-Artificial-Intelligence.pdf

8. National Institute of Standards and Technology, *Artificial Intelligence Risk Management Framework*, NIST AI RMF 1.0, U.S. Department of Commerce, January 2023, https://nvlpubs.nist.gov/nistpubs/ai/nist.ai.100-1.pdf; *Annual Freedom of Information Act Report Fiscal Year 2023*, Federal Deposit Insurance Corporation, n.d., https://www.fdic.gov/foia/files/foiareport23.pdf; and A. J. Wagner, "Essential or Extravagant: Considering FOIA Budgets, Costs and Fees," *Government Information Quarterly 34*, no. 3 (September 2017): 388–95, https://www.sciencedirect.com/science/article/abs/pii/S0740624X17300096

9. FOIA *Annual Report for 10/01/2023 Through 09/30/2024,* Department of Veterans Affairs, March 18, 2025, https://department.va.gov/foia/wp-content/uploads/sites/6/2025/03/FY2024_Annual_Report_508.pdf; *Chief FOIA Officer Report*, U.S. Department of State, March 2024, https://foia.state.gov/FOIALIBRARY/Reports/Officer/2024.pdf; and *HHS Fiscal Year 2024 Freedom of Information Annual Report*, U.S. Department of Health and Human Services, n.d., https://www.hhs.gov/foia/reports/annual-reports/2024/index.html

10. GitHub Repository, "FOIA Accelerate" (prototype code and demo), available at https://github.com/Amannor/foia-accelerator

Allied Mettle, Allied Metals: A Market-Based Playbook for Critical-Mineral Supply Chains

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"We have to win this race […] because if you think about a democracy, we have the guardrails. […] We can[not] afford to have these transformative technologies pioneered by authoritarian regimes." —Former Secretary of State Condoleezza Rice[1]

"Liberal democracy's ability to incubate innovation, technology, culture[,] and sustainable growth [...] will determine the geopolitics of the future." —Francis Fukuyama[2]

Introduction

The United States has invented the technologies that power the modern world, but it imports over two-thirds of the critical minerals required to manufacture them from its primary strategic competitor.[3]

Despite pioneering the Internet,[4] electric vehicles,[5] and renewable energy systems,[6] the United States has ceded control of the supply chains that sustain each of them: China now commands 87 percent of global rare earth refining capacity, produces over 97 percent of anode-active material capacity,[8] and accounts for 99 percent of primary gallium production: not through superior innovation, but through coordinated techno-industrial policy that democratic procurement and finance have yet to counter.[10]

This dependency challenges a core assumption: that democratic capitalism can outcompete authoritarian state control in strategic industries. Indeed, beginning in 1945, reinforced institutionally by the National Science Foundation Act of 1950, the United States built a public-private research system that repeatedly delivered frontier (albeit general-purpose) technologies through market-driven entrepreneurship, competitive universities, and venture capital networks that reward technological breakthroughs.[11] By 1960, it was financing roughly 69 percent of the world's research and development (R&D).[12] That dominance has, since, eroded markedly: By 2019, the U.S. share of global R&D stood near 27 percent (with China at about 22 percent), and by 2020 it was barely 28 percent on alternative international series.[13] And, now, in the strategic inputs that make modern systems work—the "vitamins of modern technology"[14]—China's sheer advantage in coordination sets the terms of trade. When Beijing imposes licensing or export controls (as it did in December 2024 on gallium, germanium, and antimony, and in April 2025 on a tranche of medium and heavy rare earth elements), it successfully converts commercial concentration into geopolitical leverage.[15]

The empirical record (still) favors democracies on innovation and long-run growth:[16] Countries that democratize also realize large, persistent gains in income per capita over the subsequent decades, and advanced democracies continue to dominate global innovation benchmarks.[17] Even so, the institutions that reward discovery do

not automatically translate into capacity at scale in strategic inputs, and defense-driven demand is far too small, by itself, to reprice global materials markets.[18] The task is not to mimic authoritarian direction; it is to translate strategic objectives into market incentives and allied scale.

To that end, this proposal section advances four recommendations: **firstly**, to price verifiable supply chain security inside best-value source selection; **secondly**, to stand up Allied Processing Investment Supports (APIS) that pair tax credits with long-dated offtakes and price collars; **thirdly**, to adopt a single Provenance-Ownership-Audit (POA) template that turns statutory duties into auditable practice; and, **fourthly**, to designate one federal lead agency to keep a stage-specific processing list that aligns programs across agencies and with allies. Together, these steps align market incentives with security, crowd in private capital, and build a verifiable allied backbone without abandoning the guardrails that distinguish any democracy.

