

In February 2021, President Biden issued Executive Order 14017, "[Executive Order on America's Supply Chains](#)" (discussed [here](#)), requiring (among other things) a report within 100-days requiring key government agencies to assess vulnerabilities and consider potential improvements to supply chains in four critical industries – (i) semiconductor manufacturing; (ii) high capacity batteries; (iii) rare earth elements; and (iv) pharmaceuticals.

On June 8, 2021, the White House released its [100-day Supply Chain Review Report](#) and accompanying [fact sheet](#). This article does not attempt to relay all of the information from the 250-page Report (the Report's Executive Summary alone is 6 pages). Instead, we have attempted to summarize some of the Report's most salient points and suggest how the risks, challenges, and recommendations discussed in the Report may impact companies that do business in these four critical industries.

Summary of the 100-day Supply Chain Review

As a reminder, the Executive Order asked for a quick-turn report within 100 days discussing four "critical" industries and the associated supply chain. Specific government agencies were assigned to lead the quick-turn review as follows:

Industry/Supply Chain Issues	Responsible Agency
Semiconductor manufacturing	Department of Commerce

High-capacity batteries
(including those for electric
vehicles)

Department of Energy

Rare earth elements

Department of Defense

Pharmaceuticals

Department of Health and
Human Services

Our summary, below, focuses on what we see as the key risk areas and challenges, as well as certain of the resulting recommendations identified by each reviewing agency.

I. Semiconductor Manufacturing and Advanced Packaging (Department of Commerce)

Key Risks and Challenges

1. **Fragile supply chains.** Semiconductor supply chains are immense, and require vast inputs and resources to function properly. Because the industry is highly specialized and geographically concentrated (in Asia), a natural or human-made disaster has the potential to cause a massive disruption in the industry.
2. **Malicious supply chain disruptions.** As microchips become more complex and outsourced, the risk of malicious interference or disruptions increases dramatically. In particular, this includes insertions of malicious vulnerabilities (e.g., “back doors” that can allow malicious actors to target a

system using the chip). Counterfeiting and re-use of compromised semiconductors presents an additional risk, including revenue loss and early or catastrophic failure of end systems.

3. **Dependence on China.** U.S. equipment companies are nearly entirely dependent on foreign suppliers, with purchases from China accounting for an increasingly large percentage of the market. Semiconductor companies would be significantly impacted by trade restrictions, embargos, or conflicts involving China. In short, the need to rely so heavily on a non-U.S. ally for an essential component of nearly every modern technology product puts the U.S. at significant risk.

Key Recommendations

1. **Fully fund the “Creating Helpful Incentives for Production of Semiconductors (CHIPS) for America” program.** The 2021 National Defense Authorization Act, Pub. L. No. 116-283 §§ 9901-9908, incentivizes domestic investment in semiconductor production. The Department of Commerce recommends these programs be fully funded to incentivize semiconductor manufacturing and research and development (R&D) to promote long-term U.S. leadership in the industry.
2. **Strengthen the domestic semiconductor manufacturing ecosystem.** This recommendation suggests legislative action, incentives, and investment to “support key upstream—including semiconductor manufacturing equipment, materials, and gases—and downstream industries to offset high operational costs in the United States.” Specifically, the

government may leverage programs like the International Trade Administration's "SelectUSA" program and the Department of Commerce National Institute of Standards and Technology (NIST) Manufacturing USA Institute, both of which have been requested in President Biden's 2022 Budget.

- 3. Support manufacturers, particularly small and medium-size businesses.** To enhance innovation, the Department of Commerce recommends the U.S. Government invest R&D resources in small and medium-sized business, as well as disadvantaged firms along the supply chain. This kind of diversification will reap benefits both in terms of innovation and also jobs.
- 4. Protect U.S. technological advantage.** To address national security and foreign policy concerns, the Department of Commerce recommends that export control policies align with policy actions related to the supply chain. Additionally, the Department of Commerce recommends that reviews by the Committee on Foreign Investment in the U.S. (CFIUS) consider the national security concerns related specifically to the semiconductor supply chain before approving foreign investment in U.S. companies.

