

Testimony of Dr. Thomas J. Duesterberg
Senior Fellow, Hudson Institute
U. S. Senate Committee on Energy and Natural Resources
June 24, 2020
On
“The Impact of COVID-19 on Mineral Supply Chains, the Role
of those Supply Chains in Economic
and National Security, and Challenges and Opportunities to
Rebuild America’s Supply Chains”

Chairman Murkowski, Ranking Member Manchin and Distinguished Members of the Committee,

My Name is Thomas J. Duesterberg and I am a Senior Fellow at the Hudson Institute in Washington, DC. I have served in various positions in the Congress and in the George H. W. Bush administration. I have also served as President and CEO of the Manufacturers Alliance for Productivity and Innovation, as a Senior Fellow at the Aspen Institute, and on the Board of Advisors of the Manufacturing Policy Institute at the O’Neill School of Public and Environmental Affairs at Indiana University. I would like to acknowledge the research assistance of Suri Xia, a master’s degree student at the O’Neill School. The views expressed in this testimony are mine alone and do not represent any position of the Hudson Institute.

Overview

The COVID-19 pandemic has accelerated some important preexisting trends toward bringing industrial supply chains, including medical products, back to the United States. First, the cut-off of medical supplies, not just from China but from Europe and other allies to some extent, brought the vulnerabilities of relying on outside sourcing into clearer and more immediate focus. 90 countries blocked the exports of medical products during the early months of the pandemic. Second, border closures around the world, even within the European Union,

added to the worries about interruptions in supply chains, including for workers and logistics. 70% of the world's points of entry restricted foreign travelers at some point as the pandemic grew.ⁱ Third, border closures and supply chain interruptions increased tension between nations, especially between the United States and China, which suffered severe reputational damage for its suppression of information at the start of the pandemic. Cooperation between the United States and allies also suffered. Fourth, the economic collapse due to the pandemic response again focused attention on the need to create more domestic jobs, including those in the hard-hit industrial sector. Finally, all of these developments led allies such as the United Kingdom, Japan and the European Union (EU) to reinvigorate thinking, and concrete policy proposals meant to bring production back to home territories. Clearly, these trends support policies to increase the resiliency of domestic production even beyond the parameters of defense and medical security.

I will focus my contribution on the importance of mineral and related metal resources to the manufacturing sector in the United States. Throughout our history, the vast mineral wealth of the United States has been a strong pillar of economic growth and of a high standard of living. Mineral resources have undergirded the strength of the manufacturing sector for over 200 years. Abundant energy resources have facilitated the flourishing of metals industries as well as more modern technology sectors. In recent decades however, this leadership position has been challenged by competitors ranging from Europe and East Asia to developing economic powers like China, Mexico and Brazil.

Moreover, the sources of growth in the globalized economy have evolved to more technologically sophisticated industries such as telecommunications, semiconductors, advanced computing, robotics, medical products and aerospace. Many of these new industries require different types of natural resources, combined with advanced scientific expertise, to foster new products for the global economy. The United States is not always well-endowed with the needed mineral resources, or the ability to procure them in an economically and environmentally efficient manner to compete with competitors, especially those with substantial state subsidies behind their extraction and manufacturing sectors. While the United States remains a leader in many of these industries of the future, and the related digital services and technologies enabled by them, such as artificial intelligence, autonomous vehicles and the Internet of Things, its leadership is increasingly challenged by capable and sometimes adversarial competitors such as China and Russia.

Part and parcel of the challenge, especially from the world's second largest economy, China, is exploiting a country's own natural resources, or gaining control of resources in other countries, needed for advanced industries. China's tactics, encapsulated in its Made in China 2025 and Belt and Road (BRI) programs, include purchasing mining assets from Central Asia to Africa, South America and even Australia.ⁱⁱ In the first decade of aggressive Chinese state investments to acquire natural resources outside its borders, nearly 50% of its purchases were in energy and 20% in mineral resources.ⁱⁱⁱ

In the rest of this report, I will concentrate on selected examples of growing US vulnerability to global competitors due to shortages of key mineral resources in our domestic supply base. Dependence on China for raw materials and competition with its manufacturing firms is also a key focus. Shortages do not always indicate a problem because our close allies in mineral-rich countries like Australia and Canada can mitigate gaps in domestic supply. However, China's growing control over many basic materials, and its history of using that control as leverage for its own economic and political goals makes this a cause of concern for the continued strength of the US manufacturing economy. In the remainder of my testimony, I will describe a few of the major concerns, and provide a few ideas of how to mitigate the problems.

