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# Recharging America's Electric Vehicle Strategy



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# Introduction

Since President Biden took office in January 2021, the sale of Electric Vehicles (EVs) has tripled. This rapid increase in sales has been fueled, pun not intended, by a plethora of policies and market forces. Although the EV boom is underway, there remain hindrances the United States must address to meet future demand for EVs, particularly the minerals comprising their lithium-ion batteries. Lithium, cobalt, manganese, nickel, and graphite are five critical minerals for building EV batteries.

President Biden set an [ambitious target](#) for half of all new passenger cars and light trucks sold in America to be electric by 2030. By then, America will have to produce around seven million EV cars. Those vehicles require at least [seven million batteries](#), often called battery packs. Even by 2030,

America's share of the EV market will likely be relatively small compared to the global market. According to a [Congressional Research Services \(CRS\) report](#), less than 10 percent of the 6.6 million global EV registrations belonged to consumers in the U.S. in 2022. While the U.S. companies produced 70 percent of the battery cells and sold 87 percent of the battery packs used for their EVs, public data for the *origin of the critical minerals* used to make the battery cells has yet to be available. The U.S. has relied on mineral recycling and imports to acquire most lithium-ion battery minerals, and its production of minerals such as lithium, cobalt, manganese, cobalt, and graphite pale in comparison to global production. While the U.S. has successfully sourced the minerals needed for its EV batteries thus far, future demand for critical EV minerals will increase immensely, rendering the current rate of mineral imports inadequate.

# U.S. Critical Mineral Production and Trade

The *Selected Statistics for Five EV Battery Minerals* table in the CRS report below shows that the U.S. heavily relies on international imports for EV battery minerals. The chart shows the metric tons of each critical lithium-ion battery element produced in the U.S. compared to global production. Cobalt is the EV battery mineral with the highest impact on human lives and the environment. One of the main benefits of using cobalt in batteries and electronics is that it helps to prevent the batteries from overheating and catching fire. Even though the average U.S. import price for cobalt was more than double the cobalt export price in 2022, the U.S. still exported nearly half of the cobalt it mined and imported that year because the U.S. exports cobalt to countries with much higher export prices than what the U.S. paid.

**“The USGS indicates that approximately 70% of domestic production of cobalt is from recycling. Total domestic cobalt production during 2021 is**

**estimated to be 2,300 metric tons.<sup>71</sup> Imports of cobalt during 2021 are estimated to be 9,900 metric tons, and cobalt exports in 2021 are estimated to be 4,800 metric tons. NIR (net-import reliance) on cobalt was calculated to be 76%. During the period 2017-2020, Norway was the largest supplier of U.S. cobalt imports (20%). For 2021, Democratic Republic of Congo is estimated to have the highest worldwide mineral production of cobalt (120,000 metric tons); total global production is estimated to be 170,000 metric tons.”**

– Brandon S. Tracy, “Critical Minerals in Electric Vehicle Batteries.” *Congressional Research Service, August 29, 2022.*

Import and export prices vary considerably among countries. The U.S. import cost of Canadian cobalt in [2022 was \\$3,227 per ton](#), while the U.S. export price for cobalt to South Korea was \$34,200 per ton. In 2022, Canadian imports of cobalt comprised 1.3 percent of U.S. imports, while South Korean exports comprised 37 percent of U.S. exports. Despite high import

## Selected Statistics for Five EV Battery Minerals

In metric tons, of each critical lithium-ion battery element

	Lithium	Cobalt	Manganese	Nickel	Graphite
<b>NIR (%)</b>	>25	76	100	48	100
<b>U.S. Production</b>	withheld	700	0	18,000	0
<b>Global Production</b>	100,000	170,000	20,000,000	2,700,000	1,000,000
<b>Exports</b>	1,900	4,800	1,000	25,000	8,400
<b>Imports</b>	2,500	9,900	460,000	110,024	53,000

Source: *Congressional Research Service, Critical Minerals in Electric Vehicle Batteries.*

prices, the U.S. navigates global cobalt markets profitably. Market forces impact the price difference and tariffs and allow the U.S. to export cobalt profitably, as shown in the case of Canadian imports and South Korean exports.

