ALIXYZ

S.A. SWITZERLAND

Technology Metals & Rare Earth Elements

Global Sourcing & Trading Excellence

CATALOGUE 2026

Empowering Industries Worldwide — 130+ Countries — 20+ Years of Expertise

Table of Contents

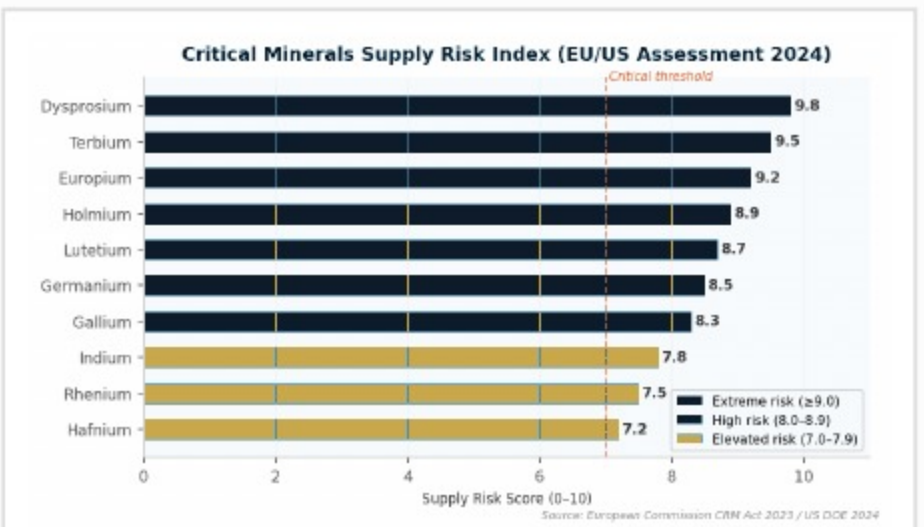
ALIXYZ S.A. — Product Catalogue 2026

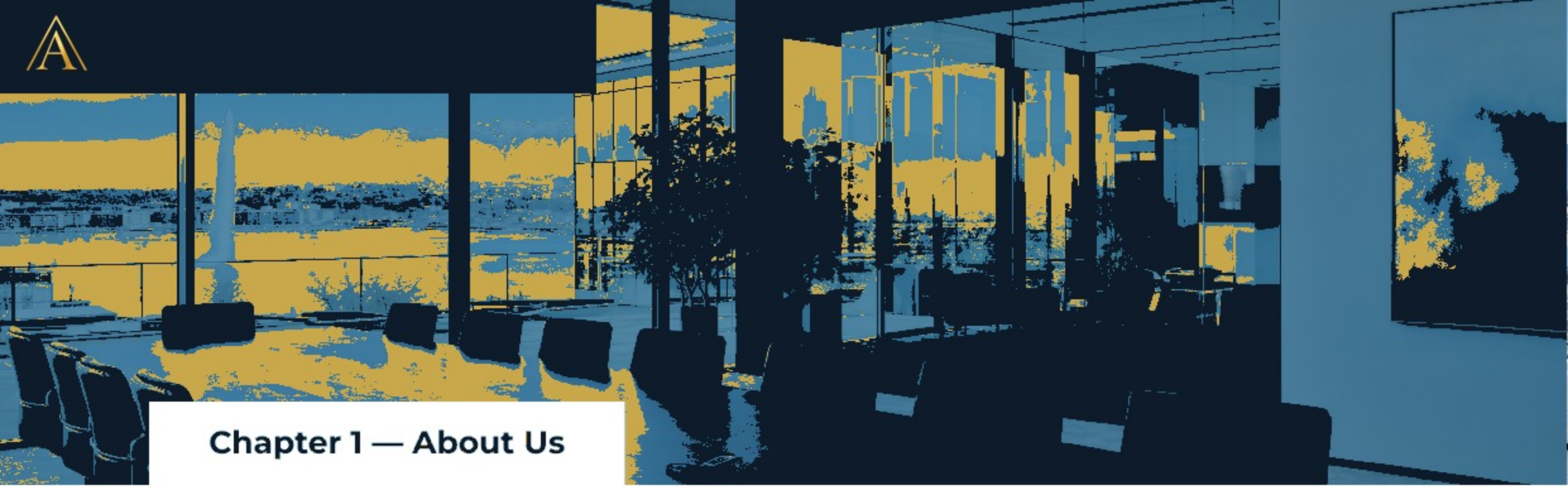
Chapter 1 — About Us

Chapter 2 — Technology Metals

Chapter 3 — Rare Earth Elements

Chapter 4 — Contact & Services





Chapter 1 — About Us

ALIXYZ
S.A. — SWITZERLAND

Founded in Geneva, Switzerland, Alixyz S.A. is a premier global trading company specializing in Technology Metals and Rare Earth Elements. With over 20 years of industry expertise, we serve as a trusted bridge between producers and industrial consumers across more than 130 countries worldwide. Our commitment to quality, reliability, and transparency has established us as one of the most respected names in the specialty metals trading sector.

20+	130+	26	AAA
YEARS OF EXPERIENCE	COUNTRIES SERVED	PRODUCTS AVAILABLE	CREDIT RATING

Our Mission

To provide reliable, high-quality access to critical technology metals and rare earth elements that power the industries of tomorrow. We believe in building long-term partnerships based on trust, transparency, and technical excellence.

Our dedicated team of specialists monitors global market trends, supply chain dynamics, and geopolitical factors to ensure our clients always have access to the materials they nee competitive price

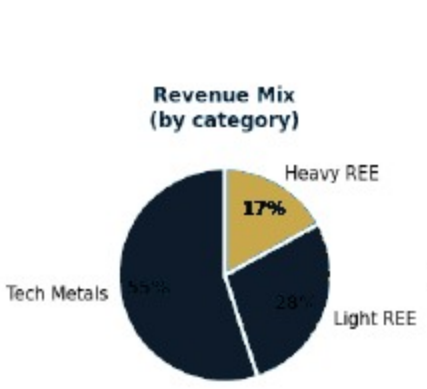
Our Services

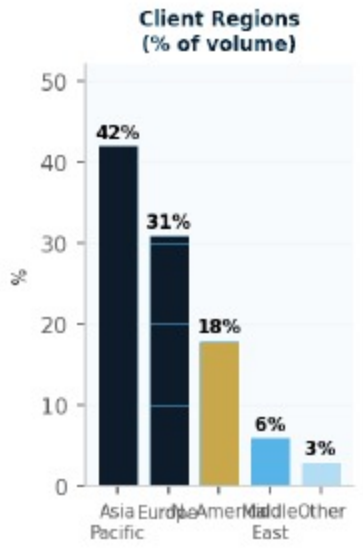
- Direct sourcing from certified producers
- Quality certification and assay verification
- Logistics and customs management
- Hedging and price risk management
- Technical consulting and market intelligence
- Long-term supply agreements

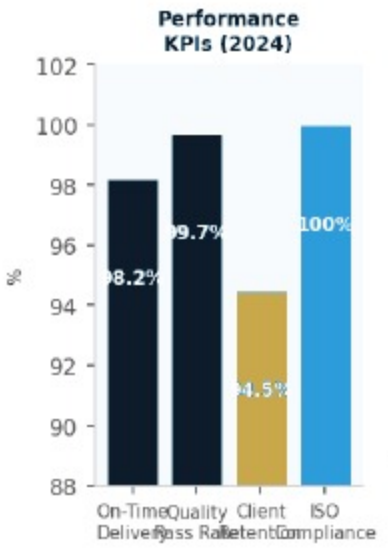
Quality Standards

All products traded by Alixyz S.A. undergo rigorous quality verification. We work exclusively with ISO-certified suppliers and provide full documentation including certificates of analysis, origin certificates, and third-party assay reports.

Our Geneva headquarters maintains the highest standards of Swiss financial and commercial integrity.







Alixyz S.A. — Performance KPIs & Business Mix (2024)

Technology Metals

Technology metals are the backbone of modern industry. From electronics and telecommunications to aerospace and clean energy, these critical materials enable the technologies that define our era. Alixyz S.A. provides direct access to 11 essential technology metals, sourced from certified producers worldwide and delivered to exacting specifications.

11
PRODUCTS AVAILABLE

Up to 99.9999%
PURITY LEVELS

40+
GLOBAL PRODUCERS

Electronics, Energy, Aerospace
KEY SECTORS

Ingot, Powder, Wire, Foil
DELIVERY FORMATS

CoA, Origin Certificate
DOCUMENTATION

29
Cu
COPPER

Copper

Copper is one of humanity's oldest and most versatile metals. As the best non-precious electrical conductor, it is indispensable in modern electronics, power transmission, and telecommunications infrastructure.

