

U.S. Minerals Mining

THE HEART OF OUR ECONOMIC RECOVERY AND A PROSPEROUS FUTURE

Mining provides the raw materials required for nearly every industry and consumer product, feeding our manufacturing, defense, medical and energy supply chains. From foundations to roofs, power plants to wind farms, roads and bridges to communications grids and data storage centers — America's energy and infrastructure projects begin with mining. Despite being home to one of the world's leading minerals reserves, the U.S. remains 100 percent dependent on imports for 17 key mineral resources and more than 50 percent dependent on imports for another 29 mineral commodities — most of which are available here at home.



It takes close to 10 years to secure a mine permit in the U.S. — one of the longest mine permitting processes in the world — while Australia and Canada, which have similar environmental standards and practices, take between two and three years.

Securing our domestic supply chains.

The COVID-19 pandemic revealed the problem with relying on global supply chains for our essential needs, placing a priority on focusing on the resources we have in abundance at home and determining how to better support access to those resources.

Solar panels and wind turbines. Electric vehicles. Medical devices. Infrastructure projects. A wide range of existing and emerging technologies and projects are set to cause an unprecedented increase in demand for a large number of mineral commodities.

Despite being resource-rich as a nation, permitting delays have been called and continue to be the most significant risk to mining projects in the United States. As the permitting of promising projects across the U.S. drags on, geopolitical rivals are taking advantage of our bureaucratic inertia.

And as our country grapples with the path to economic recovery, some of the most promising, stable and lucrative jobs are at America's mines.

Increasing mineral demands.

As the pandemic took hold around the world, awareness of the antimicrobial properties and medical applications of minerals like copper, silver, gold, zinc and other materials skyrocketed and discussions around their increased use in future infrastructure projects increased.

"...in the 1980s, 12 elements were used in the manufacture of computer chips. A decade later, 16 elements were employed, and by 2006, as many as 60 elements were used in the manufacture of high-speed, high-capacity integrated circuits."

- USGS Critical Mineral Resources of the United States

And even before the onset of COVID-19, a number of groups sounded the alarm about expected soaring demand for minerals related to new and expanding technologies. The World Bank Group, for example, estimated that the production of minerals such as graphite, lithium and cobalt, could increase by nearly 500 percent by 2050, to meet the

growing demand for clean energy technologies alone, and that more than 3 billion tons of minerals and metals will be needed to deploy wind, solar and geothermal power, and energy storage. The Center for Strategic and International Studies (CSIS) estimates a 1,000 percent jump.

Minerals Mining and Our Economy

- 421,000 direct minerals mining jobs
- 737,000 indirect minerals mining jobs
- Average wage for all U.S. miners: \$80,968 vs. average wage for all U.S. workers \$59,213
- \$6 billion. Value of minerals the U.S. imports from foreign countries, despite being home to reserves estimated at \$6.2 trillion.
- 4 percent. U.S. share of the world's nonferrous, nonfuel mineral production.

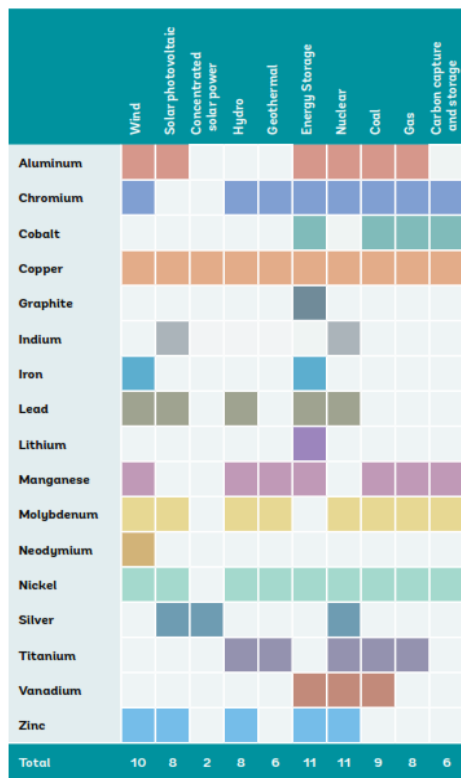
Minerals and advanced energy technologies.