Analysis

Three structural failures—namely, (i) mispriced security, (ii) insufficient demand leverage, and (iii) capital scarcity reinforced by strategic predation—explain how and why history's most innovative democracy remains dependent on China. The PRC, in turn, has made each of these weaknesses an advantage by overbuilding processing capacity to flood markets, driving prices down with subsidies to eliminate competitors, then acquiring distressed assets and intellectual property to control entire supply chains.[19] In fact, China has invested more than $16 billion annually in mining capacity since 2014 and, for several materials, now commands well over 90 percent of midstream processing.[21]

The problem originates in perverse incentives wherein resilience premia are treated as costs to avoid rather than as value to secure.[22] "We incentivize the defense primes' performance based on cost," explains one Pentagon official. "There [is] a mismatch between political intent and economic incentive structure." In one documented case, a major defense contractor traced a titanium supply chain thirteen tiers down, discovering direct dependence on "Chinese mines, Chinese roads, and Chinese trucks." When the firm disclosed these findings to the Department of Defense, officials penalized it for delays caused by the investigation itself—a perverse incentive that discouraged future transparency even as Chinese-sourced materials continued flowing into critical defense systems.[23]

China's sheer overcapacity is already exemplified by a gallium collapse in Europe: As subsidized Chinese exports surged between 2014 and 2016, gallium prices fell approximately 75 percent, forcing the Germany-based Ingal Stade GmbH—the continent's last producer—to shutter operations in 2016. After China announced licensing controls in July 2023 and subsequently banned exports to the United States in December 2024, external prices surged dramatically from $110–$130 per kilogram to $687 per kilogram by May 2025: a show of "weaponized uncertainty," according to one U.S. industrial commentator.[24] Once rival companies ceased operations, China raised prices again and, thus, cemented asymmetric control over a critical bottleneck.

Meanwhile, responsibility for "critical" materials disperses across a veritable "spaghetti monster": a tangled web of overlapping authorities, inconsistent reporting standards, and fractured information-sharing protocols spanning more than forty governmental offices, with coordination remaining episodic rather than continuous.[25] "We need a shared map and a shared playbook," demands one Interior Department official interviewed for Stanford University's Gordian Knot Center for National Security Innovation. "Right now, each agency is optimizing its own corner." Even when intent aligns, divergent federal lists and designations have blurred priorities and impeded execution.[26] Across the shifting categories that different missions require, no clear federal leader coordinates the response.[27]

These institutional failures compound as institutional investors read these signals and withdraw unless bankable demand materializes. In other words, "private capital does not [even] want to touch it," explained one institutional investor to the Gordian Knot Center. "Permitting takes too long[,] costs more[,] and the track record is poor." Offtake agreements remain thin, permitting proceeds slowly, and the credible threat of dumping can strand projects mid-development. The Pentagon's consumption cannot move world markets because defense demand for rare earths and similar inputs represents less than one-tenth of one percent of global use. Scale completes the argument: "We are not in the driver's seat in these markets," noted a defense acquisitions team. "We make twelve fighter jets monthly while Tesla produces [nearly 5,000] electric vehicles daily."[28]

The outcome is structural underinvestment in Western processing and persistent vulnerability that can be activated by policy decree. By mid-2025, China's controls covered at least sixteen minerals and alloys, and the strategic signal had become unambiguous: Commercial concentration could be converted into geopolitical leverage at will.[29] As one former National Security Council member avers, "The CCP has attempted a plan of asymmetrical dominance. As a result, they will utilize this strength against the United States without hesitation."[30]

Recommendations

The United States can reconcile strategic intent and market behavior without abandoning competitive procurement or allied trade.

To that end, one recommendation is to price supply-chain security inside best-value source selection rather than relying on waivers. Existing law already permits trade-offs among cost, schedule, and other factors when it serves the government's interest, and Defense Department guidance discourages lowest-price-technically-acceptable methods for complex or mission-critical buys.[31] Making a clearly weighted "security" factor part of each evaluation—scoring verified allied processing, stage-specific provenance from mine to magnet, and beneficial ownership—aligns practice with statute: Beginning January 1, 2027, the restriction applies across the entire U.S. chain for covered magnets, including those containing neodymium.[32] These rules justify awarding to chains that can prove origin and ownership even when they are not the absolute lowest price.

Another recommendation is to make Allied Processing Investment Supports the financing template that operationalizes the "three-pillar strategy" of Interior Secretary (and Chairman of the National Energy Dominance Council [NEDC]) Doug Burgum for critical-mineral security: first, strategic stockpiling during price wars; second, sovereign risk insurance through loan guarantees; third, direct equity investment backing. Specifically, APIS pairs the Defense Production Act's (DPA) Title III offtakes and calibrated price collars with the Inflation Reduction Act's (IRA) Section 45X production credit.[33] That credit lowers unit costs once plants are producing, which is particularly effective given that the Treasury Department's October 2024 final rules now include mining and extraction costs in production cost calculations.[34] APIS covers projects across the expanded 2025 draft list (especially copper, silver, potash, silicon, rhenium, and lead), providing the much-needed, science-based roadmap for reducing dependence on foreign adversaries that Secretary Burgum has championed.[35]

The third recommendation is to enforce a single Provenance-Ownership-Audit standard across grants, tax credits, stockpiling, and procurement. The template should require lot-level identifiers; smelters' and refiners' IDs and addresses; stage-by-stage attestations from mine through separation and refining to metals and alloys, as well as finished parts; and beneficial-ownership disclosures, with risk-based third-party audits. The Government Accountability Office has shown that fragmented lists, uneven reporting, and inconsistent verification blur priorities and drive costs higher; a single evidentiary standard remedies that defect and gives the 2027 magnet rule practical effect.[36]

The fourth and final recommendation is to designate the Interior Department, under NEDC coordination, as the lead coordinator for critical materials strategy, leveraging Secretary Burgum's leadership of both bodies to maintain one stage-specific processing list and align procurement, Section 45X, Title III, stockpiling, and trade tools to that framework.[37] The NEDC should work through the Minerals Security Partnership (MSP), the Australia-U.S. Ministerial Consultations (AUSMIN), and the U.S.-Australia Critical Minerals Compact to publish shared commissioning schedules and joint financing targets.[38]