PHYSICAL & CHEMICAL PROPERTIES

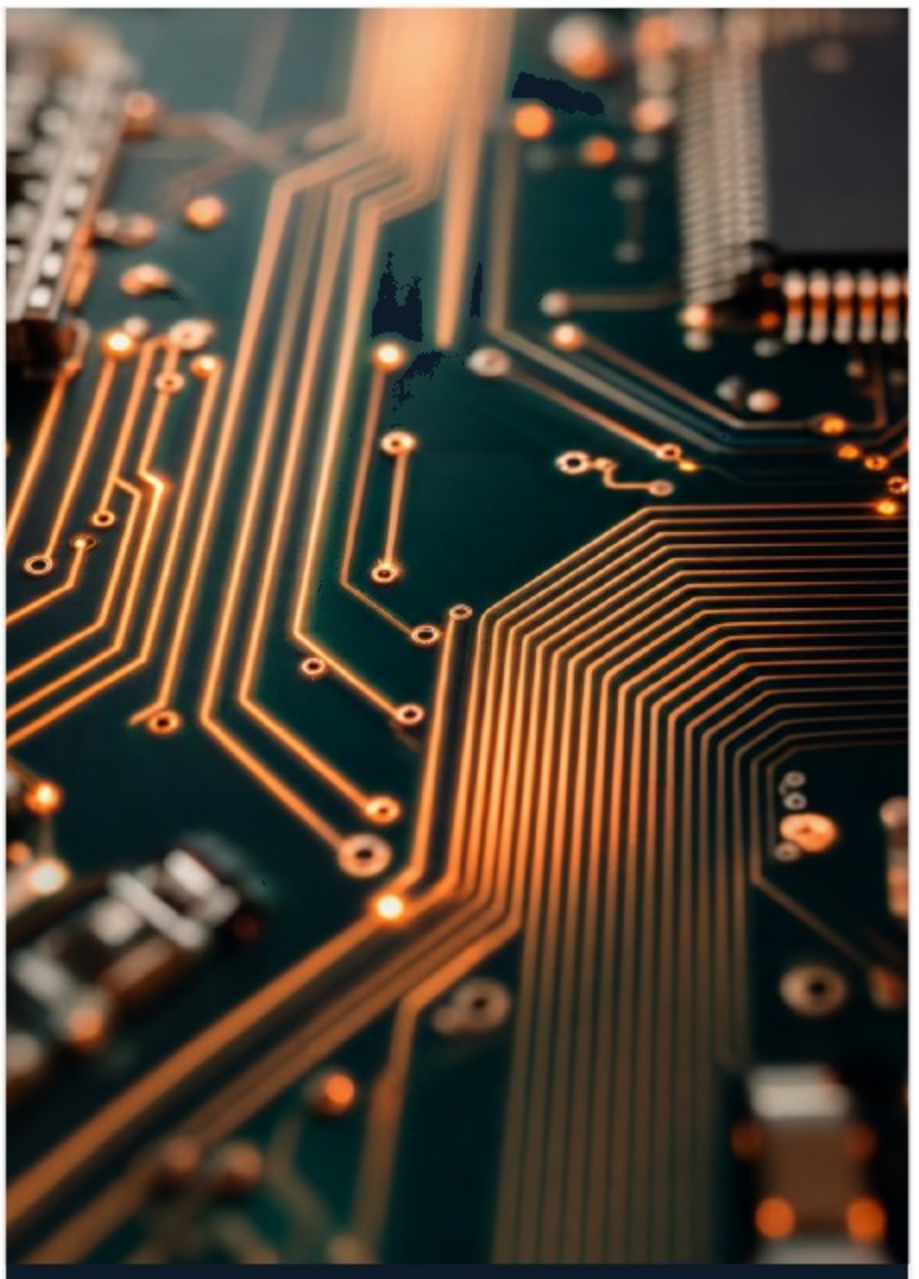
Atomic Weight	63.546 g/mol
Melting Point	1,085°C (1,984°F)
Density	8.96 g/cm³
Electrical Conductivity	59.6 × 10⁶ S/m
Thermal Conductivity	401 W/(m·K)
Crystal Structure	Face-centered cubic
Purity Available	99.9% – 99.999%

AVAILABLE PRODUCTS

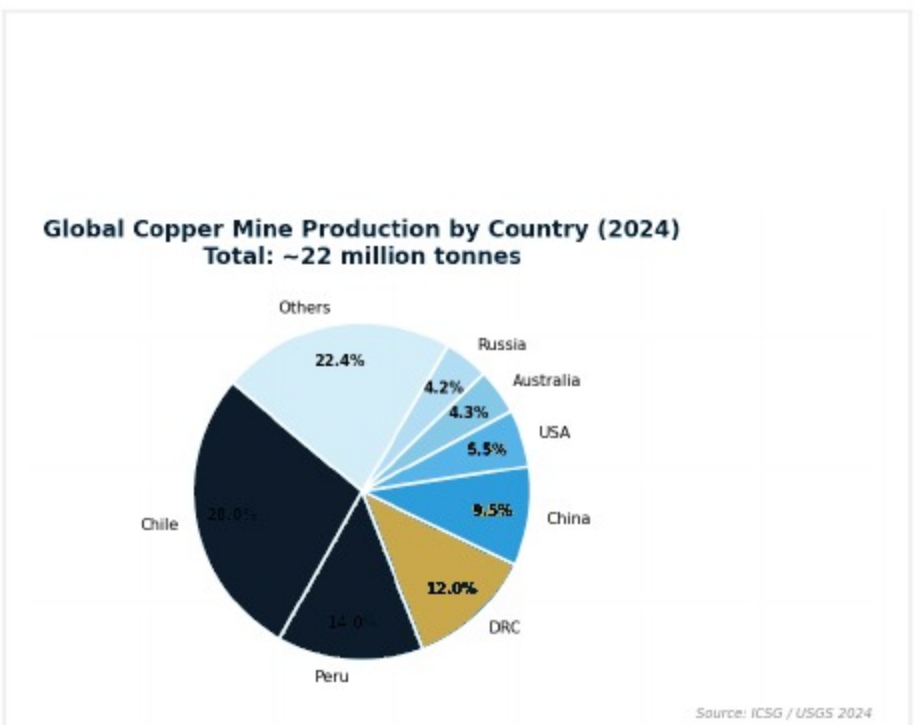
- Copper Powder (various mesh sizes)
- Copper Ingot (99.9% – 99.99%)
- Copper Cathode (Grade A)
- Copper Wire Rod
- Copper Granules

KEY APPLICATIONS

Electronics & PCBs
Power Cables
Electric Motors
Heat Exchangers
Plumbing
Renewable Energy



Copper traces on printed circuit boards — the foundation of modern electronics



Global Copper Mine Production by Country (2024)

28
Ni
NICKEL

Nickel

Nickel is a critical industrial metal prized for its corrosion resistance, high-temperature strength, and magnetic properties. It is essential in stainless steel production, superalloys for aerospace, and lithium-ion battery cathodes. Our high-purity Nickel Wire is specifically drawn for advanced electronics and specialized heating applications.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**58.693 g/mol**
Melting Point	**1,455°C (2,651°F)**
Density	**8.908 g/cm³**
Electrical Conductivity	**14.3 × 10⁶ S/m**
Thermal Conductivity	**90.9 W/(m·K)**
Crystal Structure	**Face-centered cubic**
Purity Available	**99.5% – 99.99%**

AVAILABLE PRODUCTS

- Nickel Wire (0.02mm - 5.0mm, 99.99%)
- Nickel Pellets (99.9%)
- Nickel Powder (fine grade)
- Nickel Rounds
- Nickel Cathode

KEY APPLICATIONS

Jet Engine Turbines · Stainless Steel · EV Batteries · Chemical Processing · Electroplating · Magnets

Nickel superalloy turbine blades — enabling high-temperature aerospace performance

Market Insights & Strategic Value

Global demand for Nickel is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

79
Au
GOLD

Gold

Gold is the ultimate conductor for critical electronic connections. Its unmatched resistance to corrosion and oxidation makes it irreplaceable in high-reliability electronics, semiconductor bonding, and advanced medical devices.

PHYSICAL & CHEMICAL PROPERTIES

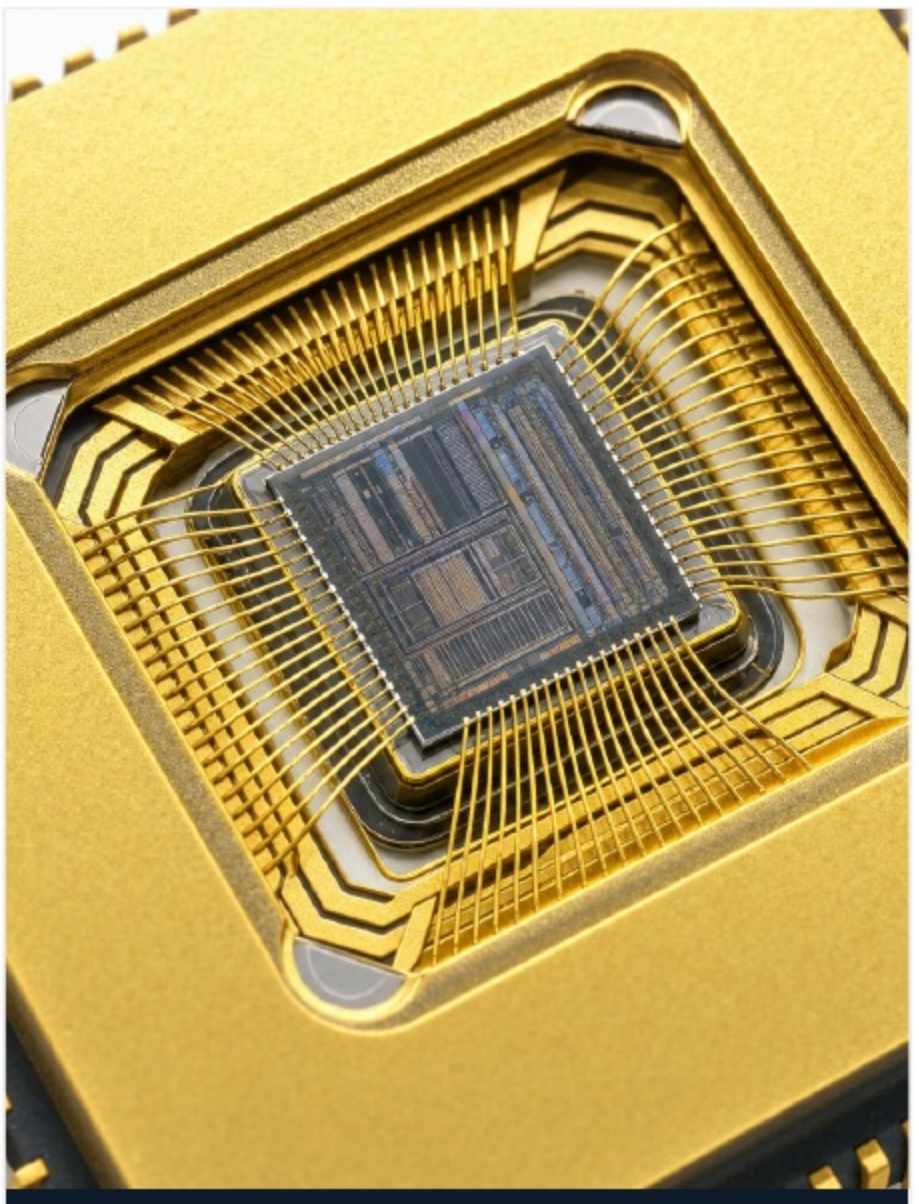
Atomic Weight	**196.967 g/mol**
Melting Point	**1,064°C (1,947°F)**
Density	**19.30 g/cm³**
Electrical Conductivity	**45.2 × 10⁶ S/m**
Thermal Conductivity	**318 W/(m·K)**
Crystal Structure	**Face-centered cubic**
Purity Available	**99.99% – 99.999%**