Advanced energy technologies - from solar photovoltaic, wind and geothermal, to carbon capture and even the production of electronic vehicles - simply require vastly more materials than traditional fossil fuel-based technologies.

In December 2019, CSIS and the Blue Green Alliance (BGA) brought together a group of stakeholders to examine a path forward for a critical minerals strategy. The group noted, "Today, the United States lacks strategies for responsibly mining these materials at home, for developing sustainable supply chains for their incorporation into the clean energy economy, and for leading through example and cooperation with other nations that seek to mine and develop these resources in safe, environmentally responsible, and socially inclusive ways."

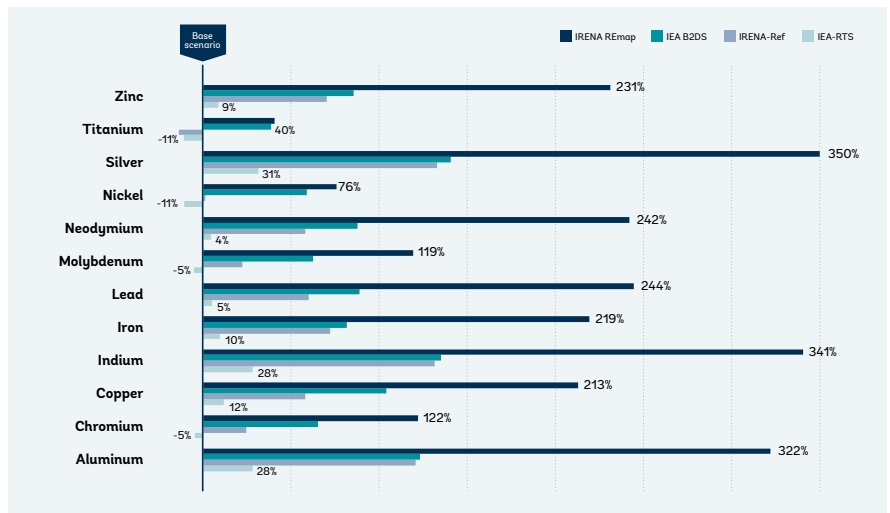
Given the new world order, increased need for secure supply chains, and exponentially increasing demand for minerals, the status quo for American mining is no longer an option.

Mapping minerals with relevant technologies



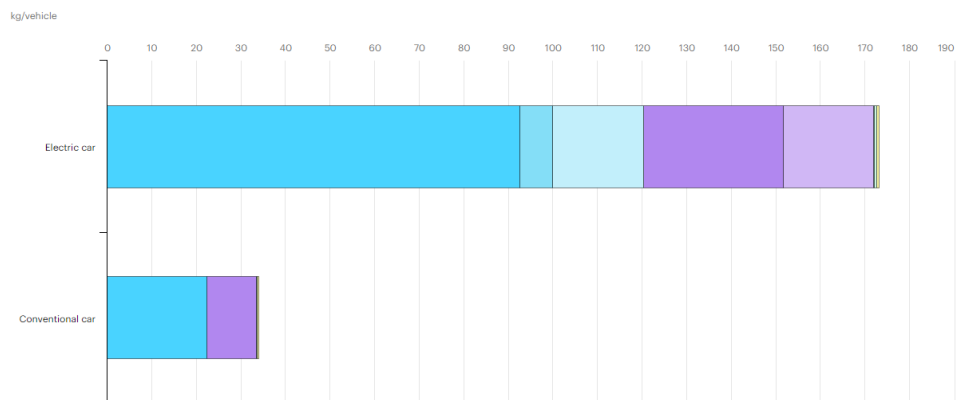
Source: *The World Bank, "Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition," page 37.*

Relative change in demand for minerals from energy technologies through 2050 (various scenarios considered)



Note: Base scenario = 4-degree scenario. B2DS = beyond 2-degree scenario. IEA = International Energy Agency. IRENA = International Renewable Energy Agency. Ref = reference scenario. REmap = renewable energy roadmap scenario; RTS = reference technology scenario.

