

The Rare Earths

The magnetic, phosphorescent and catalytic properties of rare-earth metals (the 15 lanthanides, plus scandium and yttrium) make them important to the production of numerous technologies—from aerospace components and cell phones to medical scanning and quantum computing. Here we look at their primary uses and potential sources.

RARE EARTHS: PRIMARY USES

Super alloys, ultra-light aerospace components, X-ray tubes, baseball bats, lights, semiconductors



MRI contrast agent, memory chips, nuclear reactor shielding, CDs

Ceramics, metal alloys, rechargeable batteries, TV phosphors, high-temp superconductors



Green phosphors, lasers, fluorescent lamps, optical computer memories

Batteries, optical glass, camera lenses, petroleum refining catalysts



Permanent magnets, lasers, catalysts, nuclear reactors

Catalysts, metal alloys, radiation shielding, water purifier



Lasers, nuclear reactors, catalysts, magnets

Magnets, lasers, pigments, cryogenic refrigerant



Lasers, vanadium steel, IR-absorbing glasses, optical fibers

High-strength permanent magnets, lasers, IR filters, hard disc drives



Portable X-ray machines, microwaves

Nuclear batteries, luminous paint



IR lasers, chemical reducing agent, rechargeable batteries, fiber optics

High-temp magnets, nuclear reactor rods and shielding, lasers, microwave filters



PET scan detectors, superconductors, high refractive index glass, X-ray phosphor

Liquid crystal displays, fluorescent lighting, red and blue phosphors

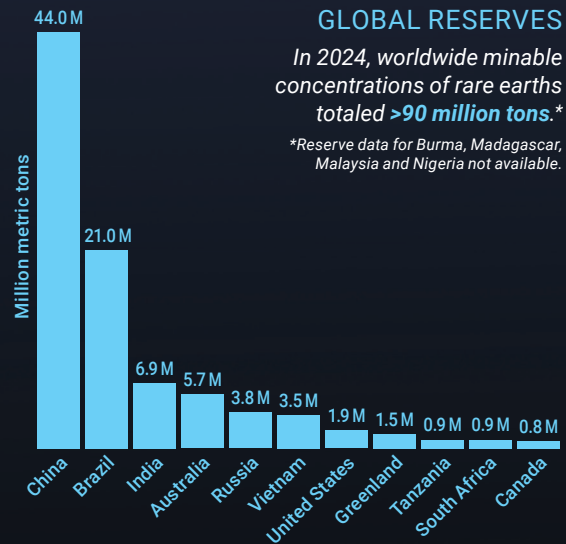


Rare-earth metals are relatively abundant in Earth's crust; however, they are spread thinly as trace impurities and require processing of large amounts of raw ore to obtain at usable purity.

GLOBAL RESERVES

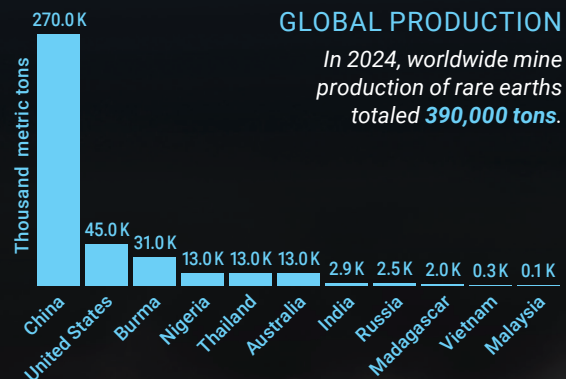
In 2024, worldwide minable concentrations of rare earths totaled **>90 million tons**.*

*Reserve data for Burma, Madagascar, Malaysia and Nigeria not available.



GLOBAL PRODUCTION

In 2024, worldwide mine production of rare earths totaled **390,000 tons**.



Source: US Geological Survey, Mineral Commodity Summaries, January 2025; wikipedia.org/wiki/Rare-earth_element; Background photo: Getty Images; Infographic: Alessia H. Kirkland