AVAILABLE PRODUCTS

- Gold Wire (various gauges, 99.99%)
- Gold Bonding Wire (ultra-fine)
- Gold Pellets (99.999%)
- Gold Sputtering Targets
- Gold Powder

KEY APPLICATIONS

- Semiconductor Bonding
- Aerospace Electronics
- Medical Devices
- Connectors
- Satellite Systems
- Nanotechnology



Gold wire bonding in semiconductor chips — ensuring perfect electrical connections

Market Insights & Strategic Value

Global demand for Gold is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

32
Ge
GERMANIUM

Germanium

Germanium is a critical semiconductor and optical material essential for fiber optic communications, infrared optics, solar cells, and advanced electronics. Global supply is highly concentrated, making reliable sourcing critical.

PHYSICAL & CHEMICAL PROPERTIES

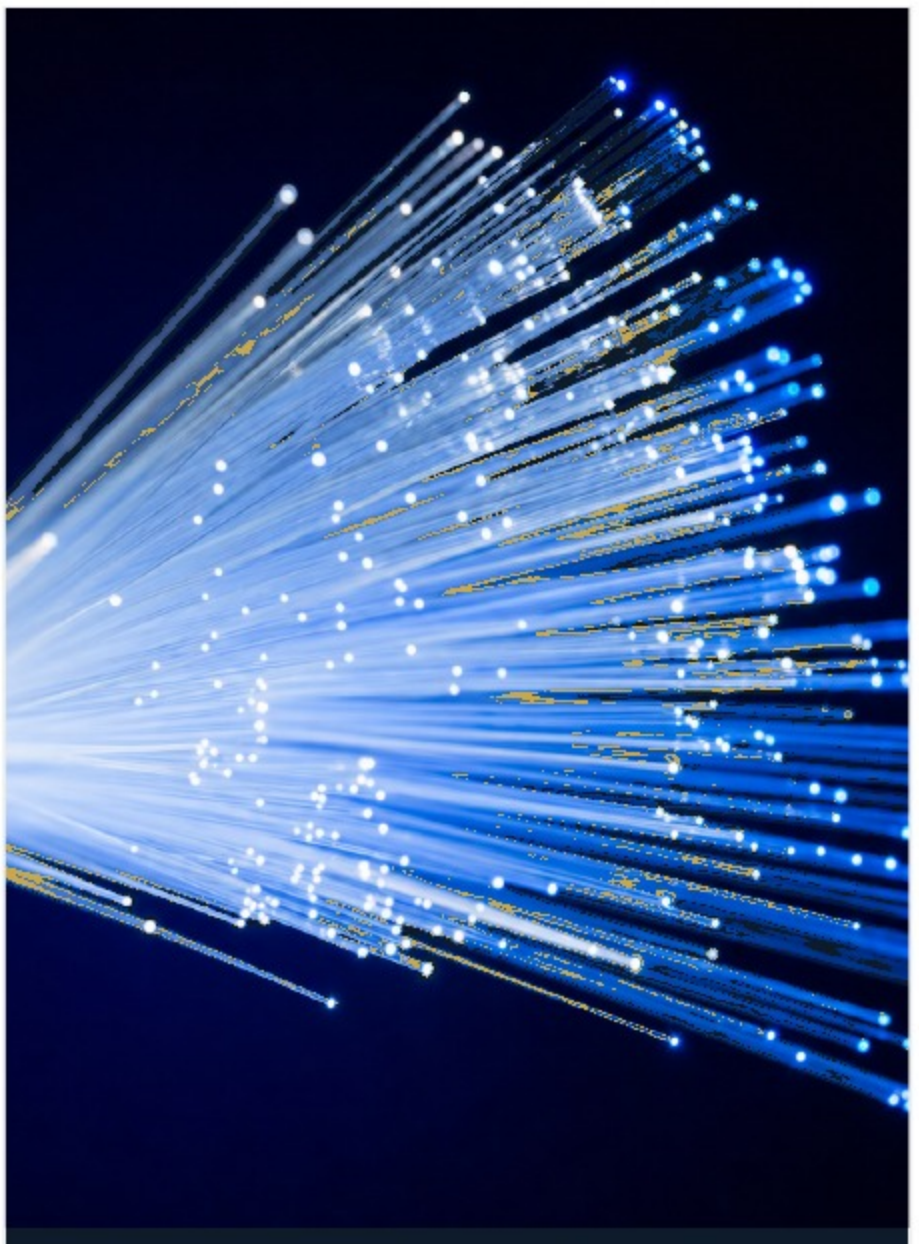
Atomic Weight	**72.630 g/mol**
Melting Point	**938°C (1,720°F)**
Density	**5.323 g/cm³**
Band Gap	**0.67 eV at 300K**
Refractive Index	**4.0 (IR range)**
Crystal Structure	**Diamond cubic**
Purity Available	**99.99% – 99.9999%**

AVAILABLE PRODUCTS

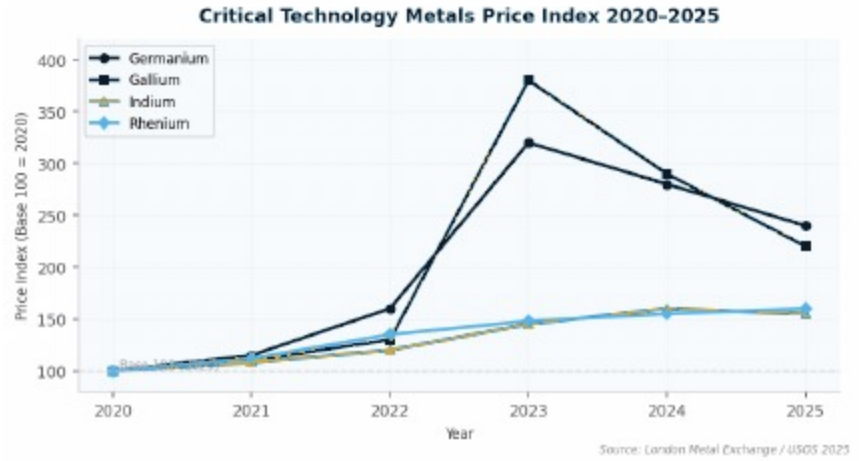
- Germanium Ingot (5N – 6N purity)
- Germanium Powder (99.99%)
- Germanium Dioxide (GeO_2)
- Germanium Sputtering Targets
- Germanium Wafers

KEY APPLICATIONS

Fiber Optic Cables · **Infrared Optics** · **Solar Cells** · **Night Vision** · **Semiconductors** · **Satellite Solar Panels**



Fiber optic cables transmitting data at the speed of light — enabled by germanium optics



Technology Metals Price Index 2020–2025

49
In
INDIUM

Indium

Indium is a soft, silvery metal critical to transparent conductive coatings. As a primary component of Indium Tin Oxide (ITO), it is essential for touchscreens, flat panel displays, and thin-film solar cells.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**114.818 g/mol**
Melting Point	**156.6°C (313.9°F)**
Density	**7.31 g/cm³**
Electrical Conductivity	**11.4 × 10⁶ S/m**
Thermal Conductivity	**81.8 W/(m·K)**
Crystal Structure	**Face-centered tetragonal**
Purity Available	**99.99% – 99.9999%**

AVAILABLE PRODUCTS

- Indium Ingot (4N – 6N purity)
- Indium Powder (99.99%)
- Indium Wire
- ITO Sputtering Targets
- Indium Foil

KEY APPLICATIONS

LCD/OLED Displays · Touchscreens · Thin-Film Solar · Semiconductors · Low-Temp Solders · Bearings

OLED display manufacturing — indium tin oxide enables every touchscreen interaction

Market Insights & Strategic Value

Global demand for Indium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

75
Re
RHENIUM

Rhenium

Rhenium has the second-highest melting point of all elements, making it irreplaceable in high-temperature superalloys for jet engine turbine blades. It is one of the rarest and most valuable metals in commercial use.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**186.207 g/mol**
Melting Point	**3,186°C (5,767°F)**
Density	**21.02 g/cm³**
Electrical Conductivity	**5.42 × 10⁶ S/m**
Thermal Conductivity	**48.0 W/(m·K)**
Crystal Structure	**Hexagonal close-packed**
Purity Available	**99.9% – 99.999%**

AVAILABLE PRODUCTS

- Rhenium Pellets (99.99%)
- Rhenium Powder (various grades)
- Rhenium Wire
- Ammonium Perrhenate
- Rhenium Sputtering Targets

KEY APPLICATIONS

- Jet Engine Turbines
- Rocket Engines
- Petroleum Catalysts
- Thermocouples
- Electrical Contacts
- X-ray Equipment

Jet engine turbine cross-section — rhenium superalloys withstand extreme temperatures

Market Insights & Strategic Value

Global demand for Rhenium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

31
Ga
GALLIUM

Gallium

Gallium is a critical semiconductor material used in compound semiconductors (GaAs, GaN) that power LEDs, laser diodes, solar cells, and high-frequency electronics. It melts at near room temperature.

