AMERICA MUST BUILD ITS OWN RARE EARTH SUPPLY CHAIN ... NOW

An Economic Development Call to Action

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Contents

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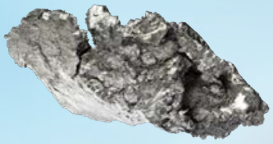


Synopsis

America's dependence on China for rare earth elements (REEs) is a deep crisis with profound global and local consequences that poses a long-term threat to economic stability and national security.

Rare earths power electric vehicles, wind turbines, precision-guided weapons, smartphones, robots, submarines, and more. China currently controls over 85% of global refining capacity and more than 90% of permanent magnet manufacturing. The United States once led this field but stepped back decades ago due to environmental concerns and high costs.

Today, the tide is turning. With support from the Department of Defense, Department of Energy, and major federal legislation, the US is working to rebuild its rare earth supply chain from mining and refining to magnet production and recycling. However, significant gaps remain, and the timeline is critical.

This is where economic developers play a central role.

Federal policies may set direction, but the real work happens locally. Site selection, permitting, workforce development, and public-private partnerships are all led at the community level. For regions across the country, this is more than a national security imperative. It represents an emerging industry opportunity that can attract private investment, create high-wage jobs, and build long-term economic resilience.

Communities that understand where they fit in the five-stage rare earth elements supply chain can position themselves to lead. Tailings, brownfields, technical colleges, and transportation infrastructure may all serve as strategic assets to draw in new investment and create good-paying jobs.

Forward-looking communities will go beyond extraction. They will pursue clean-tech innovation, develop recycling and reprocessing capabilities, and partner with research institutions and advanced manufacturers to build out a complete rare earth ecosystem.

This rare earth opportunity is, indeed, rare, but with vision and bold local leadership, it can become a lasting advantage.

The Next Threat is Already Here

Five years ago, in the earliest days of the pandemic, millions of Americans learned overnight what most had never considered—just how vulnerable we are to fragile global supply chains.

As devastating as that experience was, an even more destabilizing supply chain crisis has been unfolding for decades. It spans the entire global economy, threatens national security, undermines the United States of America's technological edge, and jeopardizes our immediate stability and our long-term prosperity.

The Pentagon is worried. So are most US allies. Only China, the source of the concern, remains unbothered. The issue is America's deep reliance on Chinese rare earth elements (also referred to as REEs and rare earths), which are critical to both economic strength and national security.

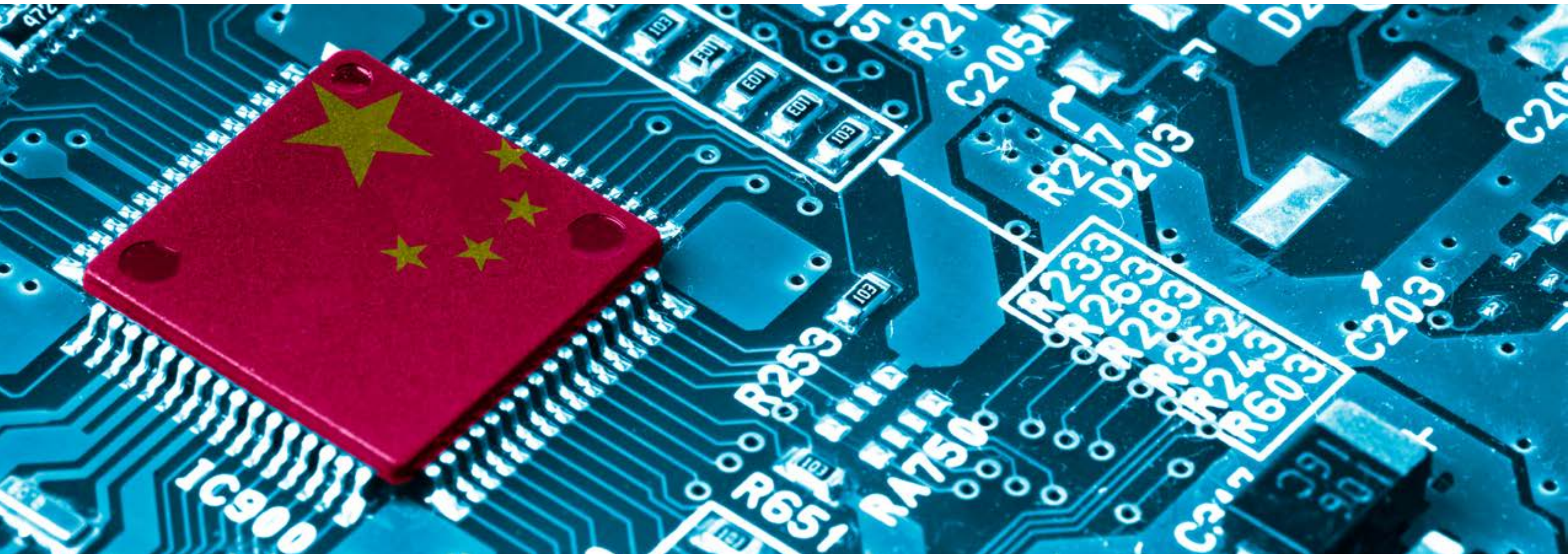
The US has formally declared rare earths essential to national security, and multiple executive, legislative, and agency-level actions have followed to address our supply chain vulnerabilities, encourage domestic production, and reduce our dependence on foreign sources, especially China.