Manganese, another critical EV battery element, is grossly lacking in U.S. production. The U.S. has

not produced [manganese since 1970](#); it sources the mineral from Gabon, South Africa, Australia, and Georgia and [exports 1,000 tons](#) of the mineral to other countries from the manganese it imports. The table above highlights that while U.S. mineral supplies are relatively low, partnerships with allied countries have allowed the U.S. to hold its own in the international mineral trade.

## China and Congolese Cobalt Mining

The primary impetus for increasing EV production is to curb climate-change-causing emissions. Yet in many global mining sites, such as those in the Democratic Republic of Congo (DRC), mining lithium-ion minerals risk human lives and produce harmful emissions and environmental degradation because mine owners put profits over [modern mining safeguards](#) and technologies. China controls [15 of the DRC's 19 cobalt mines](#), controlling [over two-thirds](#) of the world's cobalt.

Hundreds of thousands of Congolese work in cobalt mines around the country. Many are children as young as five years old. In an [interview](#) with the Yale School of the Environment, Siddharth Kara, a fellow at Harvard's T.H. Chan School of Public Health, Kara described the DRC's "working conditions." A first-hand witness to Congolese cobalt mining since 2018, Kara says that Congolese mines' working conditions are wrought with "environmental destruction, human destruction, labor exploitation, [and are a] public-health catastrophe."

**"The first place I went was an artisanal mining area near the Zambian border. It was this vast lunar landscape where everything had been chewed up. I remember looking at this destroyed landscape and these thousands of bodies laboring over it and thinking it was like some rung of hell. Literally, it was level four as you go down Dante's Inferno. I thought that was as bad as it was going to get, but it only became darker and bleaker and more destructive the further into the mining provinces I went."**

— Siddharth Kara, "For Your Phone and EV, a Cobalt Supply Chain to a Hell on Earth." *Yale Environment* 360. March 30, 2023.

Although some DRC cobalt mines use technologically advanced vehicles and electronics, many others are still "artisanal mines" and rely on human labor rather than heavy equipment. In these mines, thousands of impoverished miners use pickaxes, shovels, or bare hands to extract stones from the hard earth.

Cobalt dust and particulates are toxic, exposing miners and those living near the mines to high rates of toxins that cause cancers, congenital

disabilities, skin rashes, and other ailments, according to Kara. Additionally, [new research](#) shows congenital disabilities among newborns in Lubumbashi, a mining city in Southern DRC. The study found that “men working in mining are at higher risk of having a child with a malformation,”

Yale [interview](#), Kara described witnessing children at an industrial mine who traversed a 40-meter wall at a 45-degree angle carrying heavy sacks of stone wearing flip-flops. He explained that some of these young miners lost their footing, fell to the ground, and shattered their legs and spines.

**“No one cares about the people of the Congo or the environment of the Congo. It all just wafts over the mining provinces. Every body of water, the air, the dirt, it’s all contaminated.”**

**—Siddhartha Kara**

suggesting a possible link between paternal exposure to metals such as cobalt and newborn congenital disabilities caused by altered DNA.

Cobalt ore also contains traces of radioactive uranium, which causes lung cancer in subjects exposed to large concentrations of it and kidney damage to those who breathe in or absorb uranium which occurs much faster than cancer, according to the Centers for Disease Control and Prevention ([CDC](#)). In addition, the [CDC](#) reports that sulfuric acid is used to process the ore and is a chemical that can cause severe burns if exposed to the skin, cancer if breathed in, and even death if ingested.

Many wealthy countries import cobalt from the DRC. Their families breathe cleaner air by replacing combustion engine cars with more EVs, while the DRC families mining cobalt breathe and absorb toxic chemicals to power those EV batteries.