II. Large Capacity Batteries And Electric Vehicles (EVs) **(Department of Energy)**

Key Risks and Challenges

- 1. Weak domestic production/foreign dependence.** Global production of the minerals that are essential to producing

high-capacity batteries – including lithium, cobalt, nickel, and graphite – each are primarily dependent on a single nation, China. Additionally, the business of refining these minerals is dominated by China and Russia. Dependence on potential adversaries is a huge supply chain risk, as these countries can use market control to restrict access to necessary materials to build long-lasting batteries.

2. **Geopolitical issues.** This includes a host of different issues including restriction of access to resources by China; substandard materials being offered to U.S. makers of the battery cells; and human rights violations (including forced labor) or other types of corruption in countries in the supply chain.
3. **Market/economic shocks.** As demand increases, and supply struggles to keep pace, it is likely that battery prices may spike in the future. Additionally, any tax or penalties on products whose production and delivery require large CO₂ emissions could lead to secondary market related disruptions. If such policies become widespread, the price of Chinese products, in particular, could rise sharply, placing U.S. EV manufacturers at a severe disadvantage.

Key Recommendations

1. **Stimulate demand for end products using domestically manufactured high-capacity batteries.** This recommendation focuses on supporting U.S.-based demand in two sectors: (1) transportation and (2) utilities. For transportation, the Department of Energy recommends: (a) transitioning the entire federal government vehicle fleets, as

well as other school and transit buses, to EVs; (b) providing rebates and tax credits for consumers (with a “Buy America” preference for U.S. content); and (c) supporting the EV charging infrastructure across the country. Likewise, for utilities, the Department of Energy recommends: (i) accelerating federal procurement of battery storage; (ii) expanding tax credits to include stationary storage as a stand-alone resource; and (iii) reforming power transmission regulations to support renewable power and stationary energy storage.

2. **Strengthen responsibly-sourced supplies for key advanced battery minerals.** The Department of Energy recommends: (a) that the U.S. invest in targeted, mineral-specific strategies, including supporting sustainable domestic extraction of lithium; (b) recovering nickel and cobalt from recycled or unconventional sources; and (c) working with global allies to expand global production and increase access to supplies.
3. **Promote sustainable domestic battery materials, battery cell, and battery pack production.** This recommendation centers around financial support and investment from the U.S. government in the form of grant programs, tax credits, and federal procurement contracts. It specifically mentions leveraging the Department of Energy’s Advanced Technology Vehicle Management Loan program and reviving and expanding Section 1603 of the American Recovery and Reinvestment Tax Act (ARRTA) program to support small manufacturers in the batteries, battery cells, and related material processing supply chain.

III. Critical Minerals and Materials (Department of Defense)

Key Risks and Challenges

- 1. Concentration of supply.** Strategic and critical minerals are any materials that are needed to supply the military, industrial, and essential civilian needs of the United States during a national emergency, and that are not found or produced in the U.S. in sufficient quantities to meet such need. These materials can be found in nearly every electronic device, and they support high value-added manufacturing and high-wage jobs, in sectors such as automotive and aerospace. Similar to the materials needed for high-capacity batteries, a significant portion of global production for strategic and critical minerals is concentrated in only one or a few countries (predominantly China). The lack of diversity in suppliers creates a single point of disruption for a large portion of the global supply. In some instances, the concentration of supply is so extreme that production is limited to a single source (often China).
- 2. Price shocks.** The markets for critical minerals are often small and the production efforts are complex, which leads to a relatively inelastic supply. Such markets are particularly susceptible to massive price spikes and volatility.
- 3. Human rights and related issues.** Production and trade of critical minerals often involve a host of concerns, including forced and child labor, violence related to conflict minerals, profiteering by non-state actors, environmental pollution, organized crime, and corruption.