Ironically, despite the name, rare earth elements (such as neodymium, praseodymium, and dysprosium) aren't geologically scarce. What makes them rare is how difficult it is to extract, refine, and convert them into the high-performance materials essential to manufacturing electric vehicles, wind turbines, precision-guided weapons, medical equipment, smartphones, robots, submarines, and so much more. Rare earth elements possess unique magnetic and electrochemical properties that make them irreplaceable in modern technology.

Without them, the modern economy would grind to a halt.

That reality should raise alarm bells for the economic development profession, which plays a critical role in keeping US communities competitive.

In this Call to Action, we evaluate some factors contributing to global vulnerability around rare earth elements and outline how economic developers can respond with strategic, locally driven action that takes advantage of emerging opportunities.



From Abandonment to Advantage

The United States was once the world leader in rare earth element production. In the 1960s and ’70s, California’s Mountain Pass Mine powered the global supply, fueling technologies ranging from color televisions to early computers.

But by the early 2000s, that dominance had faded. Faced with rising environmental concerns, local opposition to mining operations, and the high cost of extraction, America effectively walked away from the industry it helped pioneer.

Public sentiment was a driving force in this retreat. Rare earth mineral mining brought to mind open pits, toxic chemicals, and radioactive waste, and it was widely seen as dirty and dangerous. Communities pushed back, and regulators responded with stringent environmental standards.

As companies grew reluctant to invest in US-based operations, China filled the void, offering low-cost production with far fewer environmental constraints. For decades, the United States outsourced the mining of the very materials needed to power its most advanced technologies.

Today, the consequences of those decisions are coming into sharp focus.

Rare earths are no longer obscure elements associated with dirty and dangerous industry; they are essential building blocks of the clean energy economy. From electric vehicle motors and wind turbine generators to space satellites and semiconductors, these critical minerals are now foundational to both national security and our decarbonization goals.

Ironically, the very sites that symbolize environmental degradation may now hold the key to a more sustainable future. There are tens of thousands of abandoned mines across the US, with most concentrated heavily in Western states like Colorado, California, Nevada, and New Mexico. (There are more than 18,000 abandoned mines in Colorado alone.)

> As technologies advance and become cleaner, and as demand for them grows, the mineral needs of the US economy intensify.[1]
>
> **DR. GRACELIN BASKARAN**
> Center for Strategic and International Studies

> In 2023, the United States produced more than 12% of the REEs mined globally but exported 93% of those materials. During the same time period, the United States produced 5% of the world's mined copper and exported 32% of it ... Without robust midstream processing capabilities, the United States is exposed to serious potential supply chain disruptions.[2]
>
> **A. JOHNSON**
> Center for Strategic and International Studies

While these sites were originally developed to extract gold, silver, copper, and coal, their leftover tailings and mine waste often contain untapped deposits of rare earth elements.

New technologies are transforming how we view these discarded materials. Research from institutions like Penn State and Oak Ridge National Laboratory shows that rare earth elements can now be recovered from mine tailings, coal ash, and even acid mine drainage—materials once treated purely as environmental liabilities—through re-mining processes. Companies like Phoenix Tailings are developing low-emission, solvent-free extraction methods, turning yesterday's waste into today's strategic assets.

In addition to re-mining, recycling rare earths from end-of-life products offers a critical, complementary path to meeting demand. Devices like wind turbine magnets, electric vehicle motors, smartphones, and military equipment all contain rare earth elements that are difficult to mine but can be recovered through advanced recycling processes.

Emerging technologies now allow for the efficient separation and purification of rare earths from used equipment, dramatically reducing the need for raw material. While only a small fraction of rare earth elements are recycled globally today, the potential is enormous and essential for building a circular, resilient supply chain.

In contrast to the toxic legacy of past practices, modern recovery methods emphasize environmental responsibility. Green chemistry, precision separation, and in-situ recovery techniques dramatically reduce the carbon footprint, water use, and ecological impact of traditional mining operations.

The result is a rare opportunity to build domestic supply chains that are not only resilient but are aligned with the very clean energy goals that rare earths help enable.

China and the Global Supply Chain

China’s dominance in the rare earth elements market represents one of the most concentrated supply chains in the global economy. As of 2024, China controlled approximately 60% of global mining operations, more than 85% of processing capacity, and over 90% of permanent magnet production.[3]

This concentration of the global rare earth elements supply in a single country, China, which is increasingly positioned as a strategic competitor, creates unacceptable vulnerabilities for national security planning.

This is because, among other things, rare earth elements are essential for:

1. **Defense Systems:** Precision-guided weapons, radar systems, jet fighter components, and drone technologies
2. **Energy Security:** Wind turbine generators, solar panel components, and electric vehicle motors that are critical for energy independence
3. **Communications:** Low-Earth Satellites, 5G infrastructure, and advanced electronics for military and civilian applications

China’s rare earths dominance didn’t happen by accident. Over the past 30 years, they have systematically built an integrated rare earths supply chain that captures value at every stage, from mining raw ore to manufacturing finished magnets. This strategy has been so successful that even rare earth minerals mined in other countries typically travel to China for refinement before they can be used in manufacturing.[4]

The vulnerability this creates became clear as early as 2010, when China first weaponized rare earths. It took the proverbial shot across the bow by banning exports to Japan over a fishing trawler dispute.[5] Since then, some countries have increased the mining of rare earth minerals, but the response is minuscule and disproportionate to the problem at hand.