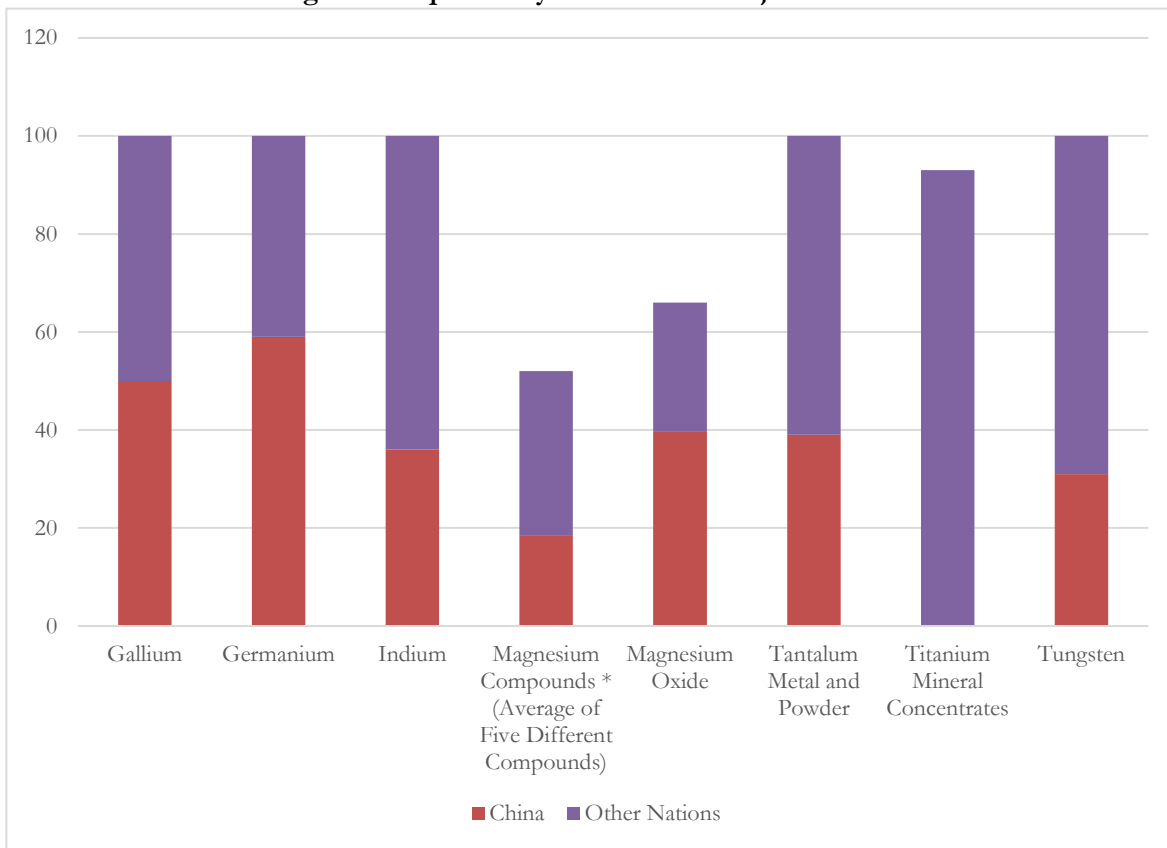
Impacts of Mineral Shortages on US Manufacturing;

-Traditional Industries

It is worthwhile to begin by noting the most recent example of US strength in natural resources, and the technologies of extraction, and their importance for manufacturing. The US chemicals industry, a nearly \$800 billion per year giant, has greatly benefitted from new drilling and mining techniques to become the world's leading producer of natural gas, and ample production has kept the price of this commodity very low in the United States. The US chemicals sector primarily employs natural gas and associated liquids as a feedstock, in contrast to European and Asian competitors which depend on petroleum-based liquids for a substantial majority of their primary feedstock.^{iv} Large and well-priced supplies of natural gas give the US producers an initial cost advantage compared to most global competitors.^v According to the American Chemistry Council, the recent boom in domestic supplies of natural gas has led to over \$200 billion in new capital investment in chemicals production in the United States, much of it by large European and Asian firms.^{vi} The related plastics industry in turn benefits from increased supplies at competitive prices of basic chemical feedstocks such as ethane. Over 400,000 jobs have been created in the United States by increased production and investment in the chemicals and related industries. The United States is now a large exporter of both natural gas and chemicals.