Methods and Metrics

Evaluation should be quarterly, public, and tied to automatic course correction. The greatest exposure lies in midstream stages: As Figure 1 below illustrates, China's control of key processing stages ranges from 87 percent of rare earth refining to over 98 percent of primary gallium production, with similarly dominant positions in neodymium-praseodymium (NdPr) oxide separation and graphite anode active material:[39]

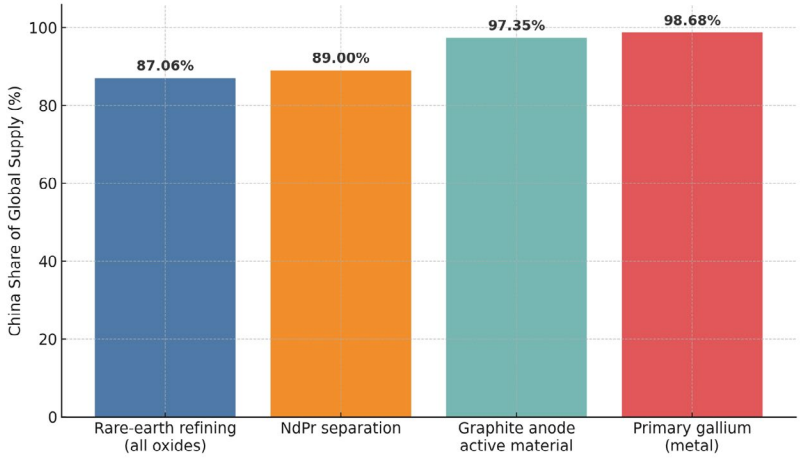

Figure 1. China's concentration in key midstream stages (2024–2025)

Shares use the latest year available and are shown to two decimals: (i) 87.06 percent for rare earth refining is calculated from Natural Resources Canada's 2022 refined output (175,000 divided by 201,000); (ii) 89.00 percent for rare-earth-oxide separation (including neodymium and praseodymium) is reported by the U.S. Department of Energy; (iii) 97.35 percent for anode-active-material capacity is an author's point estimate derived as follows: The International Energy Agency states that China holds "over 97 percent" of installed capacity; public 2024 shipment data indicate that producers outside China shipped roughly forty thousand to sixty thousand metric tons out of about 2,111,000 metric tons of global anode shipments, implying a China production share between 97.1 percent and 98.1 percent; because facilities outside China were ramping up and operated below nameplate capacity in 2024, capacity shares lie toward the lower portion of that band, so I adopt the midpoint of the capacity-consistent 97.1 percent to 97.6 percent interval, namely 97.35 percent. And, (iv) 98.68 percent for primary gallium is computed from United States Geological Survey 2024 estimated totals (750,000 divided by 760,000 kilograms). See especially Government of Canada, Natural Resources Canada, "Rare Earth Elements Facts," last modified December 20, 2024, https://natural-resources.canada.ca/minerals-mining/mining-data-statistics-analysis/minerals-metals-facts/rare-earth-elements-facts; Braeton J. Smith et al., Rare Earth Permanent Magnets: Supply Chain Deep Dive Assessment (U.S. Department of Energy, 2022), esp. Table 5; International Energy Agency, Global EV Outlook 2024 (IEA, 2024) https://www.iea.org/reports/global-ev-outlook-2024; Global Critical Minerals Outlook 2024 (International Energy Agency, 2024), https://www.iea.org/reports/global-critical-minerals-outlook-2024; and United States Geological Survey, "Gallium," in Mineral Commodity Summaries 2025 (U.S. Geological Survey, 2025), 1–2, https://pubs.usgs.gov/periodicals/mcs2025/mcs2025-gallium.pdf

For program-critical forms, such as neodymium magnet blocks, graphite anode active material, battery-grade manganese sulfate, antimony trioxide, battery-grade silicon, and copper rod, the United States should publish the allied and U.S. share of domestic demand by stage and track import-source concentration indices.[40]

Optimum efficacy in financing necessitates the tracking of final investment decisions, commissioned timelines, and realized prices against collar boundaries for each APIS contract. Two consecutive quarters outside price collars should trigger contract reviews; chronic delays should prompt milestone audits under DPA Title III authority. Strategic stockpiling metrics should include material volumes purchased during price-manipulation events and inventory levels relative to 180-day consumption benchmarks.[41] Compliance visibility, too, becomes critical as the 2027 magnet restrictions take full effect.[42] Finally, allied coordination should generate measurable joint projects, not merely diplomatic statements. Updates vis-à-vis the MSP and AUSMIN, in particular, should list cofinanced midstream facilities, stages, commissioning dates, and shared stockpiling commitments.[43]

Conclusion

Congressional proponents of industrial policy—alongside other critics—may controvert, perhaps reasonably, whether market-based incentives can counter China's coordinated strategy fast enough. After all, expanding production tax credits could cost $12–$15 billion over five years, and supply-chain auditing may increase procurement timelines.[44] These concerns deserve consideration. However, continued dependence on an adversary that weaponizes commercial concentration imposes far greater costs. Pre-existing vulnerabilities may disable critical systems within months of supply cutoffs, yielding hundreds of billions of dollars in emergency sourcing costs.[45]

The deeper issue transcends any single material. In the spirit of Secretary Rice and Mr. Fukuyama, democracies cannot cede transformative technologies to authoritarian control—a principle that extends to enabling supply chains. The four recommendations in this proposal evince that the United States need not choose between market competition and strategic security. Aligning procurement incentives with verifiable provenance, scaling allied financing, and coordinating transparent standards can restore democratic competitive advantage.