The US felt China’s vice-like grip on rare earth elements early in 2025. In April, China placed some rare earth magnets and seven rare earth elements—samarium, gadolinium, terbium, dysprosium, lutetium, scandium, and yttrium—along with related items on an export control list in response to President Donald J. Trump’s increase in tariffs. The restrictions imposed by China’s Ministry of Commerce required firms to apply for a license for the export of rare earths and magnets, creating immediate supply disruptions across multiple industries.

These kinds of moves underscore a critical truth: When it comes to rare earths, America is dangerously dependent.

THE FIVE-STAGE RARE EARTH SUPPLY CHAIN

STAGE 1: MINING AND ORE PROCESSING

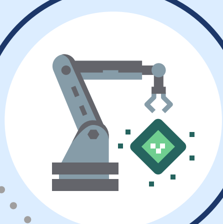
The extraction of rare earth elements-bearing minerals like bastnaesite, monazite, and xenotime from geological deposits, followed by initial processing of raw ores.

STAGE 2: SEPARATION AND REFINING

This is the most technically complex and environmentally intensive stage, involving chemical processes to isolate individual rare earth oxides. According to Linda Chrisey, program manager at the Defense Advanced Research Projects Agency (DARPA), "Two different rare earth elements may be fractions of an angstrom different in diameter—that means it's very difficult to separate using physical means. The processes that are used right now can be 100 steps."

STAGE 3: METALLIZATION AND ALLOYING

This processing stage focuses on converting oxides into metals or alloys to create precursor materials for magnets and other applications.



STAGE 4: COMPONENT MANUFACTURING

The production of permanent magnets, phosphors, catalysts, and other components, followed by integration into electronics, electric vehicle motors, wind turbines, and defense systems.

STAGE 5: CONSUMER USE AND RECYCLING

This final stage includes the real-world applications of the components manufactured in Stage 4 across defense, renewable energy, electronics, and automotive sectors, with limited but growing recycling/reuse efforts.

China's strategic advantage lies not just in controlling individual stages but in having built an integrated supply chain that spans all five stages. This vertical integration creates economies of scale and technical expertise that make it extremely difficult for competitors to enter the market profitably.

The Wake-Up Call

The US government's serious focus on rare earth elements began during President Donald J. Trump's first administration and was expanded under President Joseph R. Biden, Jr., evolving from policy declarations to concrete industrial investments.

In 2017, the first Trump administration laid the groundwork by declaring critical minerals essential to national security and economic prosperity, officially designating 35 materials, including rare earth elements, as critical.

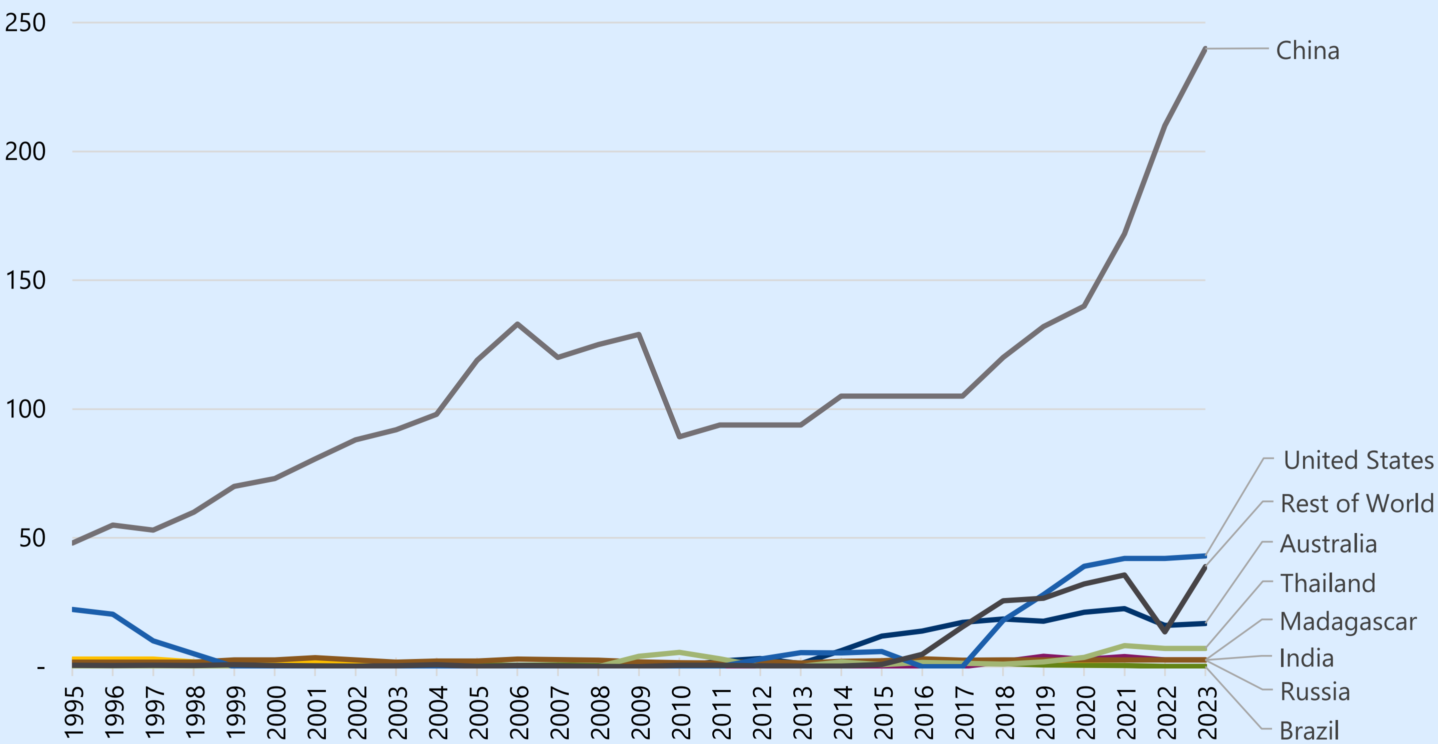
President Trump also declared a national emergency in the mining industry and directed agencies to reduce reliance on foreign critical minerals and support early domestic projects.