The US automobile industry remains one of the backbones of the manufacturing sector, but faces tough competition for the products of the future. Among the many challenges are competitively producing lighter weight and electric vehicles. Meeting carbon emission goals for this sector will require progress in replacing steel parts with lighter materials. A key component of lighter weight vehicles is magnesium. The metal is 70% lighter and stronger than steel. Its use of course is not limited to autos. It is important to all transportation equipment, construction materials, cases for laptop computers and cell phones, and batteries. Unfortunately, the United States produces virtually no raw manganese ore or finished magnesium (see Table 1).^{vii}

Figure 1: Dependency on China for Major Minerals



Source: U.S. Geological Survey (USGS), *Mineral Commodity Summaries*, National Minerals Information Center, January 2020.

China is now the world's largest producer and exporter of raw manganese and refined magnesium. Much of its access to raw materials results from ownership of mines in Africa. For the important magnesium metal market China produces over 80% of global production. The United States is highly dependent on foreign sources for manganese and magnesium metal, which is used in both steel and aluminum alloys. It has blocked imports of most finished magnesium from China much of this century, but because of its dominance of global production much of this originates in China and is reexported to the United States. The United States does import significant amounts of specialty compounds from Chinese sources. There are many other sources for magnesium compounds and metals, such as Canada, Australia, Brazil, Israel and Mexico. The Chinese auto industry, spurred by the Made in China 2025 program, prioritizes production of lighter vehicles and plans to increase the content of magnesium parts by over 500% in the next decade.^{viii}

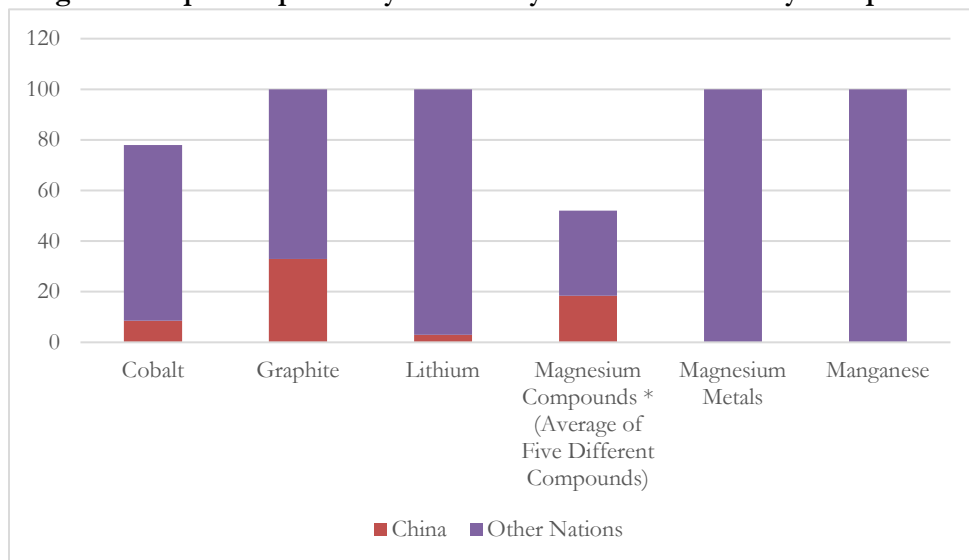
China is also determined to dominate the production of electric vehicles and their key component, advanced lithium-ion batteries. It has systematically acquired mining resources throughout the world for the metals that are used in these batteries (see Figure 2). China has a goal of reaching 80% domestic production of electric vehicles for the Chinese internal market,

the world’s largest, by 2025.^{ix} Lithium-ion batteries are also crucial to electronic products such as computers and cell phones. China has acquired substantial cobalt, lithium, magnesium oxide and graphite resources in major producing countries. The largest cobalt producer in the world is the Republic of the Congo, where China has bought 8 of the 14 largest mines. It also owns mines in Chile and Australia. The United States is totally dependent on imports, including from China, for these materials. 60% of imported magnesium oxide originates in China. A report from the *Wall Street Journal* bluntly concludes that “...there is a global race to control batteries and China is winning.”^x

Chinese battery manufacturers are not yet as agile and sophisticated as Japanese, Korean, and American firms. China does account for 37% of global battery production and 51% of US supply, as of 2019, but its dominance in raw materials and refining, along with its status as the world’s largest producer and consumer of autos, cell phones and computers, will likely result in superior economies of scale and a larger market share for advanced batteries in the future.^{xi} The Middle Kingdom has plans to increase battery production from its current level of 110 Gigawatt hours (GWh) to 260 GWh in the next few years, often with massive government subsidies. By comparison, Tesla’s “Gigafactory” in Nevada hopes to achieve annual production of 35GWh this year.^{xii} China has also captured 69% of the global market for recycling lithium-ion batteries.^{xiii}

