

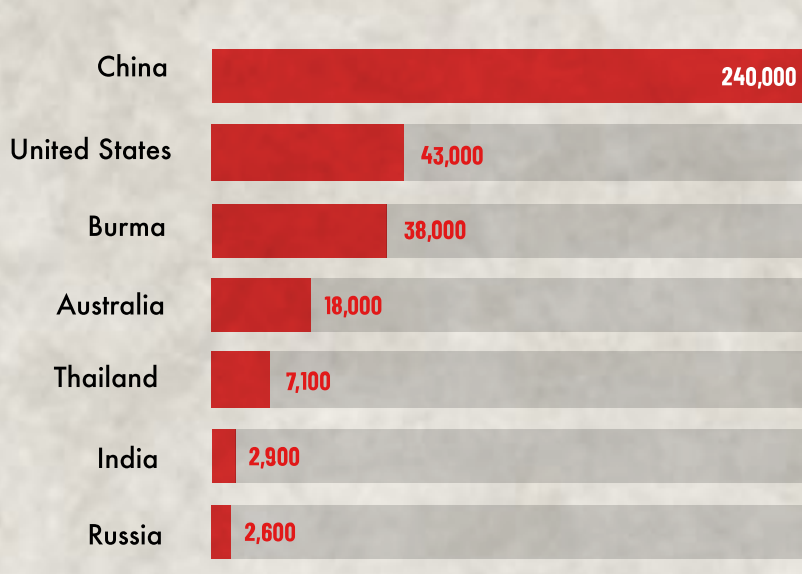
Key Players in the Rare Earth Industry

Rare earth elements consist of a group of 17 metallic elements, including the fifteen lanthanides on the periodic table plus scandium and yttrium. The rare earth supply chain involves multiple steps and complex processes from upstream mining, midstream processing before reaching a wide array of downstream applications. They are used in strategic and critical industries, such as defense and aerospace, electronics, telecommunications, advanced materials and electronic vehicles. China dominates key segments in the rare earth industrial chain, accounting for roughly 40 percent of the world's discovered rare earth reserves, and more than 80 percent of rare earth oxide separation capability. China also produces nearly 70 percent of the world's rare earths, and controls an even higher percentage of the heavy rare earth mining market. This dominance has enabled China to threaten to exercise coercive trade and diplomatic powers in recent years. In response to China's outsized influence over the rare earths supply chain, major global economies are seeking to develop alternatives and build greater supply chain resilience. This effort is part of a broader strategy to de-risk supply chains amid growing geopolitical tensions.

CHINA LEADS THE WORLD IN MINE PRODUCTION...

MINE PRODUCTION, 2023

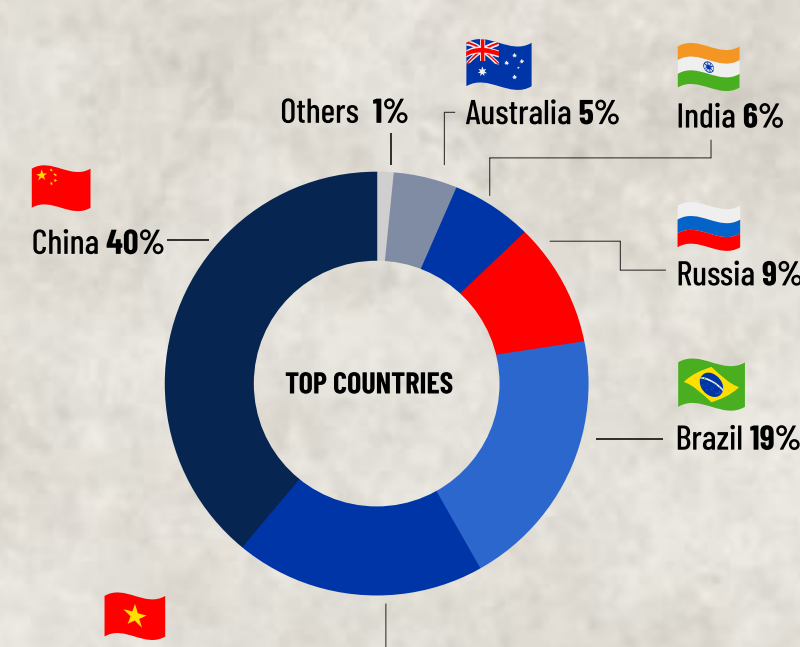
China produced over 88% of the world's total rare earth oxides in 2023