From 2021 to 2025, the Biden administration transformed policy into action by:

- Ordering a comprehensive 100-day review of critical mineral vulnerabilities
- Signing the Infrastructure Investment and Jobs Act (2021), which allocated over $6 billion for battery materials, critical minerals, and domestic manufacturing
- Signing the Inflation Reduction Act (2022), which incentivized domestic production of EV components and magnets containing rare earth elements

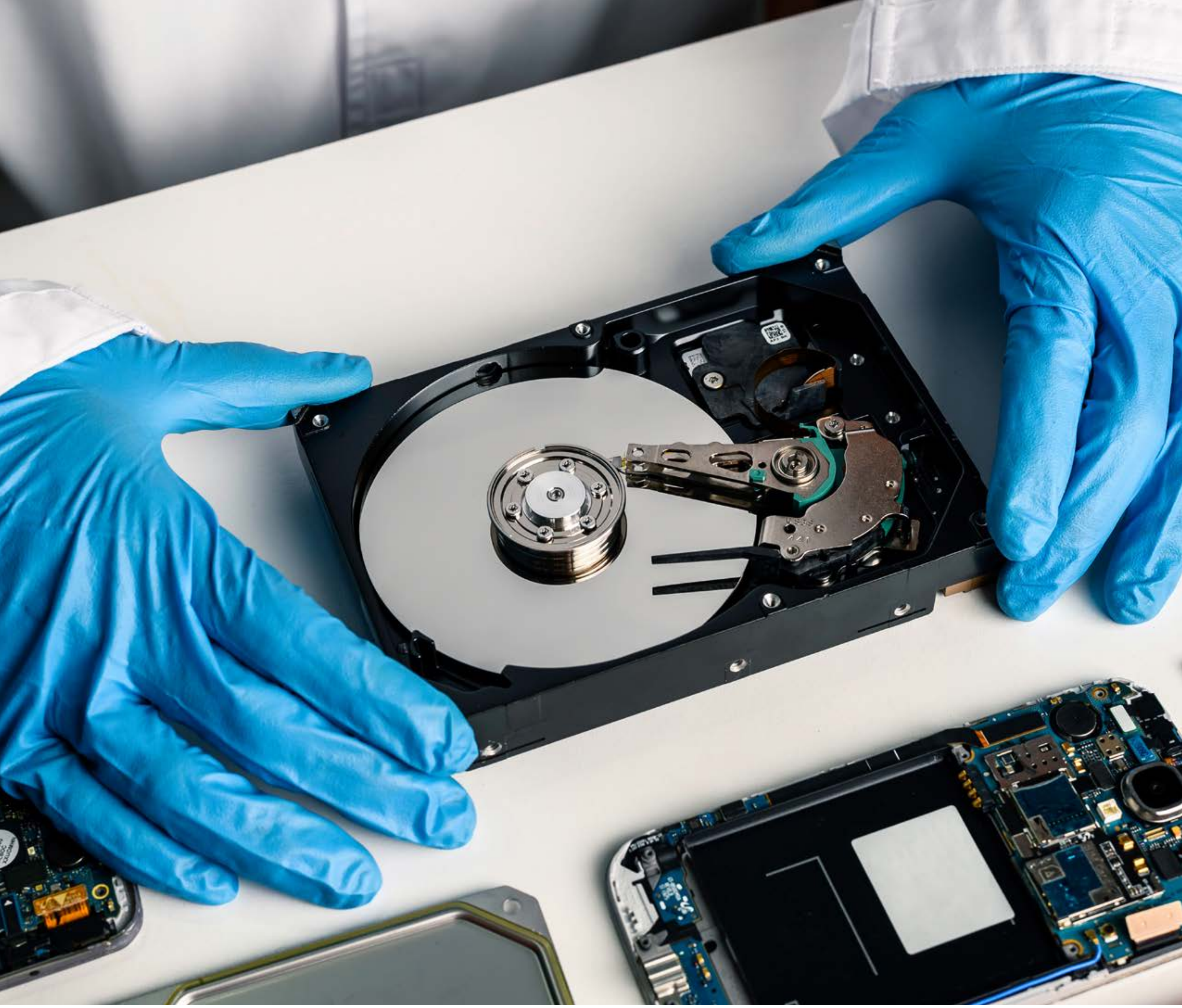
Mining Production of Rare Earth Metals, 1995-2023

Thousands of tons of rare earth oxide equivalents



Notes: Rest of the World is the sum of recorded reserves, not mined materials.