Source: *The World Bank, "Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition," page 72.*



Source: *IEA, Minerals used in selected transport technologies, IEA, Paris https://www.iea.org/data-and-statistics/charts/minerals-used-in-selected-transport-technologies.*

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The U.S. strategic disadvantage.

Over the years, the U.S., has watched as geopolitical rivals and close allies alike have taken the lead in minerals production.

In 1995, the U.S. was 100 percent import reliant for just 8 minerals. Today that number has more than doubled at 18. Getting to specifics, the of the 35 mineral commodities listed as essential for U.S. economic and national security, China is the top producer or top supplier for 23 of them. China also controls the manufacturing of technologies – be they solar panels or lithium-ion batteries – that depend on them. Between April 2019 and April 2020, China planned 46 new lithium ion battery megafactories for its electric vehicle and energy storage industries versus three plants in the U.S.

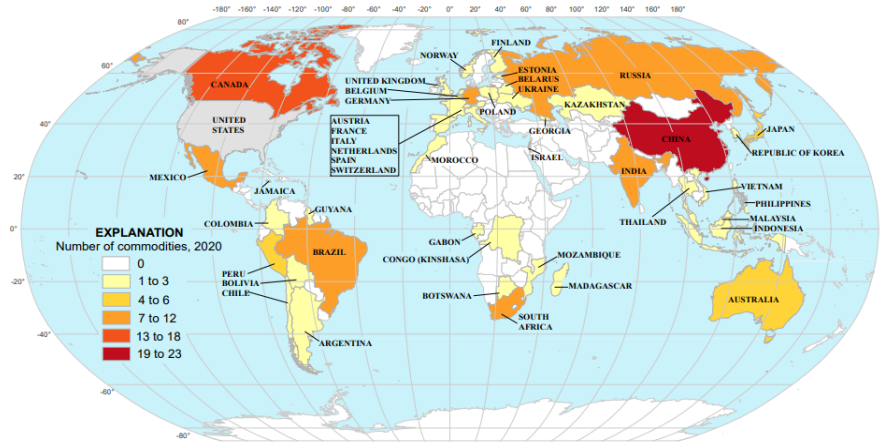
The risks inherent with that growing vulnerability are masked when trade agreements are secure and global supply chains are working as intended. But lockdowns and closed borders hit the global supply chain hard and the cracks were immediately apparent.

The focus on and need for minerals was glaringly apparent when, on a July 2020 earnings call, Tesla head Elon Musk all but begged miners for more nickel, "Tesla will give you a giant contract for a long period of time if you mine nickel efficiently and in an environmentally sensitive way." The U.S. currently has just one nickel mine.

According to the International Energy Agency (IEA), the pandemic stopped Peru's copper-mining activities, which are responsible for 12 percent of global production. Similarly, South Africa's lockdown temporarily disrupted 75 percent of the global output of platinum.