Note: Data in metric tons, rare earth oxide (REO) equivalent
Source: United States Geological Survey (USGS)

...AND THE WORLD'S TOTAL RESERVES

WORLD'S TOTAL RESERVES, 2023



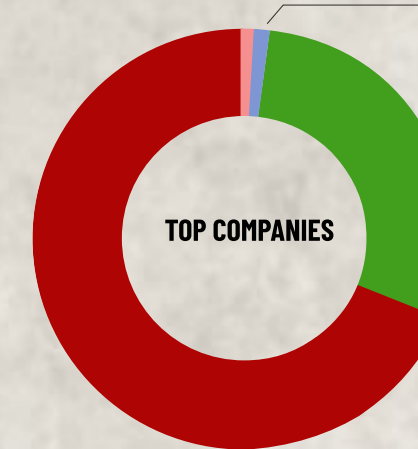
Source: United States Geological Survey (USGS)

FOUR COMPANIES DOMINATE CHINA'S RARE EARTH MARKET

China's rare earth minerals market is dominated by four state-owned conglomerates. In 2023, these companies were awarded the majority of the government's annual quotas, granting them significant control over the extraction and processing of rare earths.

CHINA'S MINING & EXTRACTION QUOTA, 2023

CHINA NORTHERN RARE EARTH HIGH-TECH 70%
Inner Mongolia



*GUANGDONG RARE EARTH INDUSTRY GROUP
Guangdong Province

XIAMEN TUNGSTEN 1%
Fujian Province

CHINA RARE EARTH 28%
Jiangxi Province

*Earlier this year, Guangdong Rare Earth Industry Group became a wholly-owned subsidiary of China Rare Earth Group.

LEGEND: Australia, Belgium, Brazil, Canada, Chile, China, France, Germany, Guernsey, Japan, Netherlands, Norway, South Korea, Spain, Sweden, Switzerland, Taiwan, United Kingdom, USA, Vietnam

UPSTREAM: MINING & EXTRACTION

While China is the world's leading producer of rare earths, American and Australian firms play a crucial role in mining and extraction. In this stage, ore is extracted from an open-pit or underground mines. Because of growing concerns about China's dominance, global firms from elsewhere, are re-entering the market.



Mining & Extraction

Major Miners & Refiners

- Aclara Resources
- American Rare Earths
- Arafura Resources
- Australian Strategic Materials
- Baotou Iron and Steel
- Blackstone Minerals
- Blue Line Corporation
- China Rare Earth Group High-Tech
- China Rare Earth Group
- China Southern Rare Earth Group
- Dreadnought Resources
- Energy Fuels
- Energy Transition Minerals
- Guangdong Rare Earth Industry Group
- Hastings Technology Metals
- Iluka Resources
- Inner Mongolia Baotou Steel Union
- Ionic Rare Earths
- Lynas Rare Earths
- HP Materials
- NioCorp Developments
- Northern Minerals
- Peak Rare Earths
- Rainbow Rare Earths
- Rare Element Resources
- RareX
- REETec
- Rising Nonferrous Metals Share
- Shandong Weishan Lake Rare Earth
- Shenghe Resources Holding
- Solvay S.A.
- Texas Mineral Resources
- Ucore Rare Metals
- USA Rare Earth
- Venus Metals
- Vietnam Rare Earth Processor
- Vital Metals
- Xiamen Tungsten
- Zhongxi (Liangshan) Rare Earth

A Closer Look at China Rare Earth Group

Established in 2021 as part of Beijing's push to consolidate China's rare earths industry, China Rare Earth Group was formed by merging the rare earths assets of three large mining conglomerates and two metallurgical research organizations, including China Minmetals Corp and Aluminum Corp of China. The company is engaged in the development of rare earth resources, smelting and separation, deep processing, and the import and export of rare earth products.