PHYSICAL & CHEMICAL PROPERTIES

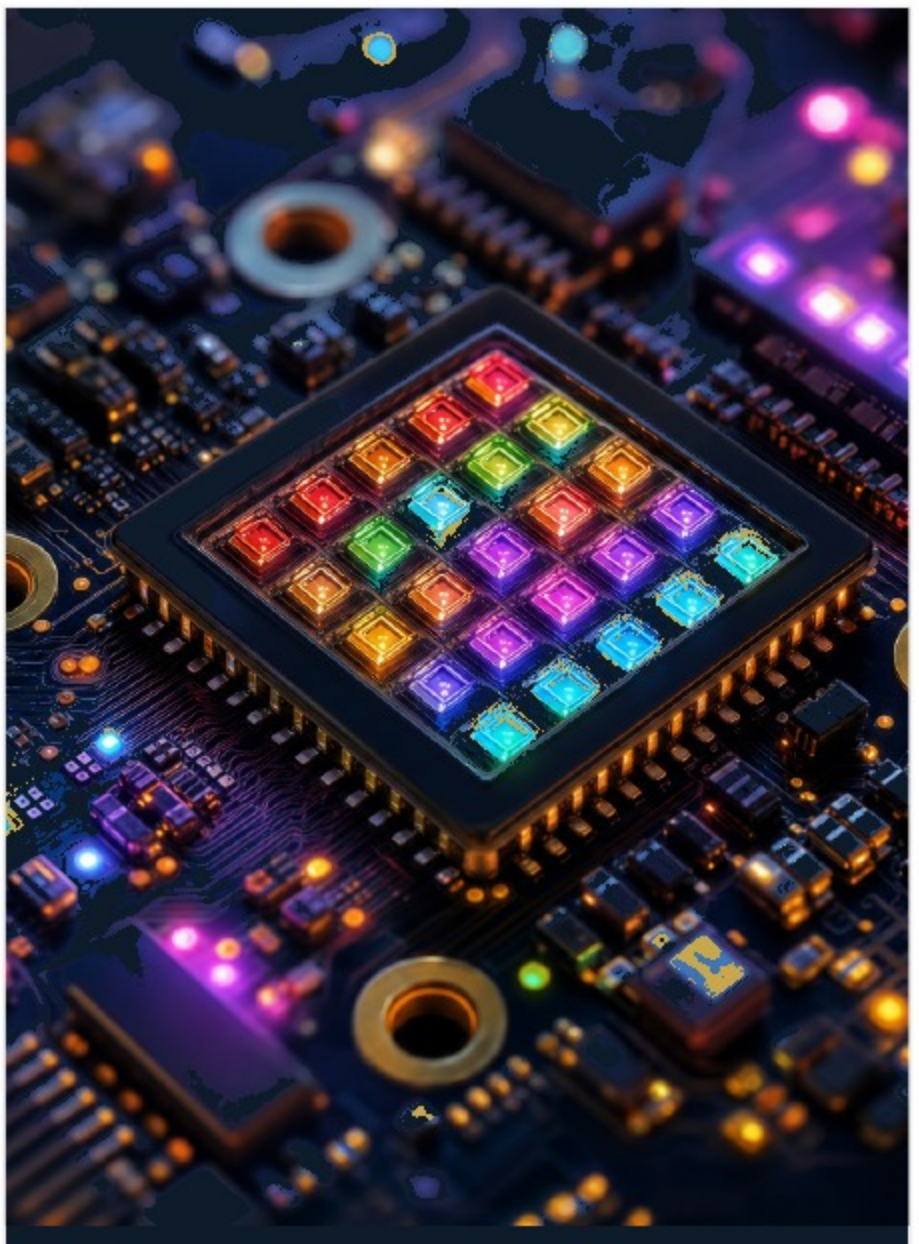
Atomic Weight	**69.723 g/mol**
Melting Point	**29.76°C (85.6°F)**
Density	**5.91 g/cm³ (liquid)**
Electrical Conductivity	**6.74 × 10⁶ S/m**
Thermal Conductivity	**40.6 W/(m·K)**
Crystal Structure	**Orthorhombic**
Purity Available	**99.99% – 99.9999%**

AVAILABLE PRODUCTS

- Gallium Metal (4N – 6N purity)
- Gallium Arsenide (GaAs) Wafers
- Gallium Nitride (GaN) Substrates
- Gallium Oxide Powder
- Gallium Sputtering Targets

KEY APPLICATIONS

LED Lighting · Laser Diodes · 5G Semiconductors · Solar Cells · Radar Systems · Power Electronics



Gallium arsenide semiconductors powering LED arrays and high-frequency 5G electronics

Market Insights & Strategic Value

Global demand for Gallium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

34
Se
SELENIUM

Selenium

Selenium is a versatile metalloid with unique photoelectric and semiconductor properties. It is essential in thin-film photovoltaic cells (CIGS technology), glass manufacturing, and electronics.

PHYSICAL & CHEMICAL PROPERTIES

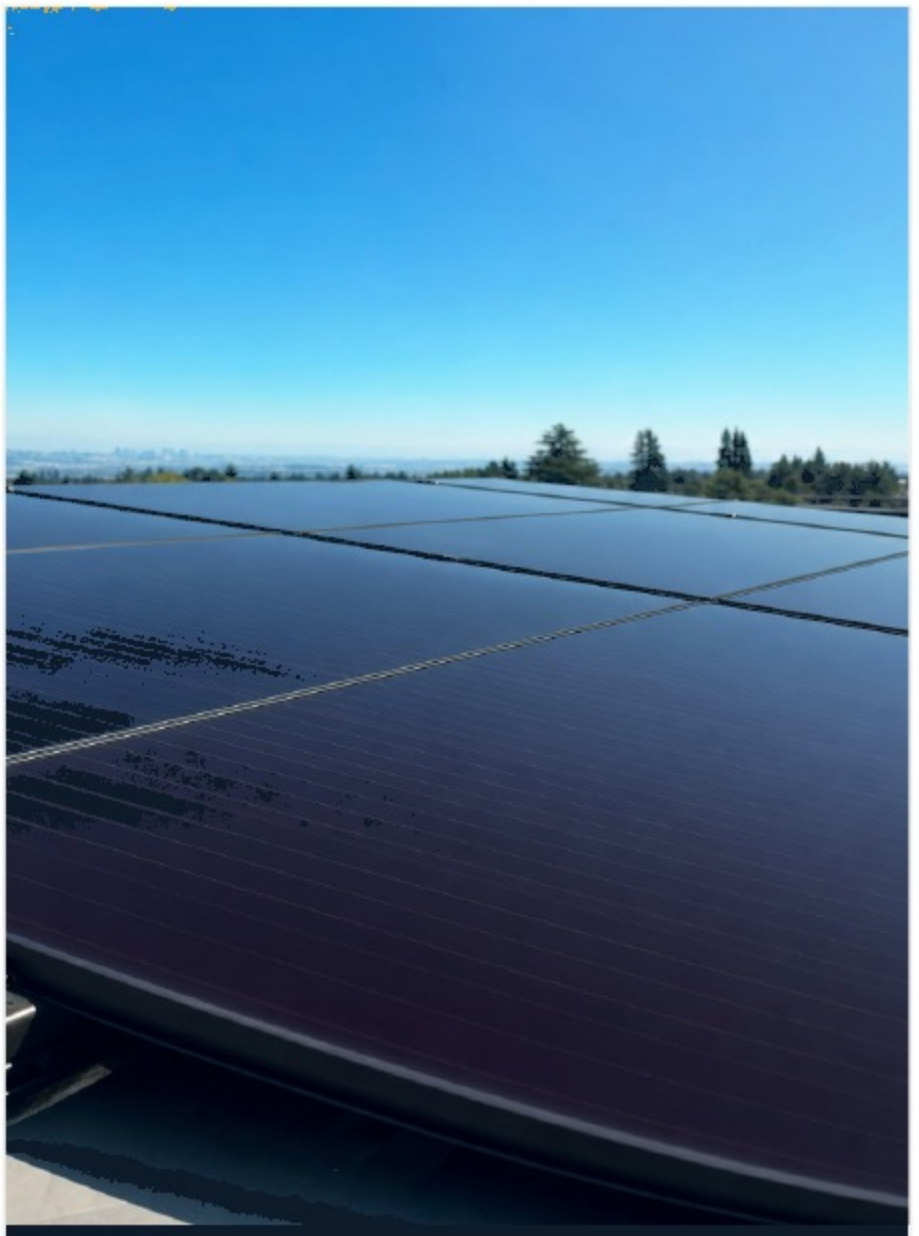
Atomic Weight	**78.971 g/mol**
Melting Point	**221°C (430°F)**
Density	**4.81 g/cm³**
Band Gap	**1.74 eV (hexagonal)**
Electrical Conductivity	**Variable (photoconductor)**
Crystal Structure	**Hexagonal (grey)**
Purity Available	**99.5% – 99.999%**

AVAILABLE PRODUCTS

- Selenium Powder (99.9% – 99.999%)
- Selenium Granules
- Selenium Pellets
- Selenium Dioxide (SeO_2)
- Selenium Sputtering Targets

KEY APPLICATIONS

Thin-Film Solar (CIGS) | Glass Decolorizing | Photocopiers | Electronics | Agriculture | Pigments



CIGS thin-film solar panels — selenium enables next-generation photovoltaic technology