Artisanal miners are not only subject to health risks from toxic chemicals and particles, but they experience mining accidents and injuries. In his

Miners are also at risk of tunnel collapses. An estimated 15,000-20,000 hand-dug tunnels are prone to collapse due to their unregulated construction, and when these tunnels collapse, says Kara, miners are buried alive. The 2019 collapse at the KOV mine in southeast Congo killed at least [41 artisanal miners](#). The KOV mine is majority owned by Swiss company Glencore and is one of the few mines in the country not owned by China.

Glencore blames the mine collapse on the illegal miners who operate at the edge of the industrial copper-cobalt mine. The company claims that, on average, 2,000 illegal miners dig for minerals at the KOV mine alone. This illicit mining highlights the desperation of thousands of Congolese. According to the [World Bank](#), the DRC is about the size of Western Europe but is among the five poorest nations in the world. In 2022, 62 percent of their population lived on less than \$2.15 a day.

In 2008, former DRC president Joseph Kabila negotiated what was hailed as the “deal of the century” with China — \$6 billion in infrastructure improvements to the DRC in exchange for access to



10 million tons of copper and 600,000 thousand pounds of cobalt. [The New York Times](#) states that in a U.S. embassy in Kinshasa report to the CIA, the deal with China included “2,000 miles of roadway linking Orientale and Katanga provinces, 31 hospitals, 145 health centers, two large universities, and 5,000 government housing units.” While President Kabila’s deal with the Chinese government ushered in critical infrastructure improvements (including new soccer stadiums and water treatment facilities), many DRC cobalt and copper mines relinquished ownership to state-owned Chinese companies, putting the country in [\\$3 billion of debt](#).

Additionally, from 2013 to 2018, President Kabila, his family, and close allies received over \$60 million in corrupt funding transferred through a shell company called Congo Construction Company (CCC), according to a [report](#) released by corruption

watchdog The Sentry. The founder of CCC is Du Wei, a successful Chinese businessman with ties to the Chinese government. According to The Sentry’s report, at “crucial moments in the life of the resources-for-infrastructure project,” Du Wei transferred tens of millions of dollars through BGFIBank DRC, controlled by Kabila’s family. In 2018 when President Kabila was near the end of his presidency and political control, \$10 million was moved out of BGFIBank DRC by companies linked to the Kabila family right before he lost power.

While the [DRC mines 70 percent](#) of the world’s cobalt, China refines 72 percent of the world’s cobalt. In April 2016, China Molybdenum, a majority Chinese government-owned company, purchased the American-owned Tenke Fungurume mine in southern DRC. As American control of DCR’s cobalt mines ended, China’s control over cobalt mining accelerated.



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# Countering China

In June 2021, the White House released its “100-Day Reviews under Executive Order 14017” titled [“Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth.”](#) In these Reviews, the White House stated, “The Chinese government’s economic control permits it to develop battery critical materials infrastructure well ahead of market drivers.” The Reviews also note that \$100 billion provided in subsidies by the Chinese

countries also pledge respect for international standards on detecting, preventing, and acting on corruption.

This stipulation in the MOU exists amidst rampant accusations and occurrences of corruption at the hands of the Chinese government. In December 2022, the U.S. Department of the Treasury issued sanctions against two Chinese officials in the Tibetan Autonomous Region

**“We’re together in combating the climate crisis, together in developing new renewable sources of energy, together also in building out economies for the future. This is a part of it.”**

**— U.S. Secretary of State Anthony Blinken,  
U.S. - Africa Leaders Summit, Washington D.C.,  
[Voice of America Africa](#), December 14, 2022**

government were provided solely to Chinese-based firms or production. According to the White House, these subsidies are “outside of globally accepted practices for international commerce.”

To counter China’s control in the DRC and Africa, representatives from the U.S., DRC, and Zambia signed a [Memorandum of Understanding \(MOU\)](#) in December 2022 to strengthen the EV battery supply chain. The DRC provides the largest percent of the world’s cobalt, followed by Zambia. The MOU pledges U.S. support with technical assistance, economic growth, and private sector investment in the EV battery value chain according to each country’s domestic laws. The

of the People’s Republic of China. The United States accuses the officials of committing severe human rights abuses, including extrajudicial killings and torture. In addition, the bribery displayed between Chinese state-funded companies and President Kabila is likely one of the reasons the U.S. was so explicit in stipulating that the agreement between the three countries operates to prevent and prosecute corruption.