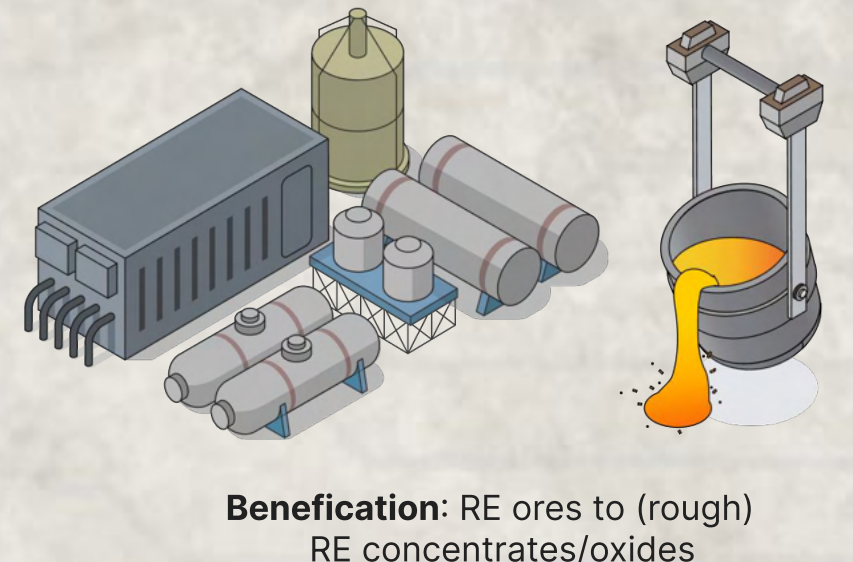
BENEFICIAL OWNERS



Click any underlined company to view the company profile in WireScreen

MIDSTREAM PROCESSING

China has a virtual monopoly over midstream processing of rare earths. After the huge Mountain Pass mine in the Mojave Desert in California closed in the early 2000s, China assumed a dominant position in both mining and processing.



Benefication: RE ores to (rough) RE concentrates/oxides
Separation: RE concentrates to RE compounds, including RE mixed compounds and chlorides
Smelting: RE mixed ores to multiple types of RE-incorporated metals & alloys