Market Insights & Strategic Value

Global demand for Selenium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

22
Ti
TITANIUM

Titanium

Titanium offers an exceptional strength-to-weight ratio combined with outstanding corrosion resistance. These properties make it the material of choice for aerospace structures, medical implants, and marine applications.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**47.867 g/mol**
Melting Point	**1,668°C (3,034°F)**
Density	**4.506 g/cm³**
Tensile Strength	**434 MPa (Grade 2)**
Thermal Conductivity	**21.9 W/(m·K)**
Crystal Structure	**Hexagonal (α) / BCC (β)**
Purity Available	**99.5% – 99.99%**

AVAILABLE PRODUCTS

- Titanium Sponge (Grade 1–4)
- Titanium Powder (various grades)
- Titanium Ingot
- Titanium Wire
- Titanium Foil

KEY APPLICATIONS

Aerospace Structures | Medical Implants | Marine Equipment | Sports Equipment | Chemical Processing | Architecture

Titanium medical implants — biocompatible, lightweight, and exceptionally strong

Market Insights & Strategic Value

Global demand for Titanium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

13
Al
ALUMINUM

Aluminum

Aluminum is the most abundant metal in Earth's crust and the second most used metal globally. Its combination of low density, high strength, excellent corrosion resistance, and recyclability makes it essential across transportation, construction, and packaging.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**26.982 g/mol**
Melting Point	**660°C (1,220°F)**
Density	**2.70 g/cm³**
Electrical Conductivity	**37.7 × 10⁶ S/m**
Thermal Conductivity	**237 W/(m·K)**
Crystal Structure	**Face-centered cubic**
Purity Available	**99.5% – 99.999%**

AVAILABLE PRODUCTS

- Aluminum Ingot (99.7% – 99.99%)
- Aluminum Powder (various grades)
- Aluminum Alloy Ingots
- Aluminum Wire
- Aluminum Pellets

KEY APPLICATIONS

Aerospace Structures · Automotive · Packaging · Construction · Electrical Cables · Consumer Electronics

Aircraft fuselage construction — aluminum alloys enable lightweight aerospace structures

Market Insights & Strategic Value

Global demand for Aluminum is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

3
Li
LITHIUM

Lithium

Lithium is the lightest metal and the cornerstone of the global energy transition. As the key component in lithium-ion batteries, it powers electric vehicles, grid-scale energy storage, and portable electronics. Demand is projected to grow exponentially through 2030.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**6.941 g/mol**
Melting Point	**180.5°C (357°F)**
Density	**0.534 g/cm³ (lightest metal)**
Specific Heat	**3,582 J/(kg·K)**
Thermal Conductivity	**84.8 W/(m·K)**
Crystal Structure	**Body-centered cubic**
Purity Available	**99.5% – 99.99%**

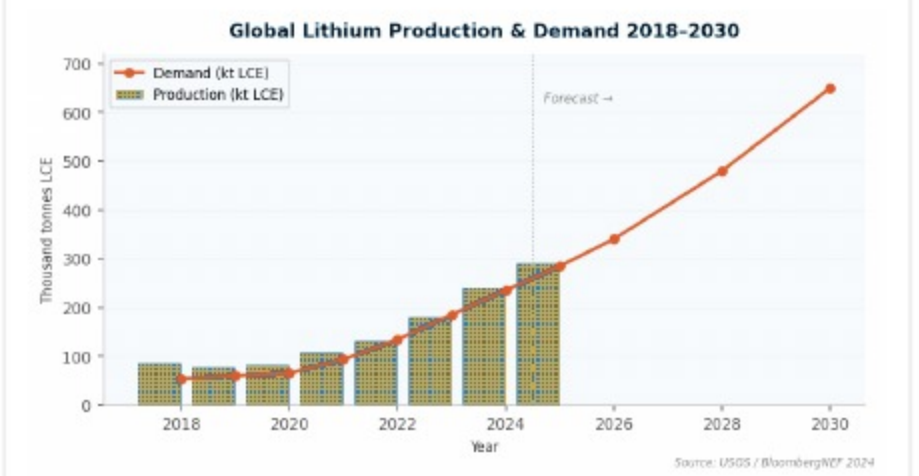
AVAILABLE PRODUCTS

- Lithium Carbonate (Li_2CO_3, Battery Grade)
- Lithium Hydroxide (LiOH, Battery Grade)
- Lithium Metal (99.9%)
- Lithium Chloride
- Lithium Foil

KEY APPLICATIONS

EV Batteries · Grid Storage · Consumer Electronics · Aerospace Alloys · Ceramics & Glass · Pharmaceuticals

Electric vehicle battery pack — lithium-ion technology powering the clean energy transition



Global Lithium Production & Demand Forecast 2030

Rare Earth Elements

Rare Earth Elements (REEs) are a group of 17 metallic elements critical to modern technology. REEs are essential for permanent magnets in wind turbines and electric vehicles, phosphors in displays and lighting, catalysts, and advanced defense systems. China controls approximately 68% of global production, making supply chain security a strategic priority. Alixyz S.A. provides reliable access to 12 key rare earth elements from diversified sources.

12
REE PRODUCTS

~68% of global supply
CHINA'S SHARE

Up to 99.999%
PURITY LEVELS

Magnets, Phosphors, Catalysts
KEY APPLICATIONS

EU & US Critical Raw Material
STRATEGIC IMPORTANCE

+300% projected by 2035
DEMAND GROWTH

60
Nd
NEODYMIUM

Neodymium

Neodymium is the most critical rare earth element for the clean energy transition. NdFeB permanent magnets — the strongest permanent magnets known — are essential in wind turbine generators and electric vehicle motors. A single offshore wind turbine can require up to 2 tonnes of neodymium.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**144.242 g/mol**
Melting Point	**1,024°C (1,875°F)**
Density	**7.01 g/cm³**
Magnetic Moment	**3.62 μB**
Crystal Structure	**Double hexagonal close-packed**
Classification	**Light REE (LREE)**
Purity Available	**99% – 99.99%**

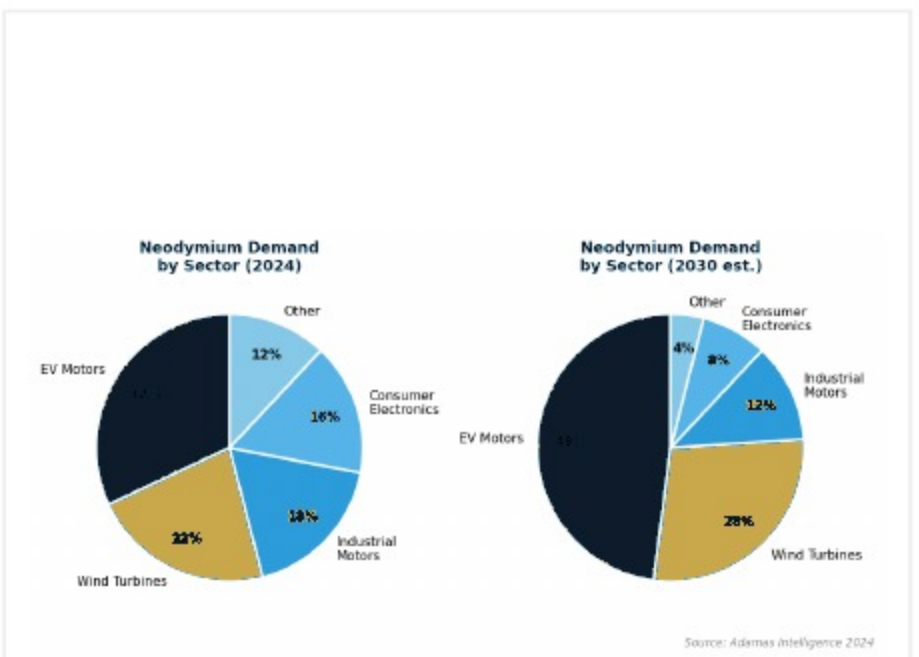
AVAILABLE PRODUCTS

- Neodymium Metal (99% – 99.9%)
- Neodymium Oxide (Nd_2O_3)
- NdFeB Magnet Alloy
- Neodymium Chloride
- Neodymium Fluoride

KEY APPLICATIONS

- Wind Turbine Generators
- EV & Hybrid Motors
- Hard Disk Drives
- MRI Machines
- Industrial Motors
- Headphones & Speakers

Wind turbine generator with NdFeB permanent magnets — neodymium enables renewable energy at scale



Neodymium Demand by Sector: 2024 vs 2030

66
Dy
DYSPROSIUM

Dysprosium

Dysprosium is added to NdFeB magnets to maintain their magnetic properties at high operating temperatures. Without dysprosium, NdFeB magnets in electric vehicle motors would demagnetize under normal operating conditions. It is one of the most strategically critical rare earth elements.