Sources: US Geological Survey, British Geological Survey ©UKRI, and World Mining Data



The current Trump administration is making some bold moves. In July 2025, the US Department of Defense acquired a 15% position in MP Materials California mine, making it the largest shareholder. This move sent a strong message to world markets that the US was serious about addressing supply chain issues.

This announcement was followed days later by news that the company negotiated a long-term agreement to supply Apple with rare earth magnets manufactured in the US from 100% recycled materials.

Also in July, for the first time in more than seven decades, a rare earth mine opened in the US in a north Wyoming coal deposit. Its owner, Ramaco, reports that it contains six REEs.[6]

Despite these actions and President Trump's executive orders in 2025 to prioritize rare earth minerals, the US has yet to prepare a comprehensive, coordinated rare earth strategy.

Current State-Based Activities

America's response to China's rare earths dominance is taking shape across multiple states, with each region developing specialized capabilities. **Announcements are coming fast and what follows is a sample of key developments as of mid-year 2025.**

Advanced Separation and High-Grade Processing
Midwest, Montana, Texas, and Wyoming

American Resources is continuing to expand its rare earth elements refining facilities in Noblesville, IN. The facility produces finished rare earth oxides (stage 2 in the supply chain). The facility currently refines rare earth elements like neodymium, praseodymium, dysprosium, and terbium.[7]

MP Materials established processing facilities in Fort Worth, TX. The facility addresses stages 3 and 4 of the supply chain using rare earth elements mined and refined domestically.[8]

Rare Element Resources is commissioning a $66 million DOE-supported processing plant in Upton, WY, designed to deliver up to 15 tons per year of high-purity NdPr oxide using innovative processes with fewer steps aimed at reducing cost and environmental impact.[9, 10]

Seadrift Facility in Texas is backed by a $120 million US Department of Defense contract to build a light and heavy rare earth elements separation plant that would start operations in 2026.

Sheep Creek Project represents a partnership between US Critical Materials and Idaho National Laboratory. It is exploiting Montana's exceptionally high-grade ore (approximately 9% total rare earth oxides, which are used directly in manufacturing magnets, batteries, phosphors, catalysts, and other high-tech applications). This pilot facility focuses on both light and heavy rare earth elements, marking a critical step in US midstream processing capability.[11, 12]

Magnet Manufacturing
Carolinas, Oklahoma, and Texas

E-Vac Magnetics, a US subsidiary of German magnet manufacturer, Vacuumschmelze (VAC Group), is constructing a high-performance NdFeB magnet plant on an 85-acre site in Sumter County, SC. The magnets will be for GM electric vehicles and US defense applications. The US Department of Defense and the State of South Carolina provided funds for "Project Eagle," which will create 300 new jobs.

MP Materials, located in Fort Worth, TX, is the company's fully integrated facility for producing neodymium-iron-boron (NdFeB) permanent magnets. This state-of-the-art site transforms refined rare earth materials from Mountain Pass into metals, alloys, and finished NdFeB magnets.

Noveon, in San Marcos, TX, is producing rare earth magnets as EcoFlux for high power applications. They will supply Japan's Nidec for automobile manufacturers.

USA Rare Earth set up a 310,000 square foot NdFeB magnet manufacturing plant in Stillwater, OK. The facility produced its first batch of sintered NdFeB (neodymium-iron-boron) magnets in January 2025. Full commercial operations are expected in 2026. This facility represents a critical link in creating a true domestic supply chain.[13]

Vulcan Elements, in Durham, NC, is a magnet maker with plans to supply the US military.

Rare Earth Mining
California, Texas, Utah, and Wyoming

Colosseum Project, located just 6 miles from the Mountain Pass Mine in California, represents a new US investment in rare earth minerals mining and is currently in development. On April 8, 2025, the Department of the Interior (DOI) granted Dateline Resources permission to continue developing the existing mine site for rare earths extraction, marking a significant breakthrough after years of regulatory delays. Once completed, the facility is expected to expand domestic production significantly.[14]

Energy Fuels in White Mesa Mill, UT, is primarily a uranium mill. However, it has begun a pilot project to recover rare earth carbonate from monazite sands and process mixed REEs that will be shipped to Estonia for separation.

Mountain Pass Mine in California is the only rare earth mine with a long history of operating in the US. It currently produces approximately 45,000 tons of rare earth oxide annually—about 15-20% of global output. The deposit is overwhelmingly light rare earths. At one time, between the 1960s and 1990s, it was the world's leading producer of light rare earth elements. Its operator, MP Materials, has significantly expanded beyond mining. In the first quarter of 2025, the company produced 563 tons of neodymium-praseodymium (NdPr) oxide, increasing the US presence in stage 2 of the supply chain and representing 36% growth quarter-over-quarter.[15]

Ramaco Resources opened a mine in a coal deposit in Wyoming that contains six REEs.

Round Top Mountain in West Texas houses the largest heavy rare earth elements deposit in the United States, containing 16 of the 17 elements. USA Rare Earth is conducting heap-leach pilot programs for recovery, focusing on the high-value elements like dysprosium and terbium that are most critical for advanced applications.[16]

R&D: Tailings and Recycling
Appalachia Region

Evolve Central Appalachia is a project backed by the US Department of Energy to research rare earth elements concentrations in coal seams, rock, and coal ash in Virginia, West Virginia, Tennessee, and Kentucky.