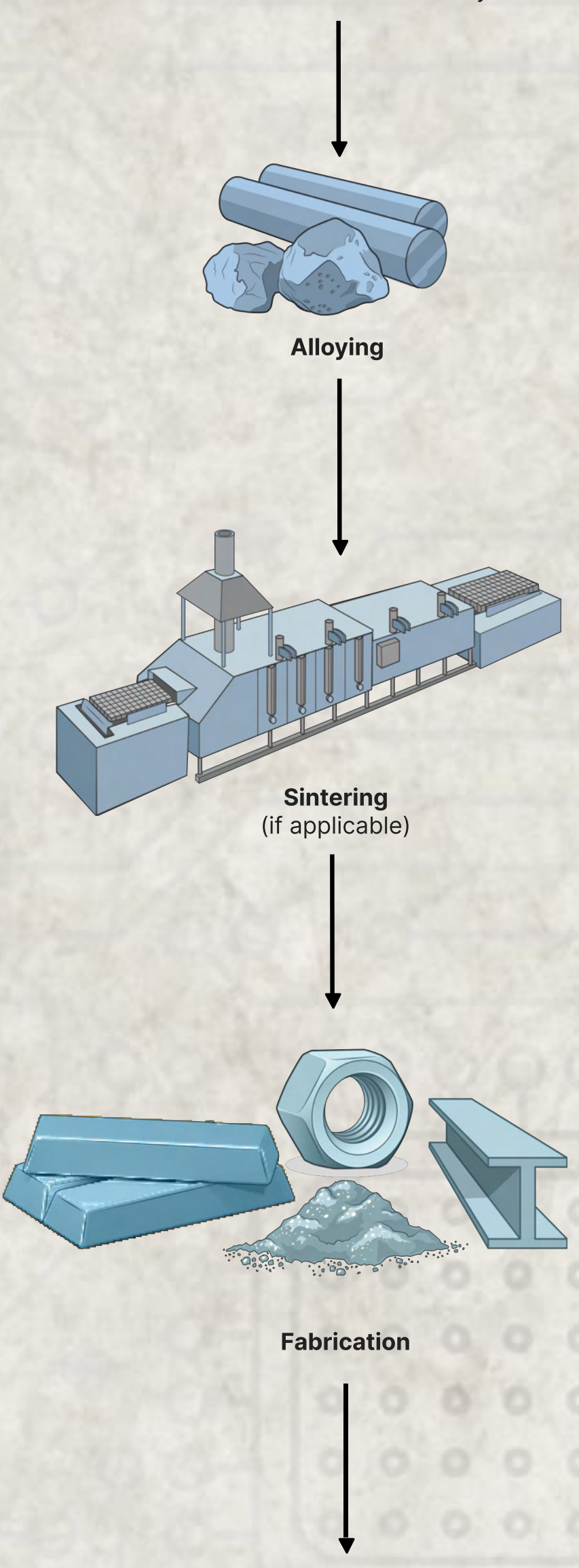
Intermediary Processors

- Baotou Feida
- Baotou Haoming
- Baotou Huamei
- Baotou Huashang
- Baotou Jingrui
- Baotou Jimeng
- Baotou Jiqian
- Baotou Qitong
- Baotou Xindamao
- Baotou Xinyuan
- Beijing Jinysu
- China Nonferrous
- China Northern RE High-Tech
- China Rare Earth Group
- China Rare Earth (Ganzhou)
- China Rare Earth Group (Yongzhou)
- China Rare Earth Group Industry Development
- China Rare Earth Holdings
- China Rare Earth Resources and Technology
- China Southern Rare Earth
- Chinalco (Guangxi)
- Chinalco (Jiangsu) Rare Earth
- Chinalco (Shandong)
- Chinalco (Shouguang)
- CNYC Southern Rare Earth (Xinfeng)
- Dechang County Zhineng
- Deqing Xinghang
- Dingnan County Nanfang
- Fujian Golden Dragon
- Fujian Rare Earth
- Gansu Rare Earth
- Gansu Rare Earth Holdings
- Gansu Rare Earth New Material
- Gansu United
- Ganzhou Rare Earth Metals
- Ganzhou Chenguang
- Ganzhou Huajing
- Ganzhou Yongquan
- Guangdong RARE EARTH HIGH-TECH
- Guangdong Fuyuan
- Guangdong Zhujiang
- Guangxi Dingli
- Guangxi Hezhou Jinguang
- Guangzhou Changtao
- Huhot Rongxin
- Hunan Rare Earth Metal Materials
- Inner Mongolia Winner
- Jiangxi Rare Earth & Rare Metals Tungsten
- Jinpi
- Leshan Orirrem
- Liyang Solvay
- Longnan Heli
- Longnan Longyri
- Maanshan Shuntai
- Pingyuan County Huaqi
- Qiongdong Rare Earth
- Quannan Advanced Resources
- Rising Nonferrous
- Ruike
- Shandong Weishan Lake Rare Earth
- Shenghe Resources
- Sichuan Mianping Fangxing
- Sichuan Wankaiteng
- Southern Rare Earth
- Suichuan Hechuang
- Wuyuan County Runze
- Xiamen Tungsten
- Xinfeng County Baosteel Xinli
- Xinfeng Rising
- Xunwu County Southern Rare Earth
- Yixing Xinwei Leesheng
- Yiyang Hongyuan
- Yongzhou Xiangjiang
- Zhongxi (Liangshan)
- Zibo Baosteel Lingshi

DOWNSTREAM

After the rare earths are extracted and separated, they need to be further refined and processed into powders or different forms. In this stage, they are transformed into specialized materials and alloys, through manufacturing, sintering and fabrication processes. Japanese firms lead in certain advanced technologies in this area.