PHYSICAL & CHEMICAL PROPERTIES

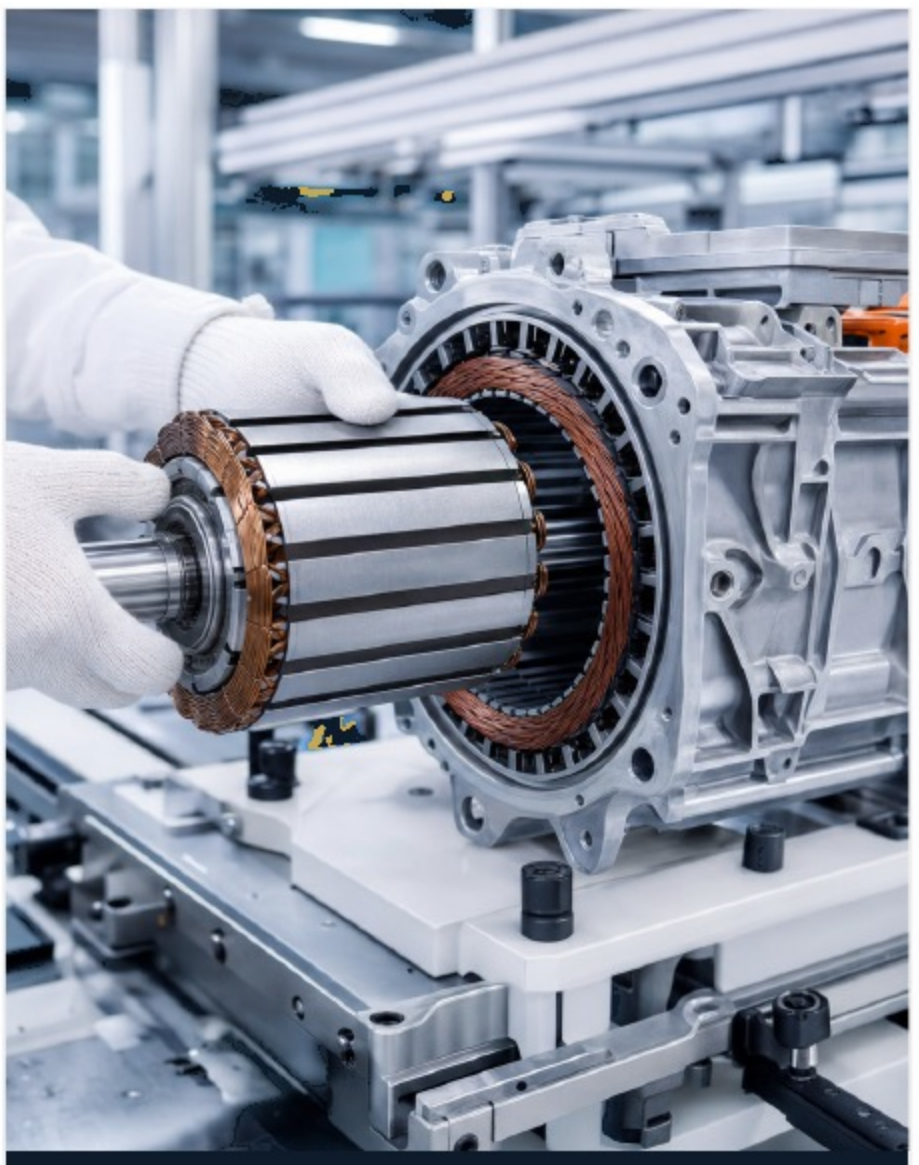
Atomic Weight	**162.500 g/mol**
Melting Point	**1,407°C (2,565°F)**
Density	**8.55 g/cm³**
Magnetic Moment	**10.65 μB (highest of all elements)**
Crystal Structure	**Hexagonal close-packed**
Classification	**Heavy REE (HREE)**
Purity Available	**99% – 99.99%**

AVAILABLE PRODUCTS

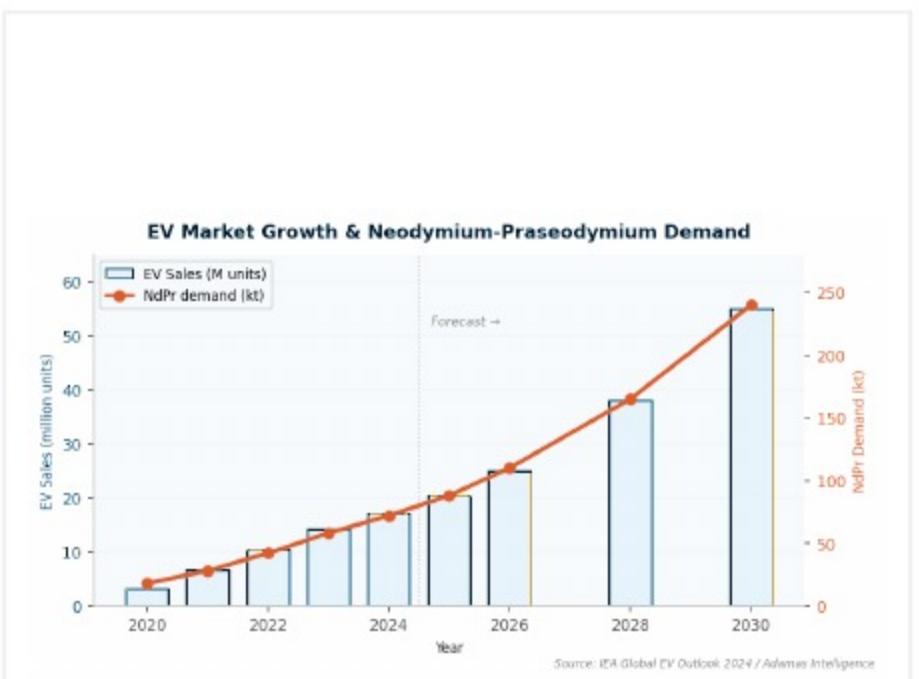
- Dysprosium Metal (99% – 99.9%)
- Dysprosium Oxide (Dy_2O_3)
- Dysprosium Fluoride
- Dysprosium Chloride
- Dysprosium Nitrate

KEY APPLICATIONS

EV Motor Magnets | Wind Turbine Magnets | Data Storage | Nuclear Reactor Control | Laser Materials | Magnetostrictive Alloys



Electric vehicle motor assembly — dysprosium ensures magnets retain performance at high temperatures



EV Market Growth & Permanent Magnet Demand

65
Tb
TERBIUM

Terbium

Terbium is used in green phosphors for energy-efficient lighting and displays, and in magnetostrictive alloys (Terfenol-D) for sonar and actuator applications. Like dysprosium, it enhances NdFeB magnet performance at elevated temperatures, making it critical for EV and wind applications.

PHYSICAL & CHEMICAL PROPERTIES

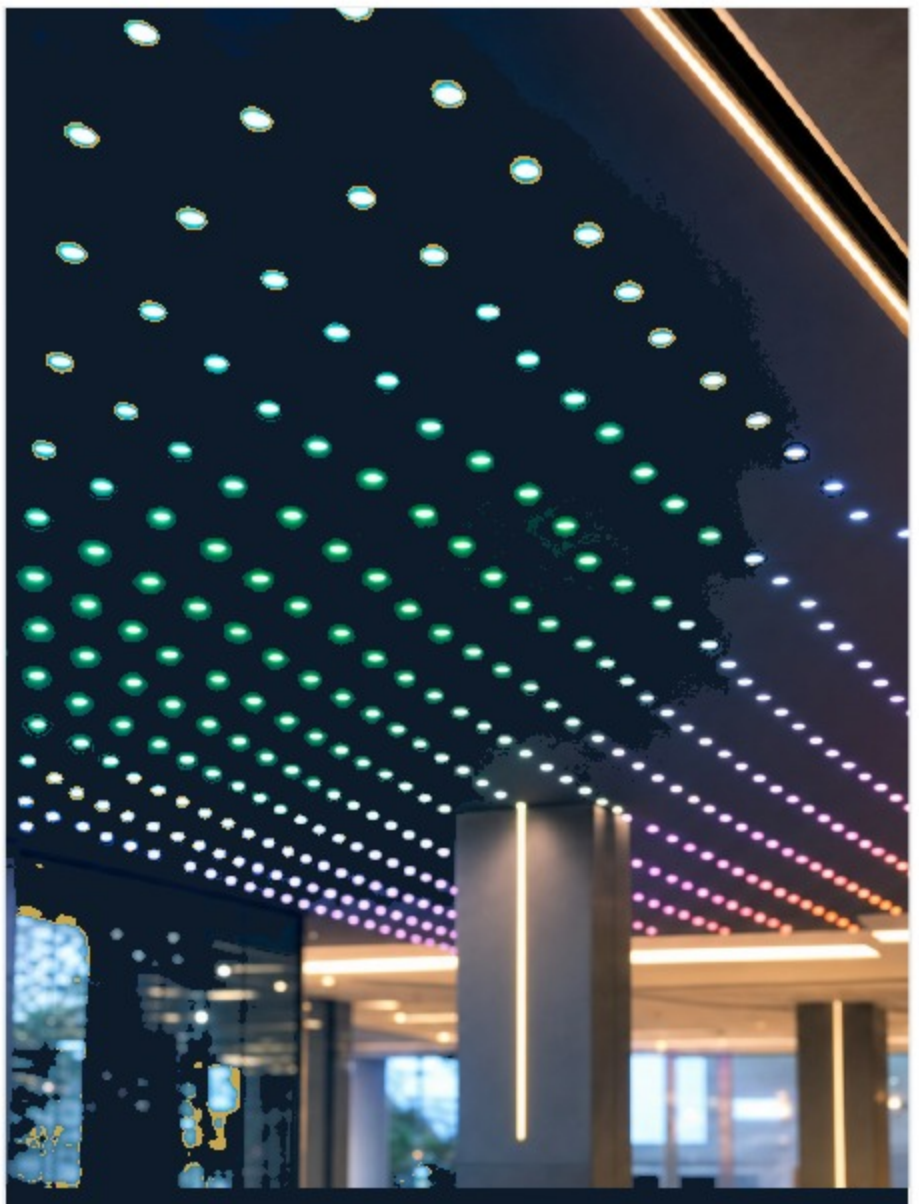
Atomic Weight	**158.925 g/mol**
Melting Point	**1,356°C (2,473°F)**
Density	**8.23 g/cm³**
Magnetic Moment	**9.72 μB**
Crystal Structure	**Hexagonal close-packed**
Classification	**Heavy REE (HREE)**
Purity Available	**99% – 99.99%**

AVAILABLE PRODUCTS

- Terbium Metal (99% – 99.9%)
- Terbium Oxide (Tb_4O_7)
- Terbium Fluoride
- Terbium Chloride
- Terbium Nitrate

KEY APPLICATIONS

- Green LED Phosphors
- Energy-Efficient Lighting
- Sonar Systems
- Fuel Cells
- NdFeB Magnet Additive
- Solid-State Devices



Energy-efficient LED lighting — terbium-based green phosphors deliver vivid, accurate colors

Market Insights & Strategic Value

Global demand for Terbium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

68
Er
ERBIUM

Erbium

Erbium is essential to global telecommunications infrastructure. Erbium-doped fiber amplifiers (EDFAs) are the primary technology used to amplify optical signals in long-distance fiber optic cables, enabling the internet backbone. It also produces a distinctive pink color in glass and crystals.