Key Recommendations

- 1. Expanding sustainable domestic production and processing capacity.** The Department of Defense recommends the U.S. Government work with key stakeholders from the private sector, labor, and nongovernmental organizations (NGOs) to develop sustainability metrics for critical materials. Additionally, the Department of Defense recommends the U.S. government adopt a sustainability requirement (*g.*, a “sustainably produced” standard) for its purchasing, and develop a related Federal Acquisition Regulation (FAR) rule to establish a preference or requirement for the selection of products with higher sustainably-produced content.
- 2. Deploy the Defense Production Act (DPA) and other programs to incentivize production.** The Department of Defense recommends that multiple agencies use the DPA and other existing authorities and funding to incentivize production across the critical materials supply chain, including downstream, high value-added manufacturing such as new magnet capabilities and advanced electric motor designs. The Department of Defense recommends using similar programs to support R&D efforts, such as those focused on rare earth magnet recycling capabilities.
- 3. Convene industry stakeholders to expand production.** This recommendation also is related to the DPA, which authorizes the U.S. government to convene industry groups (with protection from civil and criminal anti-trust law) to coordinate business activities and form plans of action that satisfy a national need. The Department of Defense

suggests convening such a group to identify opportunities to expand sustainable domestic production, and explore opportunities to create consortia or public-private partnerships for sustainable domestic processing of key strategic and critical materials.

IV. Pharmaceuticals and Active Pharmaceutical Ingredients (API) (Department of Health and Human Services)

Key Risks and Challenges

- 1. Foreign dependence/lack of domestic manufacturing.** As with the other supply chain areas, dependence on foreign nations has been cited as a key vulnerability for the U.S. pharmaceutical supply chain. The need to acquire pharmaceutical products at the lowest cost possible has led to a consolidation of production in foreign, low-cost countries (such as India). This potentially allows foreign governments to leverage such dependency by interrupting U.S. access to these supply chains.
- 2. Limited resilience.** Because of the cost and complexity of pharmaceutical manufacturing, the supply chain is particularly susceptible to disruptions. For example, shifting from an unreliable third-party source and expanding manufacturing can take significant time and require costly investment and time to obtain regulatory approvals.
- 3. Limited redundancy.** Most production of the active pharmaceutical ingredients occurs outside of the U.S., and sometimes from a single source. As such, the supply chain is

particularly vulnerable to changes in natural disasters or other disruptions that could occur in one country, but affect the entire supply chain. Additionally, there are a limited number of drug manufacturers per unique drug, such that the markets are highly concentrated, which can lead to increased costs.

Key Recommendations

- 1. Improve supply chain transparency and incentivize resilience.** The Department of Health and Human Services recommends that any new policies seek to provide increased transparency related to the sources of drug manufacturing and the quality of the facilities that make them. This will incentivize purchasers to rely on more resilient suppliers with higher quality production and a more robust supply chain.
- 2. Increase the economic sustainability of U.S. and allied drug manufacturing and distribution.** The U.S. market is often undercut by cheaper options, particularly from India and China. To increase domestic capacity for production of key drugs, the U.S. should focus on: (a) increasing the economic sustainability of U.S. and allied drug manufacturing; (b) increasing government and private sector flexibility in contracting and sourcing of finished drugs and raw materials; and (c) studying whether the current market for finished drugs supports a diversification of supply instead of relying on one or two suppliers through preferred contractual arrangements.

3. **Boost domestic production and foster international cooperation.** The Department of Health and Human Services recommends boosting domestic production with a mix of: (a) targeted investments and financial incentives (including through use of the DPA); (b) R&D to create new manufacturing technologies; (c) greater supply chain transparency; and (d) improved data collection to better understand the economics and supply chain realities.
4. **Build emergency capacity.** In addition to bolstering domestic production and creating additional supply chains with U.S. allies, the Department of Health and Human Services recommends creating a virtual stockpile of active pharmaceutical ingredients and other critical materials necessary to produce critical drugs during times of crisis.

Conclusion

- More business in these four industries/sectors (especially in the U.S.). The recommendations suggest there likely will be increased domestic investment by the Government (including tax credits and tax incentives). Overall, there seems to be recognition that domestic options may be more expensive, but that the higher price is worth the cost.
- Higher costs for foreign sourcing. The Government will be looking to increase the costs associated with foreign sourcing, making those foreign sources more expensive and thereby more competitive with the more costly domestic alternatives.

- Restrictions on Chinese imports. In particular, the Government will continue to move away from sourcing products/components/materials from China – “China” is the great buzzword in this Report, being mentioned 458 times!
- More “Buy America” requirements.
- More regulations.
- Implementation of the new bi-partisan infrastructure bill (announced last week), complete with its focus on public transportation options, may give us near-term insights into how some of these policies will play out over the longer term (including the push for more domestic jobs).