Alloying, Sintering & Fabrication: This stage is the conversion of REOs to rare earth metals and alloys



Neodymium

- Advanced Technology & Materials
- Baidida Intelligent Technology
- Baotou City Hongtianty
- Baotou City Sunlux
- Baotou Rewin
- Baotou Skyrock
- Beijing Zhongke Sanhuan
- Bgrimm
- Chengdu Galaxy Magnets
- Citizen Finedevice Co.,Ltd
- Daido Electronics
- Earth-Panda
- Gansu Rare Earth
- Ganzhou DMEGC
- Ganzhou Chengzheng
- Ganzhou Fortune Electronics
- Ganzhou Rare Earth Metals
- GRINM
- Grimm
- Guangxi Dingli
- Guangxi Hezhou Jinguang
- Guorui
- Hangzhou Quadrant
- Hengdian Group DMEGC Magnetics
- Hongda Xinye
- Inner Mongolia Northern Rare Earth
- Innuovo Technology
- Jiangsu Haicore
- Jiangsu Jinshi
- Jiangxi Jiangwu Haoyun
- Jiangxi Quantong
- Jiangxi RE Functional Materials
- Jiangxi Yueci
- Jingci
- JL MAG
- Magnite
- Magna
- Magnadrive
- Magnetworld AG
- Monte-Bianco Diamond
- MS-Schramberg
- Nihon Denji Sokki
- Ningbo Xionghai
- Ningbo Yunsheng
- Obrim
- Quadrant Magnetics
- Sagami Chemical Metal
- Shandong SRN
- Shandong Shangda
- Shandong Sinoceera
- Shanghai Heli
- Shanghai Yuelong
- Shenyang General
- Shin-Etsu Chemical
- Sumitomo Metal Mining
- TDK
- Thinova Magnet
- Tokyo Ferrite
- Vacuumschmelze
- Xinfeng County Baosteel Xinli
- Yantai Dongxing
- Yantai Zhenghai
- Zhejiang Dongyang
- Zhejiang Zhonghang

Catalysts

- BASF SE
- China Northern Rare Earth (Group) High-Tech
- Hongda Xinye
- Inner Mongolia RE Innovation Center
- Johnson Matthey
- Kaili Catalyst
- Kunming Sino-Platinum Metals Catalyst
- Rezel Catalysts
- Shaenai Rock New Materials
- Shandong Mafeng New Material Technology
- Shandong Tiancan Environmental Technology
- Shanghai Huaming Gona
- Shenghe Resources
- Sinocat Environmental Technology
- Sinopec Catalyst
- Proterial
- Welfang Zhongquan
- Wuxi Weifu Lida Catalytic Converter

Phosphorus

- Changzhou Xinyuan
- China Northern Rare Earth (Group) High-Tech
- China Rare Earth Holdings
- Dongguan Anda
- Dow Electronic Materials
- Gansu Rare Earth New Material
- Ganzhou Rare Earth Metals
- Ganzhou Qichang
- Ganzhou Xinnuo
- General Electric
- GRINM
- Grimm
- Inner Mongolia HEFA
- Inner Mongolia Rare Earth
- Inner Mongolia Tiancai
- Intematix
- Intematix Optoelectronics (Suzhou)
- Jiangmen Kanho
- Jiangsu Bree Optronics
- Jiangsu Tiancai
- Jiangxi Hetai
- Jiangxi Quantong
- Koninklijke Philips N.V.
- Mitsubishi Chemical
- Nemoto