The expected result is measurable strategic autonomy: In defending the techno-industrial policy that powers democratic innovation, such reforms will, ultimately, power democracy itself.

Endnotes

1. Justin Reynolds, "Former Secretary Rice Stresses Importance of Winning Emerging Technology Race," State Magazine, April 2025, https://statemag.state.gov/2025/04/0425itn07
2. Francis Fukuyama, Liberalism and Its Discontents (Farrar, Straus and Giroux, 2022), 139.
3. U.S. Department of Energy, Office of Fossil Energy and Carbon Management, "Developing a Domestic Supply of Critical Minerals and Materials," February 26, 2024, https://www.energy.gov/fecm/articles/developing-domestic-supply-critical-minerals-and-materials; U.S. Geological Survey, Mineral Commodity Summaries 2025 (ver. 1.2, March 2025), 7–9, 24, https://doi.org/10.3133/mcs2025; and US Geological Survey, "Rare Earths," in Mineral Commodity Summaries 2025, (U.S.GS, 2025), 1–2, https://pubs.usgs.gov/periodicals/mcs2025/mcs2025-rare-earths.pdf
4. Barry M. Leiner et al., "Brief History of the Internet," Internet Society, 1997, 2–4, 10–11, https://www.internetsociety.org/wp-content/uploads/2017/09/ISOC-History-of-the-Internet_1997.pdf
5. U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, "The History of the Electric Car," September 15, 2014, https://www.energy.gov/articles/history-electric-car
6. D. M. Chapin et al., "A New Silicon p–n Junction Photocell for Converting Solar Radiation into Electrical Power," Journal of Applied Physics 25, no. 5 (1954): 676–77, https://doi.org/10.1063/1.1721711

7. Ernest Scheyder, "Western Start-ups Seek to Break China's Grip on Rare Earths Refining," Reuters, December 4, 2023, https://www.reuters.com/sustainability/climate-energy/western-start-ups-seek-break-chinas-grip-rare-earths-refining-2023-12-04; and Natural Resources Canada, "Rare Earth Elements Facts," last modified December 20, 2024, https://natural-resources.canada.ca/minerals-mining/mining-data-statistics-analysis/minerals-metals-facts/rare-earth-elements-facts
8. Matt Blois, "China Restricts Battery Graphite Exports," Chemical & Engineering News 101, no. 36 (October 30, 2023), https://pubs.acs.org/doi/full/10.1021/cen-10136-buscon2
9. U.S. Geological Survey, "Gallium," in Mineral Commodity Summaries 2025 (U.S.GS, 2025), 74, https://pubs.usgs.gov/periodicals/mcs2025/mcs2025-gallium.pdf; and U.S. Geological Survey, Mineral Commodity Summaries 2025 (ver. 1.2, U.S.GS, March 2025), https://doi.org/10.3133/mcs2025
10. Harry Kaplan et al., "Critical Minerals and the Business of National Security: Engineering Competitive Incentives into America's Mineral Strategy," Gordian Knot Center for National Security Innovation, Stanford University, September 2, 2025, passim; see esp. 8–11, https://stacks.stanford.edu/file/mr919dh8962/Gordian%20Knot%20Center%20-%20Critical%20Minerals%20and%20the%20Business%20of%20National%20Security.pdf
11. National Science Foundation Act of 1950, Pub. L. 81-507, 64 Stat. 149 (May 10, 1950), codified as amended at 42 U.S.C. §1861 et seq., https://www.govinfo.gov/content/pkg/COMPS-10350/pdf/COMPS-10350.pdf
12. See especially Vannevar Bush, Science: The Endless Frontier (U.S. Government Printing Office, 1945), https://babel.hathitrust.org/cgi/pt?id=mdp.39015013109148
13. John F. Sargent Jr., "Global Research and Development Expenditures: Fact Sheet," Congressional Research Service (R44283), updated September 14, 2022, 1, https://sgp.fas.org/crs/misc/R44283.pdf
14. Rare earth elements are widely described as the "vitamins of modern technology." In Chinese technical/policy literature the parallel phrase is "industrial vitamins", and the metaphor is often attributed to the Soviet geochemist A. E. Fersman; see A. S. Komlev et al., "The Influence of Chemical Impurities on the Properties of Heavy Rare-Earth Metals (Tb, Dy, Ho): Experimental and Theoretical Approaches," Materials Today Chemistry 21 (2021); Marc Humphries, Rare Earth Elements: The Global Supply Chain, CRS Report R41347 (Congressional Research Service, 2013), 8; Pui-Kwan Tse, China's Rare-Earth Industry, U.S. Geological Survey Open-File Report 2011-1042 (USGS, 2011), 1; and Li Guo, Sheng Weichao, and Ni Mingfang. "Analysis of the Rare-Earth Resource Situation and Countermeasures Based on Military Value". Journal of Sichuan Ordnance 34, no. 12 (2013), 49–52, cited in Cindy A. Hurst, "China's Ace in the Hole: Rare Earth Elements," Joint Force Quarterly 59 (2010): 122.
15. See generally Ministry of Commerce of the People's Republic of China, Announcement No. 46 of 2024: Strengthening Export Controls on Certain Dual-Use Items to the United States, December 3, 2024, https://www.mofcom.gov.cn/zwgk/zcfb/art/2024/art_3d5e990b43424e60828030f58a547b60.html; see also Ministry of Commerce of the People's Republic of China and General Administration of Customs, Announcement No. 18 of 2025 of the Ministry of Commerce and the General Administration of Customs of the People's Republic of China: Announcing the Decision to Implement Export Control on Some Medium and Heavy Rare Earth Related Items, April 4, 2025, https://english.mofcom.gov.cn/Policies/AnnouncementsOrders/art/2025/art_0dd87cbee7b045bf93fabe6ab2faceee.html.

