[RARE EARTHS]

The 17 rare earth elements (REEs) are a group of minerals essential for producing permanent magnets, catalysts, rechargeable batteries, and LED lights and displays. The final goods that rely on these components range from smartphones and other consumer electronics, to advanced military weapons and communications systems, to wind turbines and electric vehicles. A steady supply of REEs is critical for the economy and national security.

ONE IN A SERIES OF REPORTS THE COMPTROLLER HAS PREPARED ON TEXAS SUPPLY CHAINS; FOR MORE INFORMATION PLEASE SEE BELOW.

MOST COMMONLY USED RARE EARTH ELEMENTS AND EXAMPLE APPLICATIONS

ELEMENT	SYMBOL	EXAMPLE APPLICATIONS
LANTHANUM	LA	OPTICAL GLASS, NICKEL-METAL-HYDRIDE BATTERIES
CERIUM	CE	COLORED GLASS (FLAT-PANEL DISPLAYS), AUTOMOBILE CATALYTIC CONVERTERS, PETROLEUM REFINING
NEODYMIUM	ND	PERMANENT MAGNETS
YTTRIUM	Y	METAL ALLOYS, VISUAL DISPLAYS, LASERS, LIGHTING

Source: U.S. Geological Survey
Note: Oxides of these four rare earth elements are estimated to be most widely imported and used by quantity, according to USGS data.

While the global market for tradeable REEs is thought to be about $3 billion to $5 billion, one estimate of the value-added market for final goods containing REEs is over $1 trillion. The market size is only set to grow as the global economy continues to become more technologically advanced and sustainable.

Supply Chain Risks and Mitigation

Starting in the 1970s, China has dominated the world market for REEs, controlling 97 percent in 2010. The U.S. share of global rare earth oxide (REO) production is rising – from zero in 2017 to about 16 percent in 2020. But the world still relies on China to turn REOs into usable metals.

16%

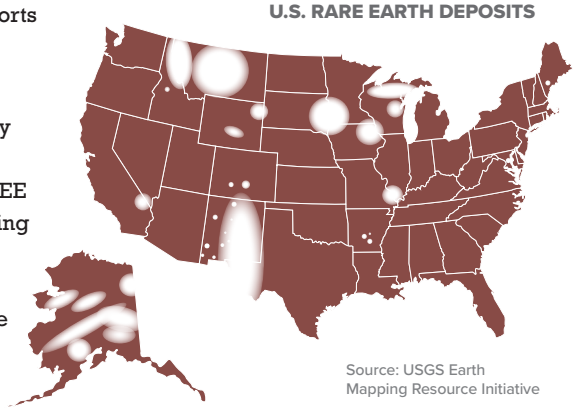
U.S. SHARE OF GLOBAL REO MARKET, 2020

Industry experts are increasingly concerned about China's ability to restrict REE exports for economic or military leverage. During a 2010 diplomatic dispute with Japan, for instance, China abruptly slashed REE exports by 37 percent and global prices jumped sevenfold.

The federal government is working closely with businesses to build a more secure supply chain. Projects to build domestic REE mining and processing capacity are ongoing in California (the biggest source of rare earths outside China), Alaska, Wyoming and Texas. The U.S. Department of Defense has entered into a number of agreements under the Defense Production Act, and the U.S. Geological Survey has begun an ambitious new mapping project.

Researchers also are looking for more efficient and economical processes to extract and process rare earths. Usable quantities of REOs could be recovered from coal-mining byproducts, for instance.

U.S. RARE EARTH DEPOSITS



Source: USGS Earth Mapping Resource Initiative

Rare Earths in Texas

Texas, home to major high-tech manufacturers, has an important role to play in building the domestic REE supply chain. Starting in 2023, USA Rare Earth will be mining 950 acres of state land at the Round Top deposit in Sierra Blanca, Texas. One of the largest U.S. deposits, it is expected to yield more than 300,000 metric tons of REOs. The company intends to begin producing American-made rare earth magnets to meet 17 percent of projected U.S. demand with $140 million in annual sales.

TEXAS RARE EARTH DEPOSITS

Source: USGS Earth Mapping Resource Initiative

RARE EARTH PROJECTIONS FOR ROUND TOP DEPOSIT, SIERRA BLANCA, STARTING 2023

EXPECTED YIELD
300,000 METRIC TONS

SHARE OF U.S. DEMAND
17%

ANNUAL SALES
$140 MILLION

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TO SEE MORE INFORMATION ON SUPPLY CHAINS AND THE TEXAS ECONOMY: https://comptroller.texas.gov/economy/economic-data/supply-chain/

Glenn Hegar Texas Comptroller of Public Accounts

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