PHYSICAL & CHEMICAL PROPERTIES

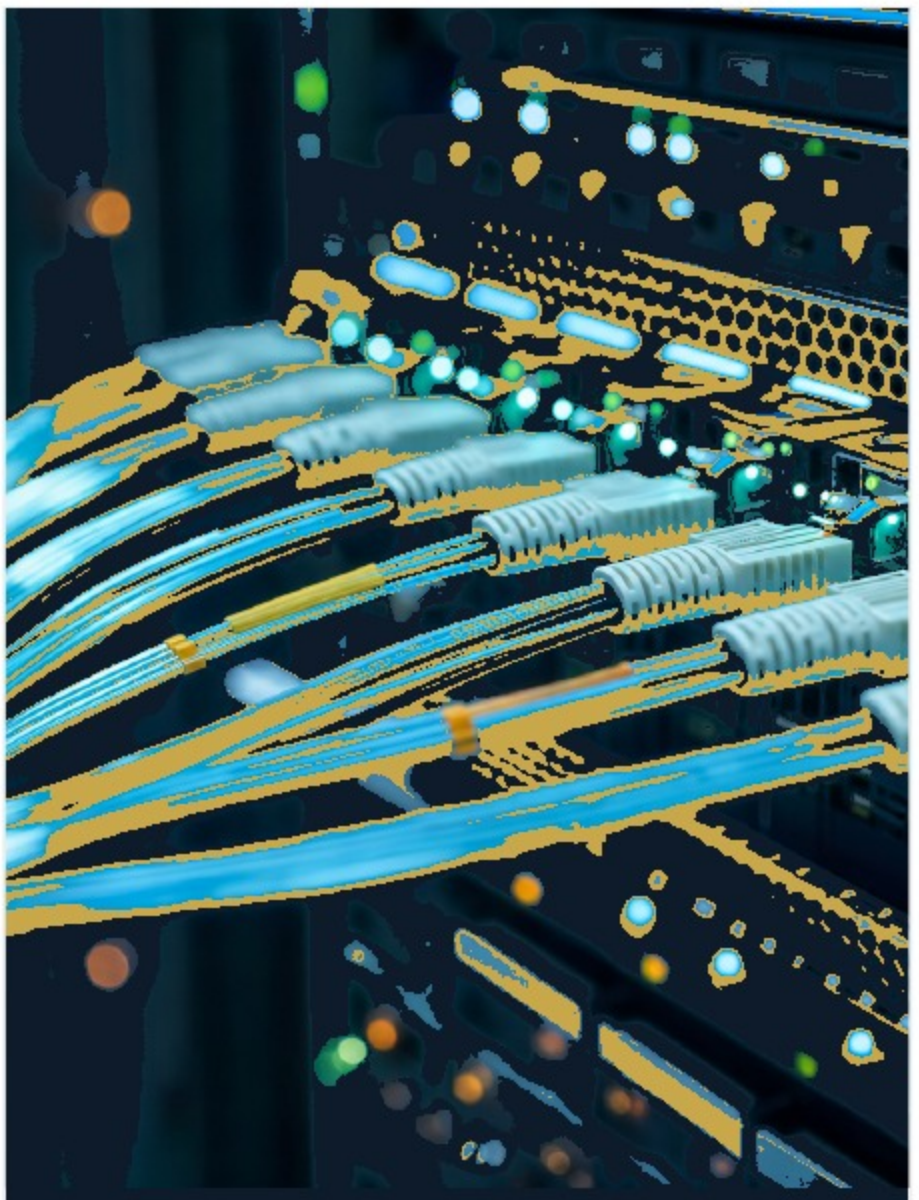
Atomic Weight	**167.259 g/mol**
Melting Point	**1,529°C (2,784°F)**
Density	**9.07 g/cm³**
Emission Wavelength	**1,550 nm (telecom window)**
Crystal Structure	**Hexagonal close-packed**
Classification	**Heavy REE (HREE)**
Purity Available	**99% – 99.999%**

AVAILABLE PRODUCTS

- Erbium Metal (99% – 99.9%)
- Erbium Oxide (Er_2O_3)
- Erbium Fluoride
- Erbium Chloride
- Erbium-doped Fiber Preforms

KEY APPLICATIONS

Fiber Optic Amplifiers · Telecommunications · Medical Lasers (Er:YAG) · Dental Lasers · Nuclear Technology · Colored Glass



Fiber optic data center infrastructure — erbium-doped amplifiers power the global internet

Market Insights & Strategic Value

Global demand for Erbium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

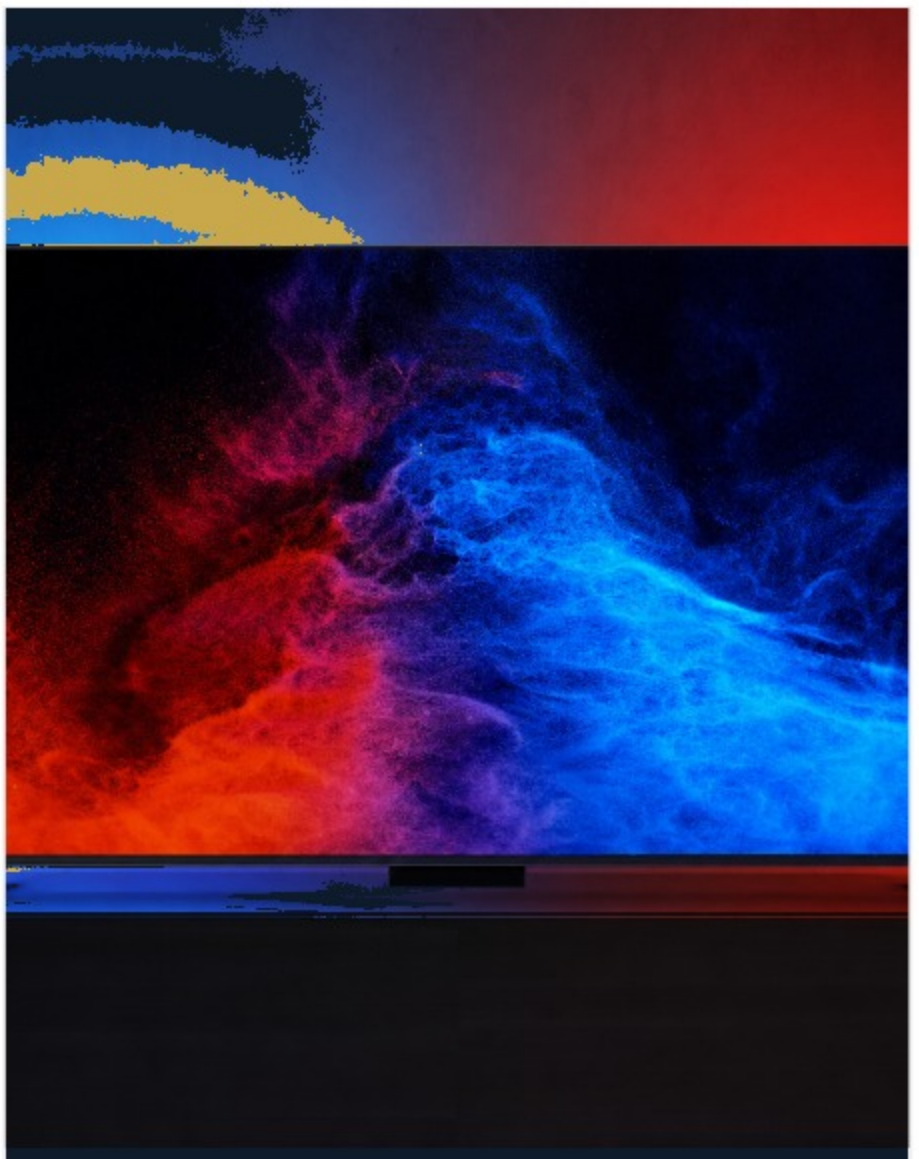
63
Eu
EUROPIUM

Europium

Europium produces the most intense red and blue phosphorescence of any rare earth element, making it essential for color television screens, LED phosphors, and fluorescent lighting. It is also used in euro banknote security features as an anti-counterfeiting measure.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**151.964 g/mol**
Melting Point	**826°C (1,519°F)**
Density	**5.24 g/cm³**
Fluorescence	**Red (Eu^{3+}) / Blue (Eu^{2+})**
Crystal Structure	**Body-centered cubic**
Classification	**Light REE (LREE)**
Purity Available	**99% – 99.99%**



OLED television display — europium phosphors produce the vivid reds essential for accurate color reproduction

AVAILABLE PRODUCTS

- Europium Metal (99% – 99.9%)
- Europium Oxide (Eu_2O_3)
- Europium Fluoride
- Europium Chloride
- Europium Nitrate

KEY APPLICATIONS

- TV & Display Phosphors
- LED Phosphors
- Fluorescent Lamps
- Security Inks
- Laser Materials
- Nuclear Reactors

Market Insights & Strategic Value

Global demand for Europium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

64
Gd
GADOLINIUM

Gadolinium

Gadolinium has unique magnetic and neutron absorption properties that make it invaluable in medical imaging and nuclear technology. As an MRI contrast agent, gadolinium-based compounds dramatically improve the clarity of magnetic resonance images, enabling earlier and more accurate disease diagnosis.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**157.250 g/mol**
Melting Point	**1,312°C (2,394°F)**
Density	**7.90 g/cm³**
Curie Temperature	**20°C (unique magnetic transition)**
Neutron Absorption	**Highest of all stable elements**
Classification	**Light REE (LREE)**
Purity Available	**99% – 99.99%**

AVAILABLE PRODUCTS

- Gadolinium Metal (99% – 99.9%)
- Gadolinium Oxide (Gd_2O_3)
- Gadolinium Fluoride
- Gadolinium Chloride
- Gadolinium Nitrate

KEY APPLICATIONS

- MRI Contrast Agents
- Nuclear Reactor Shielding
- Neutron Radiography
- Magnetocaloric Cooling
- Phosphors
- Microwave Applications

MRI scanner in clinical setting — gadolinium contrast agents enable life-saving medical diagnoses

Market Insights & Strategic Value

Global demand for Gadolinium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

67
Ho
HOLMIUM

Holmium

Holmium has the highest magnetic moment of any naturally occurring element, making it valuable in powerful magnetic fields. Holmium lasers (Ho:YAG) are widely used in minimally invasive medical procedures, particularly for kidney stone treatment and prostate surgery.