Hydrogen Storage

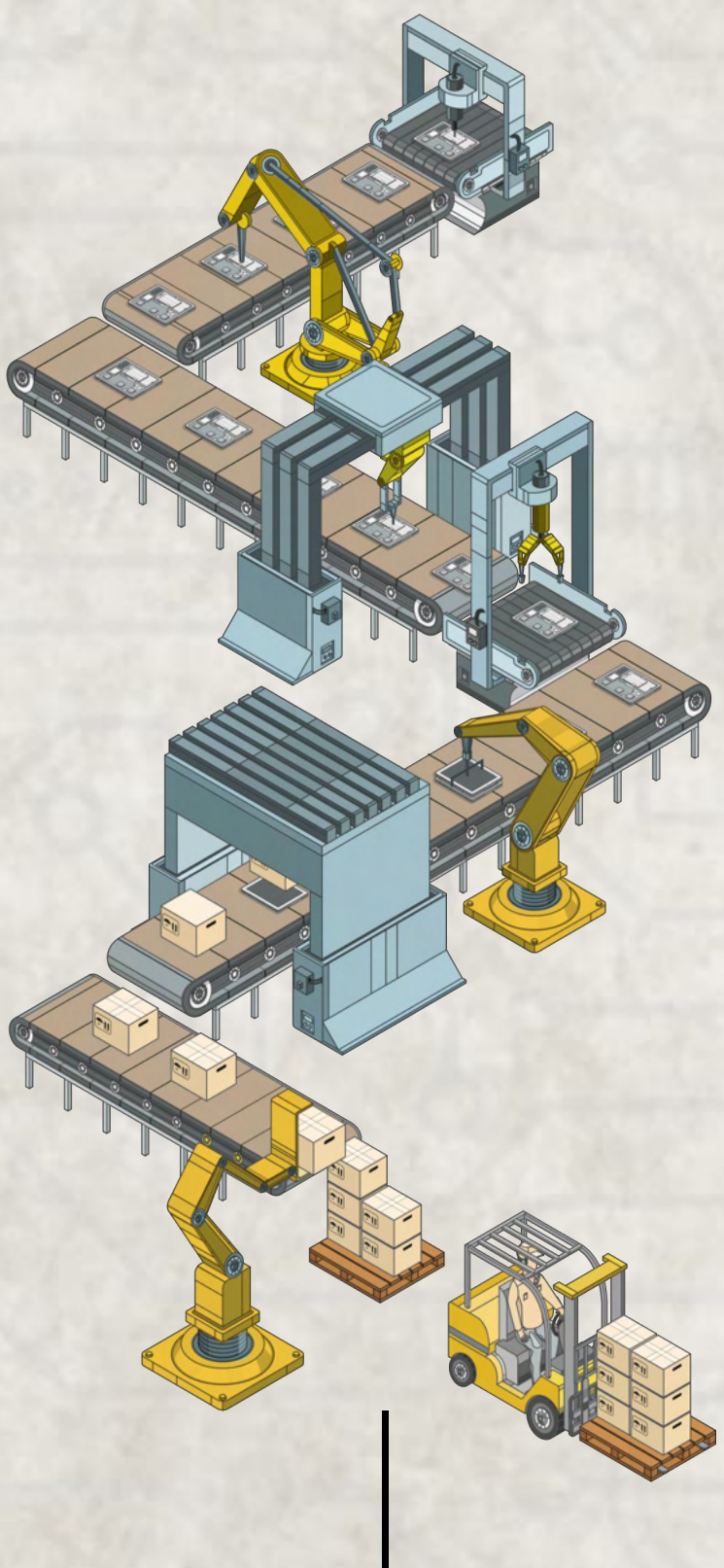
- Ajax TOCCO Magnethermic
- Baotou JQJ
- Baotou FDK
- Chinalco (Weishan)
- Eutectix
- Gansu Rare Earth New Material
- Hongda Xinye
- Human Rare Earth Metal Materials Research Institute
- Inner Mongolia Baotou Steel Hefa
- Inner Mongolia RE Functional Materials
- Inner Mongolia RE Ovonic Metal
- Japan Metals & Chemicals
- Jiangxi Jiangwu Haoyun
- Jiangxi Tungsten
- Mitsui Mining & Smelting
- Nippon Denko
- Nippon Yttrium
- Shanghai Mg Power
- Sihui Double Win
- Xiamen Tungsten
- Zhongke Xunanda
- Whole Win (Beijing)