16. Daron Acemoglu et al., "Democracy Does Cause Growth," *Journal of Political Economy* 127, no. 1 (2019): 47–100, esp. 58–59, 75–76, https://doi.org/10.1086/700936
17. World Intellectual Property Organization, *Global Innovation Index 2024: Unlocking the Promise of Social Entrepreneurship* (WIPO, 2024), Executive Summary and Rankings, https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2000-2024-exec-en-global-innovation-index-2024.pdf
18. U.S. Government Accountability Office, *Critical Materials: Action Needed to Implement Requirements That Reduce Supply Chain Risks,* GAO-24-107176 (GAO, September 10, 2024), 20, https://www.gao.gov/assets/gao-24-107176.pdf
19. Kaplan et al., "Critical Minerals and the Business of National Security," 8–11.
20. Critical mineral supply chains consist of three stages: (i) upstream (raw material extraction and mining); (ii) midstream (refining, separation, and processing of raw materials into intermediate products); and (iii) downstream (manufacturing of finished components and end products). China's dominance concentrates especially in midstream processing, whereupon technical barriers, environmental costs, and economies of scale create natural bottlenecks.
21. International Energy Agency, Global Critical Minerals Outlook 2024 (IEA, 2024), 87, https://www.iea.org/reports/global-critical-minerals-outlook-2024; see also Edward White, "China Raises State Funding for Strategic Minerals amid U.S. Trade War," *Financial Times*, March 19, 2025, https://www.ft.com/content/cace5b0f-e08c-4cb9-aac5-c3117d5a93bc
22. Federal Acquisition Regulation 15.101-2, "Lowest Price Technically Acceptable Source Selection Process," https://www.acquisition.gov/far/15.101-2; *see also* Defense Federal Acquisition Regulation Supplement (DFARS) 215.101-2-70, "Limitations and Prohibitions," https://www.acq.osd.mil/dpap/dars/dfars/html/current/215_1.htm
23. Interview conducted by report authors on April 2, 2025. Current Department of Defense official promised confidentiality. Cited in Kaplan et al., "Critical Minerals and the Business of National Security," 14–15.
24. Kaplan et al., "Critical Minerals and the Business of National Security," 10; see also Fastmarkets, "Are China's Export Curbs on Gallium and Germanium a Political Symbol or a Real Threat?," July 7, 2023, https://www.fastmarkets.com/insights/are-chinas-export-curbs-on-gallium-and-germanium-a-political-symbol-or-a-real-threat
25. U.S. Government Accountability Office, *Critical Minerals: Building on Federal Efforts to Advance Recovery and Substitution Could Help Address Supply Risks*, GAO-22-104824 [Report to the Ranking Member, Subcommittee on Interior, Environment, and Related Agencies, Senate Committee on Appropriations], (GAO, June 16, 2022), 5–7, https://www.gao.gov/assets/gao-22-104824.pdf
26. Kaplan et al., "Critical Minerals and the Business of National Security," 10–11; *see also* Linda R. Rowan, *Critical Mineral Resources: National Policy and Critical Minerals List*, CRS R47982, (Congressional Research Service, July 17, 2025), 2–5, https://www.congress.gov/crs-product/R47982; cf. U.S. Department of the Interior, "Department of the Interior Releases Draft 2025 List of Critical Minerals," press release, August 25, 2025, https://www.doi.gov/pressreleases/department-interior-releases-draft-2025-list-critical-minerals
27. Interview conducted by report authors on May 7, 2025. Current Department of Interior official promised confidentiality. Cited in Kaplan et al., "Critical Minerals and the Business of National Security," 13.