# U.S. Policies

The [Inflation Reduction Act](#) passed in August 2022 includes [tax credits](#) for Americans who purchase EVs that meet specific criteria. Consumers who purchased plug-in electric vehicles during or before 2022 are eligible for a clean vehicle tax credit of up to \$7,500. Purchasers of vehicles with a battery capacity of at least 5-kilowatt hours (kWh) qualify for a tax credit of \$2,917. Each kWh of vehicle capacity above 5 kWh provides the consumer with an extra \$417 in tax credits. Consumers are only eligible if their purchase is for personal

minerals. This section, known as the New Clean Vehicle Credit, allows consumers to purchase vehicles with batteries comprised of “critical minerals” extracted or processed in the U.S. or “in any country with which the United States has a free trade agreement in effect.” The countries in which the U.S. has a free trade agreement in effect are Australia, Bahrain, Canada, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Japan, Jordan, South Korea, Mexico, Morocco, Nicaragua, Oman, Panama,

**“Ensuring a robust, resilient, and sustainable domestic industrial base is essential to our national security and the preservation of domestic critical infrastructure.”**

**— President Biden, [Presidential Waiver of Statutory Requirements](#)**

**[Pursuant to Section 303 of the Defense Production Act of 1950, as amended, on Department of Defense Supply Chains Resilience. February 27, 2023](#)**

use in the U.S. and is not for resale. Eligible vehicles must also not exceed 14,000 pounds. In addition, vehicles made by a manufacturer that has sold more than 200,000 EVs in the U.S. are not eligible for any tax credits. After a company sells its 200,000th EV in the U.S., the tax credits decrease by 25 percent each quarter. Ford, GM, Toyota, and Tesla have all exceeded this [number](#), so consumers will have to look elsewhere to purchase an EV that provides them with tax credits.

The Internal Revenue Service (IRS) proposed [updates](#) to [Section 30D of 26 CFR Part 1](#) to decrease reliance on Chinese-mined or processed

Peru, and Singapore. The percentage of minerals extracted or processed outside the U.S. and its free trade partners will decrease every year new EVs are produced. Until January 1, 2024, new EVs require 50 percent of minerals sourced and processed by the U.S. or its trade partners. In 2024, that number is 60 percent, and in 2026, 2027, and 2028 that number is 70, 80, and 90 percent, respectively.

In March 2022, President Biden made a [Presidential Determination](#) on Section 303 of the Defense Production Act of 1950 to “secure a reliable and sustainable supply of such strategic



and critical materials.” This Determination directs the Secretary of Defense in conjunction with the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Energy, and other heads of executive departments and agencies to create “sustainable and responsible” domestic mineral production capabilities by supporting

feasibility studies for mining, mine waste reclamation, and other industrial facilities to modernize and increase domestic production. The Declaration also waives the requirements in section [303\(a\)\(1\)-\(a\)\(6\)](#) to expand sustainable and responsible domestic mining for the production of large-capacity EV batteries.

## Recommendations

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### WBD Public and Private Sector Recommendations

- Pursue trustworthy partnerships to source minerals
- Increase mineral mining operations
- Ensure mining is performed safely, cleanly, and equitably
- Expand battery recycling and new battery research
- Bolster LFP battery production

The U.S. must continue pursuing partnerships with non-adversarial countries and free trade partners to source unprocessed and processed minerals. Additionally, to meet the mineral demands the EV revolution will require, the U.S. should expand mineral mining stateside. Cobalt, the controversial mineral controlled by China, is beginning to be mined in Idaho. Owned by Australian company Jervois Global, Idaho Cobalt Operations is the only cobalt

mine in the U.S. It will provide the U.S. with 10 percent of the cobalt required for its EV production.