China’s capture of fundamental raw materials for autos and battery production is a major threat to auto manufacturers in the United States, Europe and East Asia. The challenge is especially important because it has proven to be an unreliable supplier to foreign firms. China’s control of battery production, if it continues to expand, will also make any return of advanced electronics production to the United States problematic. But there are other challenges for high technology industries, in which the United States is now the world leader.

Figure 2: Import Dependency on Primary Lithium-ion Battery Components



Source: U.S. Geological Survey (USGS), *Mineral Commodity Summaries*,
National Minerals Information Center, January 2020.

-Advanced Technology Industries

It is well known that China has been the major force in production of so-called rare earths, and metals derived from them, partly because of its lesser standards for environmental protection than in the United States and other advanced countries. The US government, led by the Department of Defense, is supporting efforts to reenter the rare earths business, in large part because of the importance of these materials to high technology products like cruise missile guidance systems, night vision devices, and various defense-related electronics. I will focus on the importance of these and some other metals important to the vast commercial applications of semiconductors and for which the United States must depend on foreign suppliers. It is worth noting too that modern transportation vehicles are increasingly reliant on advanced electronics. Semiconductors also are the heart of computing and communications products that facilitate leading edge manufactured products such as autonomous vehicles and electric (rather than hydraulic) internal control systems for commercial airliners.

Gallium is not a rare earth but is a fundamental component of high-performance Gallium-Arsenide semiconductors, which are used in defense and mobile phone applications, among many others. Again, the United States has virtually no domestic sources for Gallium and relies on China for some 50% of its supplies (see Figure 1). China accounts for around 80% of global capacity for Gallium, according to U. S. Geological Survey data. The metal is also important to Light Emitting Devices (LEDs) and to fiber optic systems. Worldwide consumption of Gallium-Arsenide chips is expected to grow from \$4 billion in 2018 to \$22 billion in 2026.^{xiv}

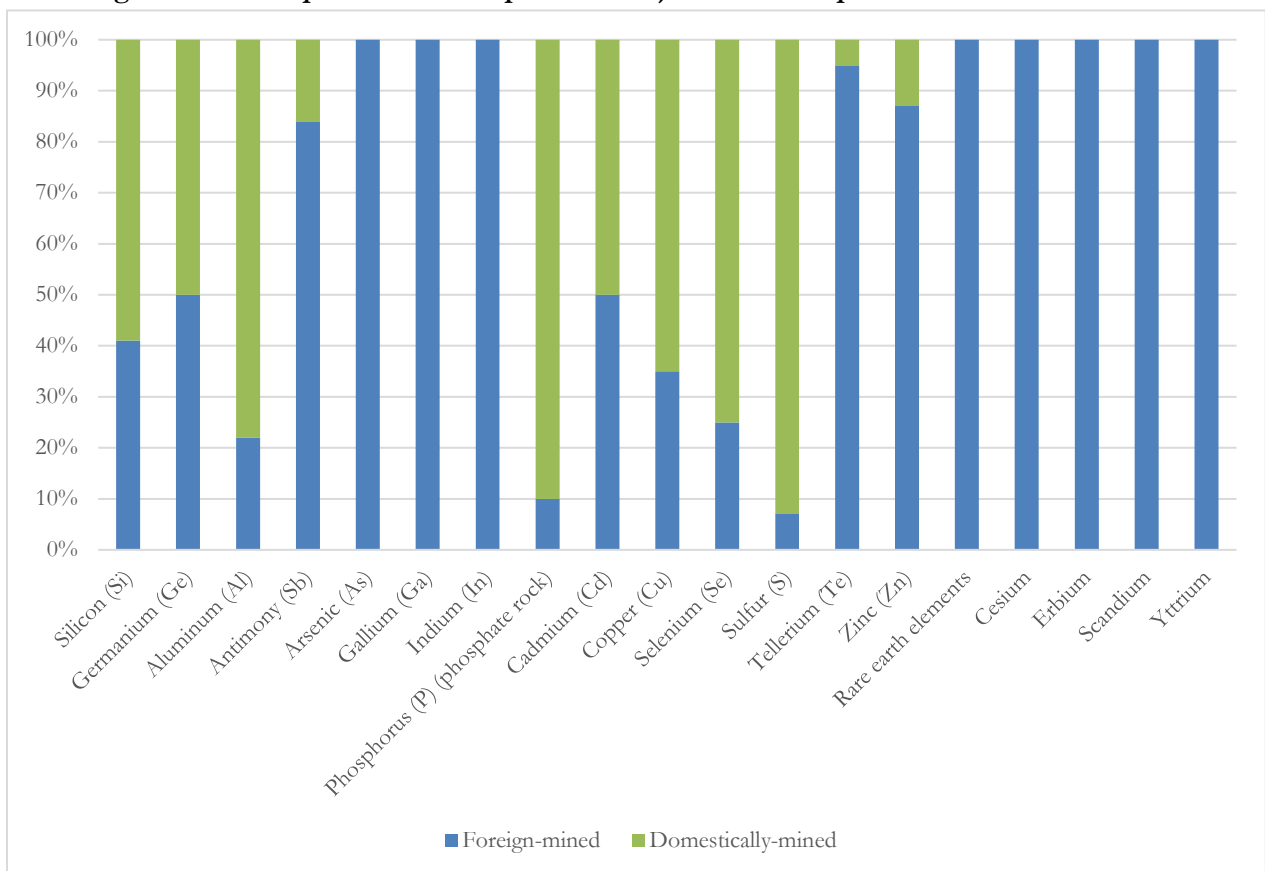
Other metals important to semiconductor production and for which the United States possess little or no domestic supply and depends on China for much of its imports include Tantalum (39% of imports from China), Tungsten (31% from China), and Indium (36% from China). China currently accounts for about 85% of global production of rare earths and around 80% (more in some recent years) of US imports of these metals.^{xv} Other important elements of semiconductor production include Selenium and Tellurium (see Table 3). It is worth noting that the estimated size of the global advanced semiconductor market is around \$500 billion.^{xvi}