28. Two interviews conducted by report authors on April 21 and April 29, 2025. Current defense prime acquisitions team promised confidentiality. Cited in Kaplan et al., "Critical Minerals and the Business of National Security," 16. Production data from Lockheed Martin, "Statement: F-35 2024 Deliveries," January 8, 2025, https://www.lockheedmartin.com/en-us/news/statements-speeches/2025/statement-f35-2024-deliveries.html; and Tesla, "Tesla Vehicle Production & Deliveries and Date for Financial Results & Webcast for Fourth Quarter 2023," January 2, 2024, https://ir.tesla.com/press-release/tesla-vehicle-production-deliveries-and-date-financial-results-webcast-fourth-quarter-2023.
29. Aidan Powers-Riggs et al., "Beyond Rare Earths: China's Growing Threat to Gallium Supply Chains," *CSIS Brief*, Center for Strategic and International Studies, July 2025, 4–5, https://csis-website-prod.s3.amazonaws.com/s3fs-public/2025-07/250707_Riggs_Hidden_Reach.pdf?VersionId=ttMYRKHGQo.z9.NyCY0vEsJ.nMXERxND
30. Interview conducted by report authors on May 16, 2025. Former National Security Council member promised confidentiality. Cited in Kaplan et al., "Critical Minerals and the Business of National Security," 10.
31. Federal Acquisition Regulation 15.101-1, "Tradeoff Process," https://www.acquisition.gov/far/subpart-15.1; Federal Acquisition Regulation 15.304(c), "Evaluation Factors and Significant Subfactors," https://www.acquisition.gov/far/15.304; and Defense Federal Acquisition Regulation Supplement 215.101-2-70, "Limitations and Prohibitions," https://www.acq.osd.mil/dpap/dars/dfars/html/current/215_1.htm
32. Defense Federal Acquisition Regulation Supplement 252.225-7052, "Restriction on the Acquisition of Certain Magnets, Tantalum, and Tungsten," *Federal Register* 89, no. 105 (May 30, 2024): 46818-21, https://www.govinfo.gov/content/pkg/FR-2024-05-30/pdf/2024-11516.pdf
33. Spencer Kimball, "Trump Aims to Fight China's Control of Minerals by Investing in Miners," CNBC, April 24, 2025, https://www.cnbc.com/2025/04/24/trump-weighs-investments-in-critical-mineral-companies-burgum-says.html
34. U.S. Department of the Treasury and Internal Revenue Service. "Advanced Manufacturing Production Credit." *Federal Register* 89 (October 28, 2024): 85,798–85,846. https://www.federalregister.gov/documents/2024/10/28/2024-24840/advanced-manufacturing-production-credit
35. U.S. Department of the Interior, "Department of the Interior Releases Draft 2025 List of Critical Minerals," press release, August 25, 2025, https://www.doi.gov/pressreleases/department-interior-releases-draft-2025-list-critical-minerals; *see also* The White House, "Immediate Measures to Increase American Mineral Production," Executive Order, March 20, 2025, https://www.whitehouse.gov/presidential-actions/2025/03/immediate-measures-to-increase-american-mineral-production
36. U.S. Government Accountability Office, "Critical Materials: Action Needed," 20.
37. U.S. Department of Commerce, Bureau of Industry and Security, "Commerce Launches Section 232 Investigation on Imports of Processed Critical Minerals and Derivative Products," press release, April 23, 2025, https://www.bis.gov/press-release/commerce-launches-section-232-investigation-imports-processed-critical-minerals-derivative-products
38. U.S. Department of State, "Minerals Security Partnership," accessed September 11, 2025, https://www.state.gov/minerals-security-partnership; and The White House, "Australia-United States Climate, Critical Minerals and Clean Energy Transformation Compact," Fact Sheet, May 20, 2023, https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2023/05/20/australia-united-states-climate-critical-minerals-and-clean-energy-transformation-compact.

39. Ernest Scheyder, "Western Start-ups Seek to Break China's Grip on Rare Earths Refining," Reuters, December 4, 2023, https://www.reuters.com/sustainability/climate-energy/western-start-ups-seek-break-chinas-grip-rare-earths-refining-2023-12-04; and U.S. Geological Survey, Mineral Commodity Summaries 2025, "Gallium," 74, https://pubs.usgs.gov/periodicals/mcs2025/mcs2025-gallium.pdf
40. U.S. Government Accountability Office, "Defense Production Act: Use and Challenges from Fiscal Years 2018 to 2024," GAO-25-108497 [Statement of William Russell, Director, Contracting and National Security Acquisitions], June 12, 2025, 2–3, https://www.gao.gov/products/gao-25-108497
41. For example, Japan has moved since 2020 from 60-day toward 180-day inventory targets for certain rare metals; see, e.g., Nedal T. Nassar et al., Quantifying Potential Effects of China's Gallium and Germanium Export Restrictions on the U.S. Economy, USGS Open-File Report 2024–1057, 10–11, https://doi.org/10.3133/ofr20241057
42. Defense Federal Acquisition Regulation Supplement 252.225-7052, 'Restriction on the Acquisition of Certain Magnets, Tantalum, and Tungsten,' Federal Register 89, no. 105 (May 30, 2024): 46818–21.
43. U.S. Department of State, "Minerals Security Partnership"; and The White House, "Australia-United States Climate."
44. U.S. Government Accountability Office, Critical Materials, 15–18; and Kaplan et al., "Critical Minerals and the Business of National Security," 17.
45. U.S. Government Accountability Office, "Defense Production Act," 2–3; and U.S. Government Accountability Office, Critical Minerals, 12–14.

Bibliography

Acemoglu, Daron, Suresh Naidu, Pascual Restrepo, and James A. Robinson. "Democracy Does Cause Growth." Journal of Political Economy 127, no. 1 (2019): 47–100. https://doi.org/10.1086/700936.

Blois, Matt. "China Restricts Battery Graphite Exports." Chemical & Engineering News 101, no. 36 (October 30, 2023). https://pubs.acs.org/doi/full/10.1021/cen-10136-buscon2.

Bush, Vannevar. Science: The Endless Frontier. US Government Printing Office, 1945. https://babel.hathitrust.org/cgi/pt?id=mdp.39015013109148.