Virginia Tech and West Virginia University are conducting research to extract rare earth elements from acid mine drainage and coal waste streams.

Sediment Deposits
Southern Coastal States

Atlantic Strategic Minerals, located in Sussex, VA, is described as the largest mineral separation plant in North America.[17] It processes heavy mineral sands to extract rare earths (notably monazite, which contains Nd/Pr), along with titanium and zirconium.

Heavy mineral sands rich in dense minerals, many of which contain rare earth elements and other economically valuable materials, can be found in coastal plains, dunes, river deltas, ancient shorelines, and inland floodplains.

Streamlined Regulatory Processes
Arkansas

Smackover Formation's mineral-rich limestone brines in southern Arkansas contain 5.1 to 19 million tons of lithium, which represents 35 to 136% of the current US lithium resource estimate, according to Science Advances, the American Association for the Advancement of Science's multidisciplinary journal. While lithium is not technically a rare earth element, the approach that the State of Arkansas is taking to the review and approval processes for accessing the Smackover deposits may be useful for other states to consider.

LIGHT vs. HEAVY RARE EARTH ELEMENTS

Light Rare Earths (LREEs) include seven elements. They are:

- More abundant and cheaper to extract
- Used in hybrid/EVs, hard drives, wind turbines, glass polishing, pollution controls
- Mined at Mountain Pass, CA

Heavy Rare Earths (HREEs) include 10 elements. They are:

- Difficult and costly to extract
- Essential for high-tech laser systems, nuclear reactors, advanced electronics, and defense technologies.
- Mined at Round Top Mountain, TX

Sources: US Geological Survey, US Department of Energy, Critical Minerals Strategy

1 H Hydrogen 1.008																		2 He Helium 4.003
3 Li Lithium 6.94	4 Be Beryllium 9.012												5 B Boron 10.81	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305												13 Al Aluminum 26.982	14 Si Silicon 28.085	15 P Phosphorus 30.974	16 S Sulfur 32.06	17 Cl Chlorine 35.45	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078		21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.630	33 As Arsenic 74.922	34 Se Selenium 78.97	35 Br Bromine 79.904	36 Kr Krypton 83.798
37 Rb Rubidium 85.468	38 Sr Strontium 87.62		39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium [97]	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	53 Te Tellurium 127.60	53 I Iodine 126.904	54 Xe Xenon 131.293
55 Cs Cesium 132.905	56 Ba Barium 137.327	* 57 - 70	71 Lu Lutetium 174.967	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	78 Ir Iridium 192.217	79 Pt Platinum 195.084	80 Au Gold 196.997	81 Hg Mercury 200.592	81 Tl Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [209]	85 At Astatine [210]	86 Rn Radon [222]
87 Fr Francium [223]	88 Ra Radium [226]	** 89 - 102	103 Lr Lawrencium [262]	104 Rf Rutherfordium [267]	105 Db Dubnium [270]	106 Sg Seaborgium [269]	107 Bh Bohrium [270]	108 Hs Hassium [270]	109 Mt Meitnerium [278]	110 Ds Darmstadtium [281]	111 Rg Roentgenium [281]	112 Cn Copernicium [285]	113 Nh Nihonium [286]	114 Fl Flerovium [289]	115 Mc Moscovium [289]	116 Lv Livermorium [293]	117 Ts Tennessine [293]	118 Og Oganesson [294]
		57 La Lanthanum 138.905	58 Ce Cerium 140.116	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.242	61 Pm Promethium [145]	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.500	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.934	70 Yb Ytterbium 173.045			
		89 Ac Actinium [227]	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium [237]	94 Pu Plutonium [244]	95 Am Americium [243]	96 Cm Curium [247]	97 Bk Berkelium [247]	98 Cf Californium [251]	99 Es Einsteinium [252]	100 Fm Fermium [257]	101 Md Mendelevium [258]	102 No Nobelium [259]			

Rare Earth Economic Development Opportunities

If the US is serious about rebuilding a domestic rare earth elements supply chain, then economic developers have a vital role to play—not just as advocates, but as architects of local opportunity.

They don't need to be geologists, but they do need to be fluent in the fundamentals and understand where rare earth elements fit in the supply chain, what public policies are in play, and how their communities might contribute.

The Most Effective Economic Developers Will Begin by Asking the Right Questions

Was the region part of the United States' mining legacy? If so, tailings once dismissed as waste may now hold strategic value.

Is the community strategically located? Access to rail, interstate highways, ports, and a reliable energy and water supply could make it a strong contender for midstream refining or magnet manufacturing.

Can local universities partner with federal agencies to research ways rare earth elements can be used to help catalyze new high-wage, clean tech businesses in regions that need them most?

Are local leaders prepared to work with federal and state agencies to streamline permitting processes across the supply chain?

Is there already a workforce in place? If not, are there institutions capable of developing one? Technical colleges, workforce training centers, and universities can serve as hubs for cultivating talent in fields like precision machining, chemical engineering, and clean-tech manufacturing.

Are there underutilized sites, perhaps brownfields, that could be repurposed for clean energy production or materials recycling?