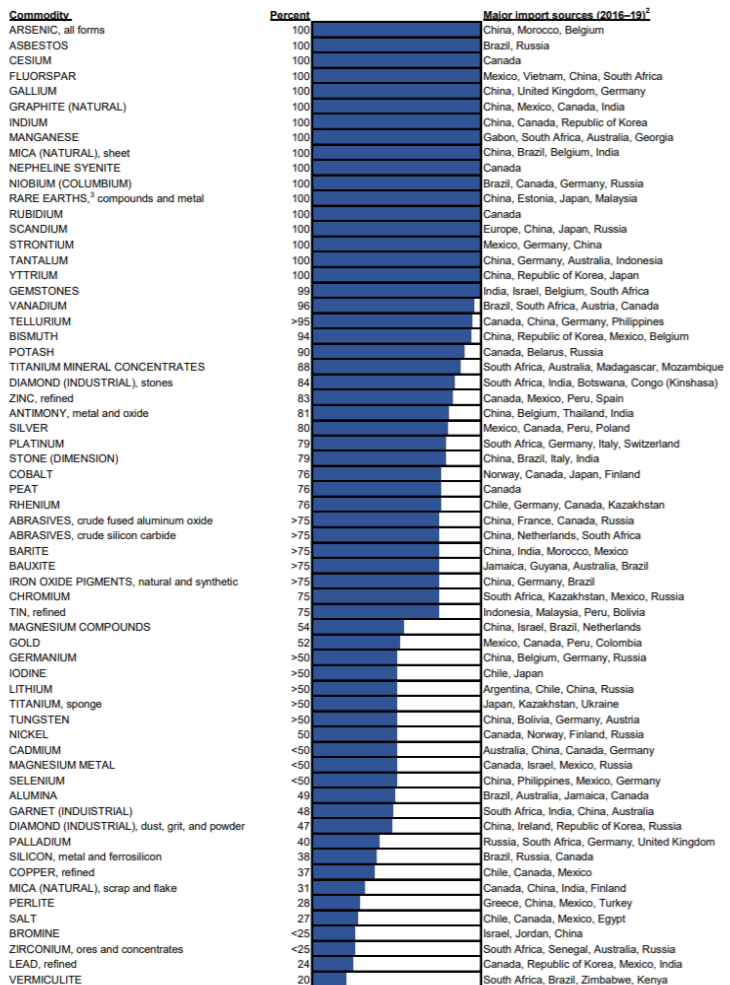
Trade tensions and political instability also play a role. The U.S. and China have been in a state of flux for the last several years, with China using its minerals dominance and ability to limit the world's rare earths supply as a significant bargaining chip. In 2018, the Democratic Republic of the Congo (DRC) nearly tripled the royalty rate on cobalt. And Indonesia, once the world's biggest nickel exporter, banned exports earlier this year in the hopes of expanding its domestic smelting industry.

Figure 3.—Major Import Sources of Nonfuel Mineral Commodities for which the United States was greater than 50% Net Import Reliant in 2020



Source: U.S. Geological Survey

2020 U.S. Net Import Reliance¹



¹Not all mineral commodities covered in this publication are listed here. Those not shown include mineral commodities for which the United States is a net exporter (boron; clays; diatomite; helium; iron and steel scrap; iron ore; kyanite; molybdenum concentrates; sand and gravel, industrial; soda ash; titanium dioxide pigment; wollastonite; zeolites; and zinc concentrates) or less than 20% net import reliant (abrasives, metallic; aluminum; beryllium; cement; feldspar; gypsum; iron and steel; iron and steel slag; lime; nitrogen (fixed)-ammonia; phosphate rock; pumice; sand and gravel, construction; stone, crushed; sulfur; and talc and pyrophyllite). For some mineral commodities (hafnium; mercury; quartz crystal, industrial; thallium; and thorium), not enough information is available to calculate the exact percentage of import reliance.

²Listed in descending order of import share.

Source: USGS "Mineral Commodity Summaries 2021"

Our opportunity.

The vital work of rebuilding our economy and securing our supply chain will require an investment into secure, stable, high-paying American jobs that support the rest of the economy. Domestic minerals mining has the ability to bolster virtually every industry and our national security and, in doing so, create some of the highest paying jobs available for Americans around the country.

Congress has the opportunity to enact critical new production legislation, including:

- The American Critical Mineral Independence Act (H.R. 2637)
- Accessing America's Critical Minerals Act (H.R. 2604)
- Reclaiming American Rare Earths (RARE) Act (H.R. 2688)
- Murkowski Manchin Permitting Re-Introduction (S. 1352)
- National Strategic and Critical Minerals Production Act (H.R. 3240)

These important pieces of legislation support and promote U.S. mineral independence and federal agency accountability by minimizing duplication and establishing firm timeframes for the permitting process and making investments in necessary research, development, demonstration and commercial application for secure and sustainable supply of minerals for national security, economic well-being and industrial production. Prioritization of our nation's domestic minerals production and supply chain will position the U.S. to capitalize on our mineral wealth while never shortchanging environmental standards.