Chapin, D. M., C. S. Fuller, and G. L. Pearson. "A New Silicon p–n Junction Photocell for Converting Solar Radiation into Electrical Power." Journal of Applied Physics 25, no. 5 (1954): 676–77. https://doi.org/10.1063/1.1721711.

Fastmarkets. "Are China's Export Curbs on Gallium and Germanium a Political Symbol or a Real Threat?" July 7, 2023. https://www.fastmarkets.com/insights/are-chinas-export-curbs-on-gallium-and-germanium-a-political-symbol-or-a-real-threat.

Federal Acquisition Regulation 15.101-1, "Tradeoff Process." https://www.acquisition.gov/far/subpart-15.1.

Federal Acquisition Regulation 15.101-2, "Lowest Price Technically Acceptable Source Selection Process." https://www.acquisition.gov/far/15.101-2.

Federal Acquisition Regulation 15.304(c), "Evaluation Factors and Significant Subfactors." https://www.acquisition.gov/far/15.304.

Fukuyama, Francis. Liberalism and Its Discontents. Farrar, Straus and Giroux, 2022.

Government of Canada. Natural Resources Canada. "Rare Earth Elements Facts." Last modified December 20, 2024. https://natural-resources.canada.ca/minerals-mining/mining-data-statistics-analysis/minerals-metals-facts/rare-earth-elements-facts.

Humphries, Marc. Rare Earth Elements: The Global Supply Chain. CRS Report R41347. Congressional Research Service, 2013.

Hurst, Cindy A. "China's Ace in the Hole: Rare Earth Elements." Joint Force Quarterly 59 (2010): 119–27.

International Energy Agency. Global Critical Minerals Outlook 2024. IEA, 2024. https://www.iea.org/reports/global-critical-minerals-outlook-2024.

International Energy Agency. Global EV Outlook 2024. IEA, 2024. https://www.iea.org/reports/global-ev-outlook-2024.

Kaplan, Harry, Sidharth Gopisetty, Alexis Opferman, Abby Reinhold, and Emma Williamson. "Critical Minerals and the Business of National Security: Engineering Competitive Incentives into America's Mineral Strategy." Gordian Knot Center for National Security Innovation, Stanford University, September 2, 2025. https://stacks.stanford.edu/file/mr919dh8962/Gordian%20Knot%20Center%20-%20Critical%20Minerals%20and%20the%20Business%20of%20National%20Security.pdf.

Kimball, Spencer. "Trump Aims to Fight China's Control of Minerals by Investing in Miners." CNBC, April 24, 2025. https://www.cnbc.com/2025/04/24/trump-weighs-investments-in-critical-mineral-companies-burgum-says.html.

Komlev, A. S., et al. "The Influence of Chemical Impurities on the Properties of Heavy Rare-Earth Metals (Tb, Dy, Ho): Experimental and Theoretical Approaches." Materials Today Chemistry 21 (2021).

Leiner, Barry M., Vinton G. Cerf, David D. Clark, et al. "Brief History of the Internet." Internet Society, 1997. https://www.internetsociety.org/wp-content/uploads/2017/09/ISOC-History-of-the-Internet_1997.pdf.

Li Guo, Sheng Weichao, and Ni Mingfang. "[Analysis of the Rare-Earth Resource Situation and Countermeasures Based on Military Value". Journal of Sichuan Ordnance 34, no. 12 (2013): 49–52. https://bzxb.cqut.edu.cn/download.aspx?type=paper&id=5133.

Lockheed Martin. "Statement: F-35 2024 Deliveries." January 8, 2025. https://www.lockheedmartin.com/en-us/news/statements-speeches/2025/statement-f35-2024-deliveries.html.

Ministry of Commerce of the People's Republic of China. Announcement No. 46 of 2024: Strengthening Export Controls on Certain Dual-Use Items to the United States. December 3, 2024. https://www.mofcom.gov.cn/zwgk/zcfb/art/2024/art_3d5e990b43424e60828030f58a547b60.html.

Ministry of Commerce of the People's Republic of China and General Administration of Customs. Announcement No. 18 of 2025 of the Ministry of Commerce and the General Administration of Customs of the People's Republic of China: Announcing the Decision to Implement Export Control on Some Medium and Heavy Rare Earth Related Items. April 4, 2025. https://english.mofcom.gov.cn/Policies/AnnouncementsOrders/art/2025/art_0dd87cbee7b045bf93fabe6ab2faceee.html.

National Science Foundation Act of 1950. Pub. L. 81-507, 64 Stat. 149 (May 10, 1950), codified as amended at 42 U.S.C. §1861 et seq. https://www.govinfo.gov/content/pkg/COMPS-10350/pdf/COMPS-10350.pdf.

Nassar, Nedal T., et al. Quantifying Potential Effects of China's Gallium and Germanium Export Restrictions on the U.S. Economy. U.S. Geological Survey Open-File Report 2024–1057. USGS, 2024. https://doi.org/10.3133/ofr20241057.

Powers-Riggs, Aidan, Brian Hart, Matthew P. Funaiole, Scott Thomsett, Simon Zieleniewski, and Tim Rose. "Beyond Rare Earths: China's Growing Threat to Gallium Supply Chains." CSIS Brief, Center for Strategic and International Studies, July 2025. https://csis-website-prod.s3.amazonaws.com/s3fs-public/2025-07/250707_Riggs_Hidden_Reach.pdf?VersionId=ttMYRKHGQo.z9.NyCY0vEsJ.nMXERxND.