It is hard to exaggerate the importance of semiconductors to the US economy.^{xvii} Although 55% of the actual physical production of US-designed semiconductors is done outside of the country, most leading-edge designs originate in domestic firms such as Intel, NVIDIA, Texas Instruments, Micron Technology, and AMD. Some US firms such as Qualcomm, a leading designer of advanced chips used in cell phones and other communication equipment, contract

most of their designs to fabricators such as Taiwan Semiconductor Manufacturing Corporation (TSMC). US firms represent 47% of world production of semiconductors and maintain a large trade surplus in these products, despite producing many of them abroad. They exported more than \$45 billion of product in 2019 and maintain a large trade surplus. The US industry devotes around 20% of revenues to research and development to maintain its technological lead over competitors in China, Japan, Taiwan, Korea and Europe. This spring TSMC, the world’s largest fabricator, announced it will build a \$12 billion new facility in Arizona.^{xviii}

If the United States wants to build on its lead in semiconductors and expand the domestic production footprint, it would benefit from having a greater capacity to produce the rare earths and other somewhat obscure minerals listed in Figure 3 that form the basis of advanced electronic circuits. The large and growing computer and telecommunications sectors as noted earlier depend on advanced semiconductors. The entire US electronics industry requires a more reliable resource base to maintain, and preferably expand, its manufacturing footprint.

Figure 3: U.S. Dependence on Imports for Major Metal Components of Semiconductors



Source: Christiana Honsberg & Stuart Bowden, “Semiconductor Materials,” PVEducation, 2019;

U.S. Geological Survey (USGS), *Mineral Commodity Summaries*, National Minerals Information Center, January 2020.

It is also worth noting that two other high technology sectors also require many of the same materials as the semiconductor industry. Although severely challenged by subsidized Chinese competitors, US solar photovoltaic (PV) manufacturers are leaders in this growing field so important to meeting commitments for reduction of greenhouse gases. First Solar, the largest US player in the market, uses a “thin film” technology with an electronic core of Cadmium and Tellurium compounds.^{xix} US suppliers do produce about 50% of the Cadmium required for its products, but must import almost all of the Tellurium. China supplies over 90% of annual US consumption of this rare earth. First Solar’s products are much less bulky and thick than silicon crystal solar cells, thus requiring less labor to install. Its systems are less costly than competing silicon crystal products. In the face of intense competition from Chinese and European producers, First Solar is concentrating its business on large electric generating facilities, a growing part of the US market.