Does the community offer the right environment, both physical and regulatory, to attract innovation-driven industries? Tools like zoning overlays, tax incentives, and site readiness can be decisive factors.

The savviest communities won't just respond to current demand; they will anticipate where the market is headed. They will think upstream and downstream to align with innovators, researchers, and clean-tech entrepreneurs to position themselves for long-term advantage.

To stay ahead, economic developers must also keep a close eye on innovation. Breakthroughs in science and engineering are reshaping what's possible across the rare earth elements supply chain, and the most future-ready communities will align themselves with these developments.

A few notable areas of advancement include:

Biomining and Biological Processing

Through initiatives like the Defense Advanced Research Projects Agency's (DARPA) EMBER (Environmental Microbes as a BioEngineering Resource) program, researchers are exploring how microbes can naturally separate and purify rare earths.

National labs such as Lawrence Livermore in California, along with institutions like Battelle and San Diego State University, are at the forefront of this work. Communities that build partnerships with these innovators could position themselves as early adopters of next-generation extraction methods.

Recycling and Urban Mining

Today, less than 1% of rare earth elements are recycled, leaving vast potential untapped. Companies like Phoenix Tailings are pioneering new processes to recover rare earth elements from magnets, batteries, and electronic waste.

Economic developers who identify local collection systems, industrial clusters, or brownfield sites suitable for such technologies can turn yesterday's scrap into tomorrow's strategic advantage.

Alternative Materials Research

Although not yet commercially viable at scale, ongoing research into rare-earth-free magnets—particularly in Europe—signals a long-term diversification of the supply chain.

These materials may not match the performance of rare earth elements for today's high-demand applications, but their eventual role in reducing dependence on imported resources cannot be ignored.

Forward-thinking communities will monitor these developments and look for collaborative opportunities with universities and research consortia.

Together, these technologies reinforce a key truth: the rare earth elements supply chain is not static; it's evolving. Economic developers who understand this dynamic and position their communities as flexible, innovation-friendly environments will be far better prepared to compete.

> This is not just a story of minerals, but of advanced materials science, high-tech manufacturing, and economic resilience. Those who engage now have a chance to shape the future.

Let's be clear: A community doesn't need to become the next Mountain Pass to make a meaningful contribution.

This is not about reverting to a 19th-century extractive model. It's about embracing a 21st-century materials strategy that is smart, sustainable, and circular. The true value isn't just in the minerals beneath our feet; it's in how we transform those materials into technologies that power the future.

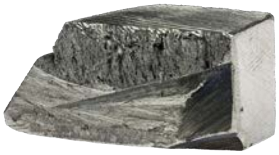
China didn't come to dominate the rare earths industry by chance. It built an end-to-end industrial ecosystem with strategic intent, coordinated investment, and global market positioning. Meanwhile, the United States ceded ground, becoming dependent and reactive. That era is ending. A new window has opened, and this time, the strategy must be national in scale but rooted in local action.

That's where economic developers come in.

While federal policy can open doors and set direction, the execution (the idea generation, research, permitting, the partnerships, the talent pipelines, the infrastructure planning) happens at the local level. It's boots on the ground. This is about communities making smart bets, seizing opportunities, and forging public-private alliances that can outlast election cycles.

To lead in this moment, communities must think big. They must design and pitch rare-earth-ready ecosystems. A decade from now, it could be a small town in Kentucky, Oklahoma, or upstate New York that emerges as the "rare earth elements research center of America" or "magnet capital." A mid-sized metro in Georgia or rural West Virginia could reinvent itself as a highly profitable rare earth recycling hub.

These futures are possible not because Washington, DC, decreed them, but because local leaders didn't wait for permission. They saw the moment and were moved to act.



Conclusion: Seizing the Rare Earth Moment

The development of a resilient domestic rare earths supply chain represents one of the most urgent—and promising—industrial strategies of our time.

Policymakers, investors, and innovators are paying attention for good reasons. China's export restrictions have exposed the vulnerabilities of a highly concentrated global supply chain for materials that power everything from wind turbines and EVs to precision-guided defense systems.

Fortunately, the US is no longer standing still. From the deserts of California to the refineries of Texas and a magnet plant in Oklahoma, a domestic rare earth elements industry is taking shape. The question is no longer if the US can build this capacity, but how fast it can scale it.

As the clean energy transition accelerates and advanced manufacturing surges, the demand for rare earth elements will only grow. Communities that align early with this movement will gain not just jobs but strategic relevance in a rapidly shifting economy.

Success will require more than capital. It will take sustained coordination, local ingenuity, and recognition that supply chain resilience is about more than logistics. It's about national security, technological leadership, and shaping a future where the next generation builds not just with imported parts but with homegrown innovation.

The rare earth opportunity is rare, indeed. But with foresight, collaboration, and a bit of magnetic thinking, it doesn't have to stay that way for long.

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KEY TAKEAWAYS

1

Rare Earth Elements Are the Backbone of Modern Technology and Security

Despite their misleading name, rare earth elements (REEs) are not scarce in nature, but they are incredibly difficult to extract and refine. These materials are essential to manufacturing electric vehicles, wind turbines, defense systems, smartphones, and more. The US's dependence on foreign sources, especially China, for these strategic resources poses critical risks to national security and economic competitiveness.

