

Critical Minerals

Why We Need a Domestic Supply

Rare earths and other critical minerals and materials are key to our nation's defense and to U.S. manufacturing of clean energy technologies.

What are Critical Minerals?

Critical minerals, which include rare earth elements, are a group of 50 chemical elements in the periodic table of elements. These critical minerals form the building blocks for many modern clean energy and other technologies we need safeguard our national security and to achieve our national climate and economic goals.



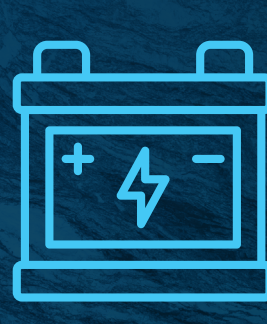
What are Critical Minerals Used For?

Critical minerals are integral to the way we live. They have unique magnetic, heat-resistance, and phosphorescent properties unlike any other elements. They are essential components in a wide range of technologies, including:

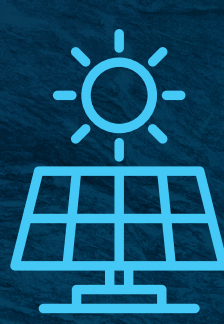
Defense and homeland security applications



Batteries



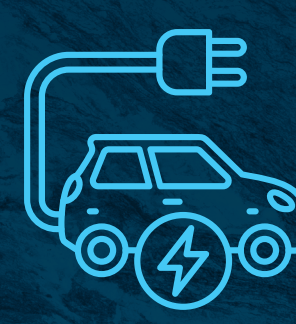
Solar panels and wind turbines



Cell phones and electronic devices



Hybrid and electric vehicles



Demand for critical minerals is increasing as the world transitions to a clean energy economy. In fact, the global demand for critical minerals is set to skyrocket by **400-600 percent** over the next several decades. The need for some minerals, such as lithium and graphite used in electric vehicle batteries, will increase even more—by as much as **4,000 percent**.

Where are Critical Minerals Produced and Supplied?

Until the mid-1980s, the United States was the leading global producer of rare earth elements. But these elements are often found in low concentrations and mixed in other mineral deposits, which can be challenging and expensive to separate.

MORE THAN 95% of the U.S. demand for rare earth elements come from foreign sources.

The United States is increasingly dependent on foreign sources for both the production and processing of many critical minerals. Globally, China controls most of the market for processing and refining lithium, rare earth elements, cobalt, and other minerals. Because these elements are essential to our everyday lives and to achieving the nation's climate goals, the U.S. Department of Energy's Office of Fossil Energy and Carbon Management (FECM) is supporting the development of the United States' own supply of critical minerals.

MORE THAN 50% of most critical materials (43 of 50) come from foreign sources.

AT LEAST 12 critical minerals come exclusively from foreign sources.

Where are Critical Minerals Found in the United States?

Fortunately, the United States has untapped potential to support greater domestic production. Many minerals can be found in ore bodies, some still undiscovered, throughout the United States. Additionally, a substantial quantity of critical minerals exists as trace elements within the nation's large supply of natural resources. Critical minerals can also be found in "unconventional and secondary" sources, such as mined coal and wastes from fossil fuel, mining and other industries, including coal waste, mine tailings, refuse piles, acid mine drainage, fly ash, and water produced with oil and gas. Initial estimates suggest these unconventional and secondary sources currently contain, for example, more than 10 million tons of rare earth elements, which is equivalent to more than a 300-year supply at the current rate of U.S. consumption.

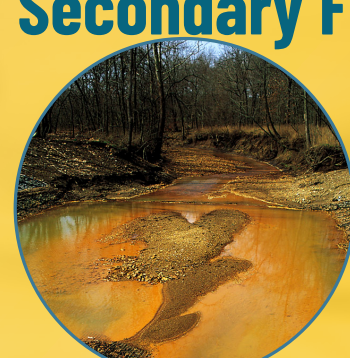
Unconventional Feedstocks & Secondary Feedstocks



Refuse Piles



Monazite Concentrate



Acid Mine Drainage



Ash

What are the Benefits of Developing a Domestic Supply of Critical Minerals?

In addition to supporting our national security and economic prosperity, developing a domestic supply of critical minerals will:



Reduce U.S. dependence on foreign sources



Support the creation of new manufacturing jobs



Secure diverse, resilient, and domestic critical mineral supply chains



Support environmental stewardship and clean up of legacy waste



Underpin the technological development of a clean energy future

How is FECM Advancing this Effort?

FECM's research, development, demonstration, and deployment portfolio is focused on technologies that enable the cost-effective and sustainable production and processing of critical minerals. FECM has scaled these technologies to small-scale pilots and is moving to larger field demonstrations to create domestic critical minerals supply chains across the United States. FECM will pursue this work while engaging with local communities and stakeholders to ensure that their perspectives are considered in the design and implementation of projects and that projects deliver tangible economic and environmental benefits to affected communities. Recent efforts include:

- **\$60 million to develop regional partnerships** supporting the domestic production of critical minerals and materials, continuing the work of the Carbon Ore, Rare Earth, and Critical Minerals (CORE-CM) initiative.
- **\$17.5 million for four projects** that will help lower the costs and reduce the environmental impacts of the onshore production of rare earths and other critical minerals and materials from coal, coal wastes, and coal by-products.
- **\$75 million to develop a Critical Materials Supply Chain Research Facility**, bringing together the expertise of nine U.S. Department of Energy national laboratories to accelerate the development of technologies across the critical minerals and materials supply chain.

Additionally, FECM is establishing new research, development, and demonstration program that will help develop technologies to substantially decrease the environmental and community impacts of mining by using a more surgical approach. This program will work with experts in drilling, geophysics, chemistry, biology, robotics, artificial intelligence, and other fields to develop technologies that enable precision extraction of critical materials from deep and underground without the need for digging giant pits, sending people underground, or significantly impacting the land, water, and air in local communities.

To learn more about the work FECM is doing to support the development of a domestic supply of critical minerals, visit FECM's [Office of Resource Sustainability website](#).