Reynolds, Justin. "Former Secretary Rice Stresses Importance of Winning Emerging Technology Race." State Magazine, April 2025, https://statemag.state.gov/2025/04/0425itn07.

Rowan, Linda R. Critical Mineral Resources: National Policy and Critical Minerals List. CRS Report R47982. Congressional Research Service, July 17, 2025. https://www.congress.gov/crs-product/R47982.

Sargent Jr., John F. "Global Research and Development Expenditures: Fact Sheet." Congressional Research Service (R44283), updated September 14, 2022. https://sgp.fas.org/crs/misc/R44283.pdf.

Scheyder, Ernest. "Western Start-ups Seek to Break China's Grip on Rare Earths Refining." Reuters, December 4, 2023. https://www.reuters.com/sustainability/climate-energy/western-start-ups-seek-break-chinas-grip-rare-earths-refining-2023-12-04.

Smith, Braeton J., Matthew E. Riddle, Matthew R. Earlam, Chukwunwike Iloeje, and David Diamond. Rare Earth Permanent Magnets: Supply Chain Deep Dive Assessment. US Department of Energy, February 23, 2022. https://www.osti.gov/biblio/1871577

Tesla. "Vehicle Production & Deliveries and Date for Financial Results & Webcast for Fourth Quarter 2023." January 2, 2024. https://ir.tesla.com/press-release/tesla-vehicle-production-deliveries-and-date-financial-results-webcast-fourth-quarter-2023

Tse, Pui-Kwan. China's Rare-Earth Industry. US Geological Survey Open-File Report 2011-1042. US Geological Survey, 2011. https://pubs.usgs.gov/of/2011/1042/of2011-1042.pdf

US Department of Commerce, Bureau of Industry and Security. "Commerce Launches Section 232 Investigation on Imports of Processed Critical Minerals and Derivative Products." Press release, April 23, 2025. https://www.bis.gov/press-release/commerce-launches-section-232-investigation-imports-processed-critical-minerals-derivative-products

US Department of Energy, Office of Energy Efficiency & Renewable Energy. "The History of the Electric Car." September 15, 2014. https://www.energy.gov/articles/history-electric-car

US Department of Energy, Office of Fossil Energy and Carbon Management. "Developing a Domestic Supply of Critical Minerals and Materials." February 26, 2024. https://www.energy.gov/fecm/articles/developing-domestic-supply-critical-minerals-and-materials

US Department of the Interior. "Department of the Interior Releases Draft 2025 List of Critical Minerals." Press release, August 25, 2025. https://www.doi.gov/pressreleases/department-interior-releases-draft-2025-list-critical-minerals

US Department of State. "Minerals Security Partnership." Accessed September 11, 2025. https://www.state.gov/minerals-security-partnership

US Department of the Treasury and Internal Revenue Service, "Advanced Manufacturing Production Credit," Federal Register 89 (October 28, 2024): 85,798–85,846, https://www.federalregister.gov/documents/2024/10/28/2024-24840/advanced-manufacturing-production-credit

US Geological Survey. "Gallium." In Mineral Commodity Summaries 2025. USGS, 2025. https://pubs.usgs.gov/periodicals/mcs2025/mcs2025-gallium.pdf

US Geological Survey. Mineral Commodity Summaries 2025 (ver. 1.2, March 2025). https://doi.org/10.3133/mcs2025

US Geological Survey. "Rare Earths." In Mineral Commodity Summaries 2025. USGS, 2025. https://pubs.usgs.gov/periodicals/mcs2025/mcs2025-rare-earths.pdf

US Government Accountability Office. Critical Materials: Action Needed to Implement Requirements That Reduce Supply Chain Risks. GAO-24-107176. September 10, 2024. https://www.gao.gov/assets/gao-24-107176.pdf

US Government Accountability Office. Critical Minerals: Building on Federal Efforts to Advance Recovery and Substitution Could Help Address Supply Risks. GAO-22-104824. June 16, 2022. https://www.gao.gov/assets/gao-22-104824.pdf

US Government Accountability Office. "Defense Production Act: Use and Challenges from Fiscal Years 2018 to 2024." GAO-25-108497 [Statement of William Russell, Director, Contracting and National Security Acquisitions]. GAO, June 12, 2025. https://www.gao.gov/products/gao-25-108497

The White House. “Australia-United States Climate, Critical Minerals and Clean Energy Transformation Compact.” Fact Sheet, May 20, 2023. https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2023/05/20/australia-united-states-climate-critical-minerals-and-clean-energy-transformation-compact

The White House. “Immediate Measures to Increase American Mineral Production.” Executive Order, March 20, 2025. https://www.whitehouse.gov/presidential-actions/2025/03/immediate-measures-to-increase-american-mineral-production

White, Edward. “China Raises State Funding for Strategic Minerals amid US Trade War.” Financial Times, March 19, 2025. https://www.ft.com/content/cace5b0f-e08c-4cb9-aac5-c3117d5a93bc

World Intellectual Property Organization. Global Innovation Index 2024: Unlocking the Promise of Social Entrepreneurship. WIPO, 2024. https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2000-2024-exec-en-global-innovation-index-2024.pdf

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