The fiber optic cable and laser industries also depend on important rare earths: Erbium, Ytterbium, Neodymium, Thulium and Holmium. The first three are the most widely used.^{xx} Tungsten, Titanium and Zirconium are also integral components of fiber optic systems, the backbone of the digital transmission network.^{xxi} Lasers are obviously a key part of these systems, ensuring the generation and amplification for long-distance transmission of light impulses carrying data, and they utilize many scarce materials. China is the major source of the most important rare earth metals for fiber optic systems, and a significant source of Tungsten and Titanium. The United States does not produce any raw Tungsten and relies on China for 31% of supply. (This metal is also important for metalworking and oil and gas drilling equipment). It also has minimal amounts of domestic Titanium, producing only about 9% of consumption, although most supplies originate in Japan.

Chinese telecommunication giant Huawei is a major competitor in fiber optic cable systems.^{xxii} Given the importance of these systems as the backbone of modern digital communications, it is essential for US fiber optic and laser industries to maintain leadership and market share in these technologies. Access to scarce raw materials is crucial. Lasers are also extremely important, and becoming more important, to national defense applications.

Some Ideas for US Strategy for Key Minerals for Advanced Manufacturing

The Trump administration has already begun to address the underlying problem of import dependence for critical minerals. A 2017 presidential executive order on “critical materials” charged the executive branch with developing a comprehensive strategy to reduce dependencies. In May of 2018, the Department of the Interior issued a list of 35 critical minerals, which includes all the major minerals highlighted in this report. DoD has also for many years been active in defining mineral resources needed for national defense and has built

stockpiles of many of the most important of these. These efforts are a starting point and deserve support by the Congress. This is especially important in terms of budgetary support and clear legislative authorization for minerals used in commercial applications not covered by DoD priorities. The bipartisan bill authored by the Chairman and Ranking Member of this Committee, the “American Mineral Security Act,” S. 1317, is an excellent start to accomplishing this national priority.^{xxiii} I would emphasize the importance of the attention in the bill to promoting research in processing technology, recycling and development of the appropriate workforce for the mining and processing industries.

In view of the importance of the critical materials to the highly productive and innovative manufacturing sector, and of the goal to consolidate production and supply chains in the United States (or at least away from unreliable and subsidized Chinese sources) other ideas ought to be considered by the Congress. Senator Cruz has a proposal for tax incentives for onshore investment in rare earth mines, and for a 200% deduction for purchases of domestically produced rare earth metals.^{xxiv} It also requires DoD to source all purchases of rare earths from US suppliers. I would urge the committee also to review the more general ideas of Professor Willi Shih of the Harvard Business School, who outlines a policy of broad “demand side” stimulus from Federal purchasing power for critical industries, as well as methods to allow “pre-competitive research consortia” to promote public-private collaboration in developing new technologies.^{xxv} These ideas could be applied to the mineral resources and processing industries.

DoD recently awarded, then shortly thereafter suspended, two contracts for seed funding for rare earth processing in the United States.^{xxvi} Opposition in the Congress to the Australian awardee, Lynas, was based on debate about whether to use US government funding for minerals from a foreign source.^{xxvii} Questions about a minor Chinese stake in the California-based awardee, MP Materials, was behind the freezing of the second contract. These questions are appropriate for Congress to debate, but don’t seem insurmountable to clear up. Overall, the underlying idea of supporting new process-manufacturing technology is a sound one, as is the overall idea of using Federal resources for incentivizing demand for domestic production. Using Federal purchasing power to stimulate the demand side is appropriate for other critical materials.

I also believe that US strategy on the larger question of reliable supplies of critical materials ought to include coordination with the “Five Eyes” group.^{xxviii} These are historically our most consistent allies, and ones who share a common economic philosophy as well as a willingness to push back on growing Chinese influence. They can be trusted to be part of critical supply chains, as suggested by London’s Henry Jackson Society. Fortunately, members of this group—Canada, Australia, United Kingdom and New Zealand—are significant producers of minerals and metals, and manufactured goods, needed for defense and advanced technology leadership. Some analysts, including the Henry Jackson Society, have also supported the idea of eventually bringing Japan into the Five Eyes.