Mining critical lithium-ion battery minerals in the U.S. will mitigate the economic and national security risks posed by relying on other countries, especially adversaries. However, the environmental and social benefits of the EV revolution will be tainted if mining for battery minerals causes environmental degradation and infringes on tribal rights. The Biden Administration must work directly with stakeholders affected by mineral mining to ensure that mining is done safely, cleanly, and equitably.

Beyond expanding the availability of minerals required for lithium-ion batteries, the U.S. should expand battery recycling and new battery research. The U.S. does not have battery recycling requirements, but Section 40208-40210 in the Bipartisan Infrastructure Law, signed in June 2021, establishes grants for battery and mineral recycling research programs. This grant provides \$50,000,000 for constructing one or more “commercial-scale advanced battery component manufacturing, advanced battery manufacturing, or recycling facilities in the United States.” Recycling programs

will assist the U.S. in relying less on domestically mined or imported minerals, as will new EV battery developments.

Another option U.S. automakers should continue to pursue is using lithium iron phosphate (LFP) batteries. These batteries do not require nickel or cobalt and instead rely on iron cathodes to balance the negative charge sent out by the anode. Tesla, Ford, Rivian, and Volkswagen have all committed in varying degrees to using LFP batteries in the EVs they produce.

China has dominated LFP production and, in 2021, made 90 percent of the world's LFP powder. Yet, LFP manufacturing in the U.S. has recently increased as Norwegian company Freyr announced plans to build a \$1.7 billion battery factory in Georgia. American Battery Company also plans to produce multiple battery cell gigafactories;

the first site to produce the iron phosphate battery cells will be a 2 million square foot factory in Tuscon, Arizona. And the Massachusetts-based start-up 6K, which received a DOE grant in 2022, aims to prepare the raw minerals for LFP batteries and to build a 10,000-ton cathode manufacturing facility by 2026.

**“This investment represents a generational opportunity both for us as a company and for Tucson as a community as a means to truly make energy independence a reality for everyone. Batteries make shifting to an entirely green energy economy possible. With this first factory, we will secure a strategically positioned company headquarters while taking the critical first steps in making it possible to one day move the country and the entire world to 100% renewable power.”**

— Paul Charles, President and CEO of American Battery Factory, Tucson, Arizona, December 6, 2022



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# Washington Business Dynamics

Washington Business Dynamics is committed to advancing [sustainability solutions](#) and [assisting developing nations](#) in becoming more energy efficient and sustainable. For our client, the U.S. Agency for International Development (USAID), our green energy experts [offered new technical solutions](#) to lower vessel emissions and increase energy efficiency to transport goods via inland waterways in Bangladesh, Bhutan, India, and Nepal. In addition, WBD provided the following:

- Energy-efficient model design and testing
- Training and certification for shipbuilding inspection authorities
- New financing models

As a result, modern vessels in this region will have fewer waste spills, lower greenhouse gas emissions, and air pollution, and improve overall inland waterway operations through lower transport costs, better fuel efficiency, and improved safety.

Our strategic advisory services also include Climate Change Professionals that offer support in [updating policies and processes](#) toward [clean, sustainable practices](#). For state and local clients, WBD can assist in building a [climate resilience plan](#).

For our U.S. Department of Agriculture's (USDA) Farm Production and Conservation (FPAC) client, our experts are revamping the FPAC's acquisitions framework to ensure the agency succeeds in [its mission](#) to "sustain forests and grasslands for present and future generations." WBD provides [acquisition services](#) and institute procurement innovations that modernize and



## WBD Capabilities

- Provide green energy technical solutions
- Build climate-resilient communities
- Assist federal clients in EV acquisition and procurement

streamline the FPAC's current practices, including EV vehicle purchases. Our efforts ensure sound land management and prevent environmental damage via strategic planning, contractual consolidations, and acquisitions of critical resources, expert labor, and technology. WBD's consultants collaborate with FPAC government subject matter experts to lead [USDA's "Natural Resources and Environment"](#) mission area reorganization.

Whatever your climate resilience needs, WBD's consultants can help you [make better decisions](#) through our strategy and transformation, acquisition and procurement, operations and supply chain management, finance, and communication services.