2

America's Past Mining Legacy Can Be Repurposed for a Sustainable Future

The US once led global REE production but ceded ground due to environmental concerns and high costs. Today, abandoned mines and industrial waste sites across the country hold untapped REE potential. Emerging technologies are making it feasible—and environmentally responsible—to re-mine these sites and recover valuable materials from waste once seen as liabilities.

3

Innovation Is Creating New Pathways to Rare Earth Resilience

Recycling REEs from old electronics, wind turbines, and electric vehicles, along with innovations like biomining and solvent-free extraction, are revolutionizing how the US can source these materials. These technologies allow for the creation of cleaner, circular supply chains that align with decarbonization goals and reduce dependence on mining alone.

4

Building a Domestic REE Supply Chain Requires Local Leadership

While federal policies and investments are critical, the success of a US-based rare earth supply chain hinges on local action. Economic developers must assess their region's assets—such as legacy mine sites, infrastructure, research institutions, and workforce readiness—to identify opportunities in mining, processing, refining, recycling, or magnet manufacturing.

5

The Window for Strategic Action Is Open—And Urgent

China's near-total control of global REE processing and permanent magnet manufacturing gives it leverage over critical US industries. Communities that act now by aligning with public-private partners, streamlining permitting, investing in talent pipelines, and supporting clean-tech innovation can position themselves as indispensable nodes in a reimagined, secure domestic REE ecosystem.

ENDNOTES

[1] Dr. Gracelin Baskaran, *Critical Minerals and Future of the US Economy*, Center for Strategic and International Studies, February 2025, Chapter 1: page 3.

[2] Adam Johnson, *Closing the Midstream Gap in the US Critical Minerals Supply Chains, Critical Minerals and the Future of the US Economy*, Center for Strategic and International Studies, February 2025, Chapter 11: page 84.

[3] "Global Critical Minerals Outlook 2024," International Energy Agency (IEA), May 2024, https://www.iea.org/reports/global-critical-minerals-outlook-2024

[4] "Rare Earth Magnet Production Outside China Recently - Investor Briefing," Rare Earth Exchanges, May 26, 2025, https://rareearthexchanges.com/news/rare-earth-magnet-production-outside-china-recently-investor-briefing/

[5] Keith Bradsher, "Amid Tension, China Blocks Vital Exports to Japan," *New York Times*, September 22, 2010, https://www.nytimes.com/2010/09/23/business/global/23rare.html

[6] "Ramaco to Host US Secretary of Energy, Top Elected Officials for Historic Ribbon Cutting Ceremony for Nation's First Rare Earth Mine in Decades," Ramaco Resources, Inc. via PR Newswire, July 1, 2025, https://www.prnewswire.com/news-releases/ramaco-to-host-us-secretary-of-energy-top-elected-officials-for-historic-ribbon-cutting-ceremony-for-nations-first-rare-earth-mine-in-decades-302495078.html

[7] "ReElement Technologies Accelerates Rare Earth Production at Indiana Plant," Mining.com, April 22, 2025, https://www.mining.com/reelement-technologies-accelerates-rare-earth-production-at-indiana-plant/

[8] "America's Rare Earth Production Hub," MP Materials Independence facility web page, https://mpmaterials.com/independence

[9] Brian Daigle and Samantha DeCarlo, "Rare Earths and the US Electronics Sector: Supply Chain Developments and Trends," US International Trade Commission Office of Industries Working Paper ID-075, June 2011, https://www.usitc.gov/publications/332/working_papers/rare_earths_and_the_electronics_sector_final_070921_2-compliant.pdf

[10] "Rare Element Resources Provides Rare Earth Demonstration Plant Update," Rare Element Resources, April 17, 2025, https://www.rareelementresources.com/rare-element-resources-provides-rare-earth-demonstration-plant-update-2/

[11] "US Critical Materials and Idaho National Laboratory Collaborate to Strengthen US National Security with Next-Generation Rare Earth/Critical Minerals Processing Plant," US Critical Materials Corp via PR Newswire, June 5, 2025, https://www.prnewswire.com/news-releases/us-critical-materials-and-idaho-national-laboratory-collaborate-to-strengthen-us-national-security-with-next-generation-rare-earth--critical-minerals-processing-plant-302473863.html

[12] "Sheep Creek" web page, US Critical Materials, https://uscriticalmaterials.com/sheep-creek/

[13] "USA Rare Earth Produces First Batch of Magnets at Oklahoma Plant," Mining.com, January 8, 2025, https://www.mining.com/usa-rare-earth-produces-first-batch-of-magnets-at-oklahoma-plant/

[14] "Colosseum Mine in California Given Go Ahead to Continue Mining Operation," US Bureau of Land Management, April 8, 2025, https://www.blm.gov/announcement/colosseum-mine-california-given-go-ahead-continue-mining-operation

[15] "MP Materials Reports First Quarter 2025 Results," MP Materials, May 8, 2025, https://investors.mpmaterials.com/investor-news/news-details/2025/MP-Materials-Reports-First-Quarter-2025-Results/default.aspx

[16] "We are Bringing the Rare Earth Magnet Supply Chain Back to America," USA Rare Earth "About" web page, https://www.usare.com/about

[17] "Critical Minerals Producer Atlantic Strategic Minerals to Reactivate Operations in Virginia," Virginia Economic Development Partnership, March 11, 2024, https://www.vedp.org/press-release/2024-03/asm-sussex