If the United States is to reinvigorate mining, recovery and processing of critical minerals, it undoubtedly requires a new look at how these industries are regulated. To compete with China and its growing natural resources network in developing countries means either incentivizing production by lowering well-known regulatory barriers or simply deciding to pay more for the critical resources, either through use of public funds or by imposing more costs on the users of these materials. Some rethinking of regulatory barriers is warranted in my view.^{xxix}

I and many others have argued that trade policy represents another basket of tools to reduce import dependency due to unfair trade practices or to meet national security requirements.^{xxx} US trade actions to increase tariffs on China and reduce its ability to buy strategic assets have already reduced the ability of China to use its economies of scale and advance its ascent of the technology ladder in manufacturing. Other related tools, but ones not widely recognized, are the antidumping (AD) and countervailing duty (CVD) laws. These are the most widely used trade actions in the US arsenal in the last decades, and are partially effective in blocking subsidized products. Magnesium metal imports are just one target among the hundreds of actions directed against China.^{xxxi} I also would argue that US trade policy should be coordinated—difficult as that is—with close allies, not only the Five Eyes group but with Europe, Japan, Korea, Taiwan and, hopefully, India.^{xxxii} China is simply too large an economy, with growing political reach, for the United States acting alone to influence decisively. The World Trade Organization could be helpful in curbing China’s mercantilist policies of subsidization and theft of intellectual property, but it requires significant reform before it can be effective in doing so.^{xxxiii}

In closing, I commend the Committee for its leadership in addressing one of the most important economic and political challenges in the difficult domestic and global political economy now facing the United States. These challenges were not caused by the COVID-19 pandemic but were certainly deepened by it. I hope the analysis and suggestions in this testimony are helpful to the deliberations of the Committee.

ⁱ For a recent overview of pandemic-related restrictions of global movement of goods and travelers, see: Jacob M. Schlesinger, “How the Coronavirus Will Reshape World Trade.” *The Wall Street Journal*, June 19, 2020. https://www.wsj.com/articles/how-the-coronavirus-will-reshape-world-trade-11592592995?mod=hp_lead_pos5

ⁱⁱ See John Lee, “China’s Economic Slowdown: Root Causes, Beijing’s Response and Strategic Implications for the US and Allies;” Hudson Institute, December 16, 2019. <https://www.hudson.org/research/15551-china-s-economic-slowdown-root-causes-beijing-s-response-and-strategic-implications-for-the-us-and-allies>

ⁱⁱⁱ *Ibid.*, P. 70.

^{iv} U. S Department of Energy, Energy Information Administration, “Natural Gas expected to remain most-consumer fuel in the U. S industrial sector.” March 1, 2018. <https://www.eia.gov/todayinenergy/detail.php?id=35152>

^v American Chemistry Council, “Shale Gas, Competitiveness, and New US Chemical Industry Investment: An Analysis Based on Announced Projects.” May, 2013. March 4, 2020.

https://www.americanchemistry.com/News_and_Resources/?topic=&srchtext=&ref=VGV4dCxlYnR0YXhvbW9teWNhdGVnb3J5LGVidHRheG9ub215Y2F0ZWdvcnkIM2EIMjJb250ZW50K3R5cGUraW5mb2dyYXBoaWNzK2FuZCtmYW50K3NoZWV0cyUyMg==

^{vii} Unless otherwise noted, all data in this report are derived from: U. S. Geological Survey (USGS): “Mineral Commodity Summaries,” National Minerals Information Center. January, 2020.

<https://www.usgs.gov/centers/nmic/mineral-commodity-summaries>

^{viii} Lee, *op. cit.*, Pp. 42-48.

^{ix} *Ibid.*, P. 56.

^x Scott Patterson and Russell Gold, “There’s a Global Race to Control Batteries—and China is Winning: Chinese companies dominate the cobalt supply chain that begins in Congo.” *The Wall Street Journal*, May 18, 2018.

<https://www.wsj.com/articles/theres-a-global-race-to-control-batteriesand-china-is-winning-1518374815>

^{xi} J. Rogers, D. Foxall, M. Henderson and S. Armstrong, “Breaking the China Supply Chain: How the ‘Five Eyes’ can Decouple from Strategic Dependency;” Henry Jackson Society. May 14, 2020. P. 28.

<https://henryjacksonsociety.org/publications/breaking-the-china-supply-chain-how-the-five-eyes-can-decouple-from-strategic-dependency/>

^{xii} Patterson and Gold, *op cit.*

^e^{xiii} See Tanaka Precious Metals, “How China is cornering the Lithium-ion Cell Recycling Market.” November 28, 2019. <https://tanaka-preciousmetals.com/us/elements/news-cred-20191128-04/#:~:text=It's%20just%20that%20China%20has,U.K.%2Dbased%20Circular%20Energy%20Storage.>