Polishing Powder

- Anhui Triumph
- Anyang Fangyuan
- Baotou Halliang
- Baotou Haorui
- Baotou Huachen
- Baotou Huaxing
- Baotou Jiaxin Nano
- Baotou Tianjiao Semei
- Beijing Guorui Sheng
- China Northern RE High-Tech
- China Rare Earth Holdings
- CNC Materials
- Gansu Rare Earth New Material
- Gansu Golden Sun Hi-Tech Material Co., Ltd.
- Ganzhou Chengzheng
- Grimm
- Human Haoshi
- Inner Mongolia RE Innovation Center
- Inner Mongolia Xinyu
- Liyang Solvay
- Merck KGaA
- Mitsui Mining & Smelting
- Resonac Corporation
- Rising Nonferrous
- Shandong Mafeng
- Shandong Xinfangyuan
- Shanghai Huaming Gona
- Solvay S.A.
- Universal Photonics
- Zibo Rongruida

END USE

Rare earths are used in a variety of applications, including in electronics, lasers, glass, magnetic materials and industrial processes. Among other things, they can help make products lighter and more efficient. They can be found in everything from microchips, space rockets, wind turbines, electric vehicles and other clean energy technologies.



Electronics Industry

- AMD
- Apple
- Applied Materials
- Dell
- Hon Hai Precision
- Huawei
- Nvidia
- Panasonic
- Samsung

Renewable Energy

- Beijing Jieryuan
- GE Gas Power
- Goldwin
- Mitsubishi Heavy Industries
- SANY Group
- Shanghai Electric
- Siemens Gamesa
- Sumitomo
- Zhejiang Windey

Magnets

- ABB
- Denso
- Mitsubishi Electric
- Siemens AG
- TDK
- Stanford Magnets
- Proterial
- TyTek Industries
- Adams Magnetic Products

Automotive Industry

- Bosch
- LE Energy Solution
- Samsung SDI
- Tesla
- Proterial
- Denso
- ZF Friedrichshafen AG
- Hyundai Motor Group
- Magna International

Telecommunications

- Chengdu Xunhong Photonics
- Omron
- The 8th Research Institute Of China Electronics Technology
- Yangtze Optical Fibre & Cable
- Zhejiang Futong Optical Fibre

Medical Technology

- Beijing Wandong Medical
- Fujifilm Holdings
- GE Healthcare
- Koninklijke Philips NV
- Siemens Healthineers

Defense & Aerospace

- Boeing
- GE Aerospace
- Honeywell Aerospace
- Safran S.A.
- Rolls-Royce Holdings

Consumer Products

- Citizens Electronics
- DOWA Electronics Materials
- Henkel
- Osram Opto Semiconductors
- Vishay

Industrial Applications

- China Petrochemical (Sinopec Group)
- China Petroleum & Chemical
- Hengyi Petrochemical
- SK Innovation

Notes on WireScreen Data

Companies were included based on their relative importance in the rare earth industry, as measured by market cap (if applicable), market share, registered capital, and/or technical ability. Information was gathered from corporate filings and industry research notes, press releases, academic papers, government reports, and other publicly available sources.

Firms that operate in multiple segments of the rare earth supply chain, especially leading players with numerous subsidiaries specializing in each key segment will appear multiple times in this graph.

This list is in alphabetical order and organized by country, based on the location of the corporate headquarters.