^{xiv} Research and Markets, “Next Generation Gallium Arsenide (GaAs) Semiconductors Market: Shares, Forecasts, Analysis. March 3, 2010. <https://henryjacksonsociety.org/publications/breaking-the-china-supply-chain-how-the-five-eyes-can-decouple-from-strategic-dependency/>

^{xv} In addition to USGS sources, see: “U. S. dependence on China’s rare earth: Trade war vulnerability;” *Reuters*, June 27, 2019. <https://www.reuters.com/article/us-usa-trade-china-rareearth-explainer-idUSKCN1TS3AQ>

^{xvi} Research and Markets, *op. cit.*

^{xvii} See, Semiconductor Industry Association, “2020 State of the U. S. Semiconductor Industry,” (Washington, DC, 2020). <https://www.semiconductors.org/2020-state-of-the-u-s-semiconductor-industry/>

^{xviii} Steve Dent, “Apple chip-maker TSMC is building a \$12 billion plant in Arizona,” *Engadget*, May 15, 2020.

<https://www.engadget.com/tsmc-12-billion-chip-plant-arizona-083518143.html>

^{xix} See Wikipedia “First Solar.” https://en.wikipedia.org/wiki/First_Solar

^{xx} See Wikipedia, Extavour Marcus, “Rare Earth elements: High Demand, Uncertain Supply.” *Optics & Photonics News* (The Optical Society), July 1, 2011.

^{xxi} G. Haxel, J. Hendrick and G. Orris, “Rare Earth Elements—Critical Resources for High Technology.” U. S. Geological Survey, Fact Sheet 087-02. <https://pubs.usgs.gov/fs/2002/fs087-02/>

^{xxii} Meaghan Tobin, “US-China Tech War’s New Battleground: Undersea Cables,” *South China Morning Post*, December 14, 2019. <https://www.scmp.com/week-asia/politics/article/3042058/us-china-tech-wars-new-battleground-undersea-internet-cables>

^{xxiii} U. S. Senate committee on Energy and Natural Resources, “Murkowski, Manchin, Colleagues Introduce Bipartisan Legislation to Strengthen America’s Mineral Security.” May 3, 2020.

<https://www.energy.senate.gov/public/index.cfm/2019/5/murkowski-manchin-colleagues-introduce-bipartisan>

^{xxiv} Office of Senator Ted Cruz, “Sen. Cruz Introduces Legislation to Reduce Dangerous U. S. Dependence on China for Critical Materials,” Press Release of May 12, 2020.

^{xxv} Willi Shih, “On Research and Development: Pre-competitive research & development consortia are vital to sparking innovation.” *American Compass*, June 8, 2020. <https://americancompass.org/essays/on-research-development/>

^{xxvi} Ernest Scheyder, “Exclusive: Pentagon halts rare earths funding for Lynas, MP Materials,” *Reuters*, May 22, 2020. <https://finance.yahoo.com/news/exclusive-pentagon-halts-rare-earths-141449215.html>

^{xxvii} Colin Kreuger, “US political heat puts Lynas defense contract on ice.” *The Sydney Morning Post*, May 25, 2020. <https://www.smh.com.au/business/companies/us-political-heat-puts-lynas-defense-contract-on-ice-20200522-p54vop.html>

^{xxviii} J. Rogers *et. al.*, “Breaking the China Supply Chain, *op. cit.*”

^{xxix} See Oren Cass, “On Regulatory Reform: Outdated environmental regulation poses an irrational barrier to reshoring efforts,” *American Compass*, June 10, 2020. <https://americancompass.org/essays/on-regulatory-reform/>

^{xxx} Thomas J. Duesterberg, “On Terms of Trade: The international trading system must recover the core principles of reciprocity, security and democracy,” *American Compass*, June 11, 2020.

<https://americancompass.org/essays/on-terms-of-trade/>

^{xxxi} Gilbert Kaplan, “Will Trade Enforcement Trends Continue?” Indiana University, O’Neill School of Public and Environmental Affairs, Manufacturing Policy Initiative. June, 2020. <https://manufacturingpolicy.indiana.edu/news-publications/publications/insight/2020/insight-062020.html>

^{xxxii} Thomas J. Duesterberg, “The US Needs Allies on Trade,” *The Wall Street Journal*, April 23, 2018.

<https://www.wsj.com/articles/trump-needs-allies-on-trade-1524524224>

^{xxxiii} Thomas J. Duesterberg, “Now is a Good Time to Modernize the WTO.” *The Wall Street Journal*, December 1, 2019. <https://www.wsj.com/articles/now-is-a-good-time-to-modernize-the-wto-11575229069>