PHYSICAL & CHEMICAL PROPERTIES

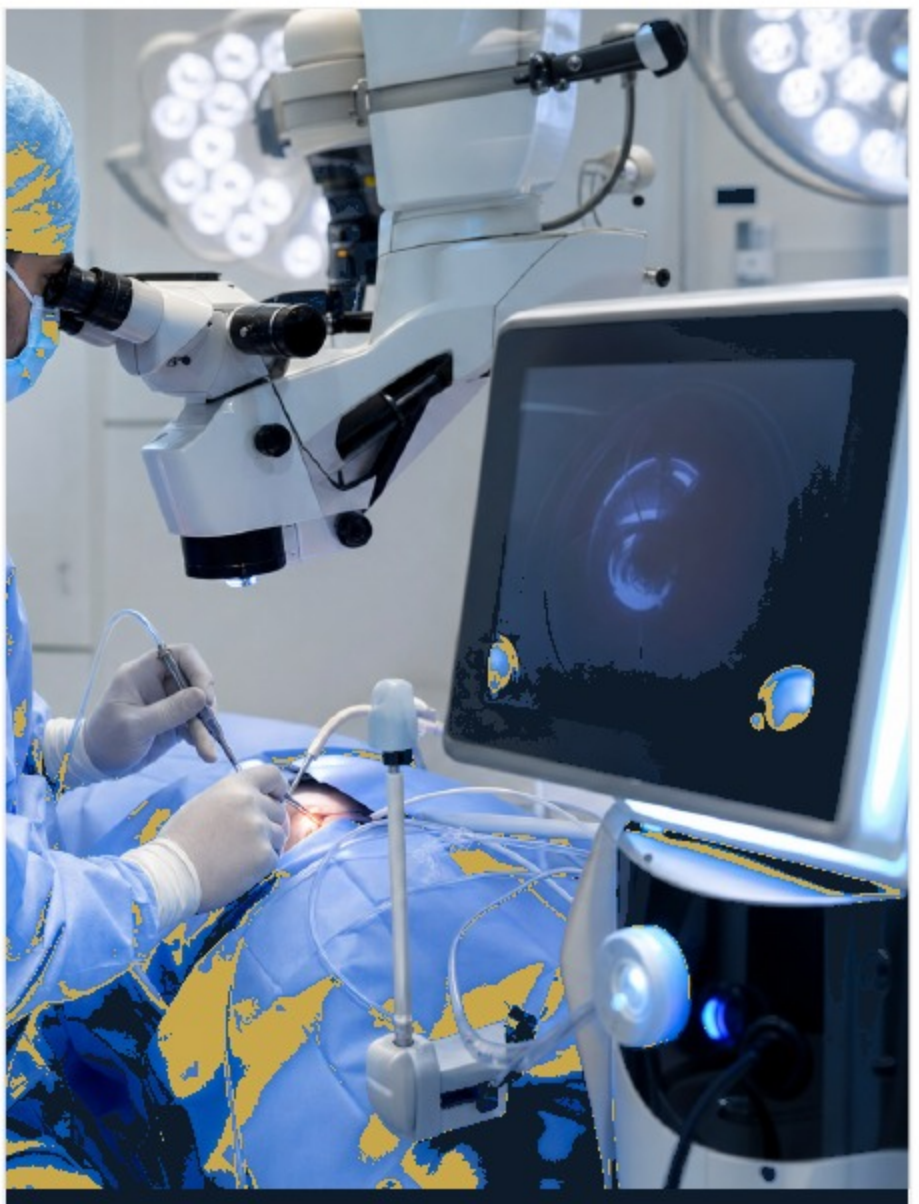
Atomic Weight	**164.930 g/mol**
Melting Point	**1,461°C (2,662°F)**
Density	**8.80 g/cm³**
Magnetic Moment	**10.6 μB (highest natural element)**
Laser Wavelength	**2,090 nm (Ho:YAG)**
Classification	**Heavy REE (HREE)**
Purity Available	**99% – 99.99%**

AVAILABLE PRODUCTS

- Holmium Metal (99% – 99.9%)
- Holmium Oxide (Ho_2O_3)
- Holmium Fluoride
- Holmium Chloride
- Ho:YAG Laser Crystals

KEY APPLICATIONS

- Medical Lasers (Ho:YAG)
- Kidney Stone Treatment
- Magnetic Flux Concentrators
- Nuclear Reactors
- Solid-State Lasers
- Magnetic Pole Pieces



Holmium laser surgery — minimally invasive procedures enabled by Ho:YAG laser technology

Market Insights & Strategic Value

Global demand for Holmium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

57
La
LANTHANUM

Lanthanum

Lanthanum is the first element of the rare earth series and one of the most widely used. It is essential in high-refractive-index optical glass for camera and telescope lenses, nickel-metal hydride (NiMH) batteries, petroleum refining catalysts, and as a dopant in various materials.

PHYSICAL & CHEMICAL PROPERTIES

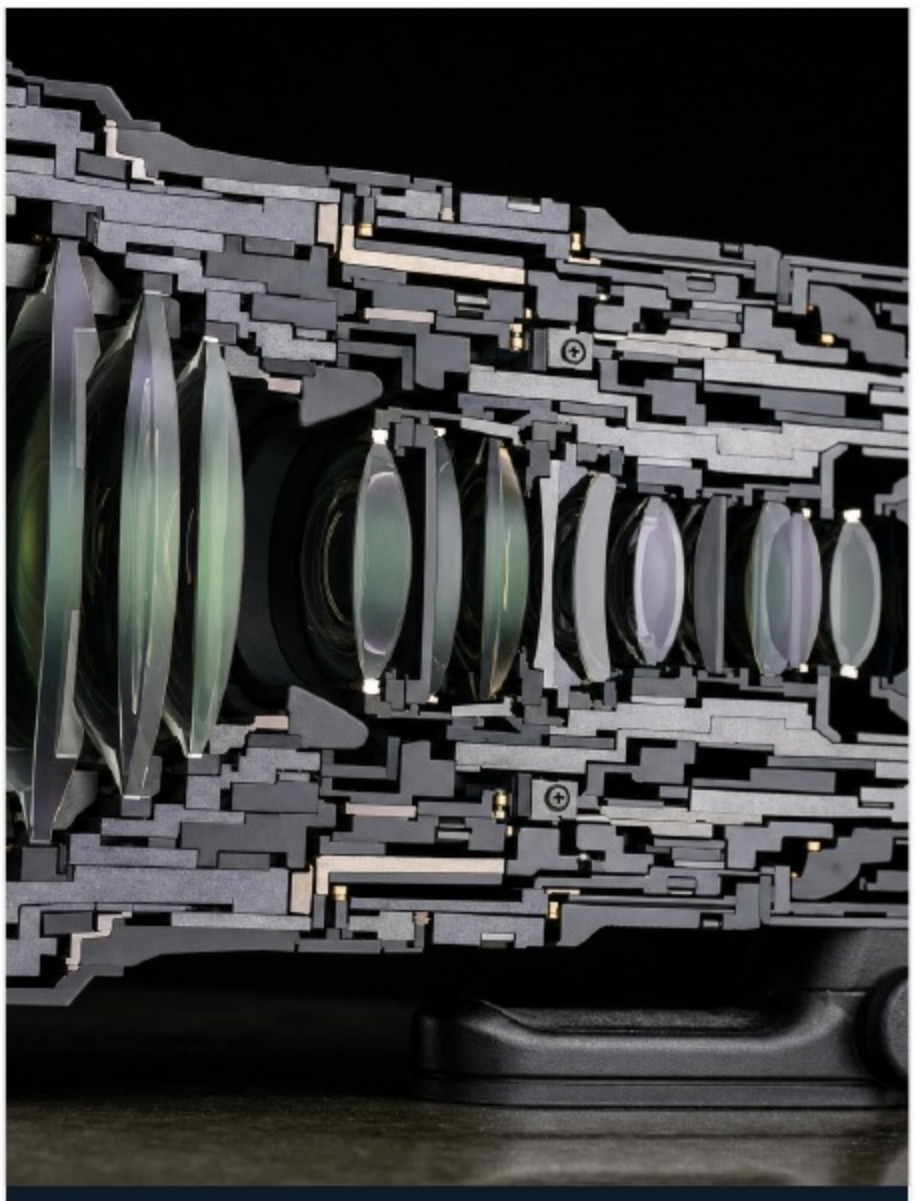
Atomic Weight	**138.905 g/mol**
Melting Point	**920°C (1,688°F)**
Density	**6.162 g/cm³**
Refractive Index	**Up to 2.0 (La-doped glass)**
Crystal Structure	**Double hexagonal close-packed**
Classification	**Light REE (LREE)**
Purity Available	**99% – 99.999%**

AVAILABLE PRODUCTS

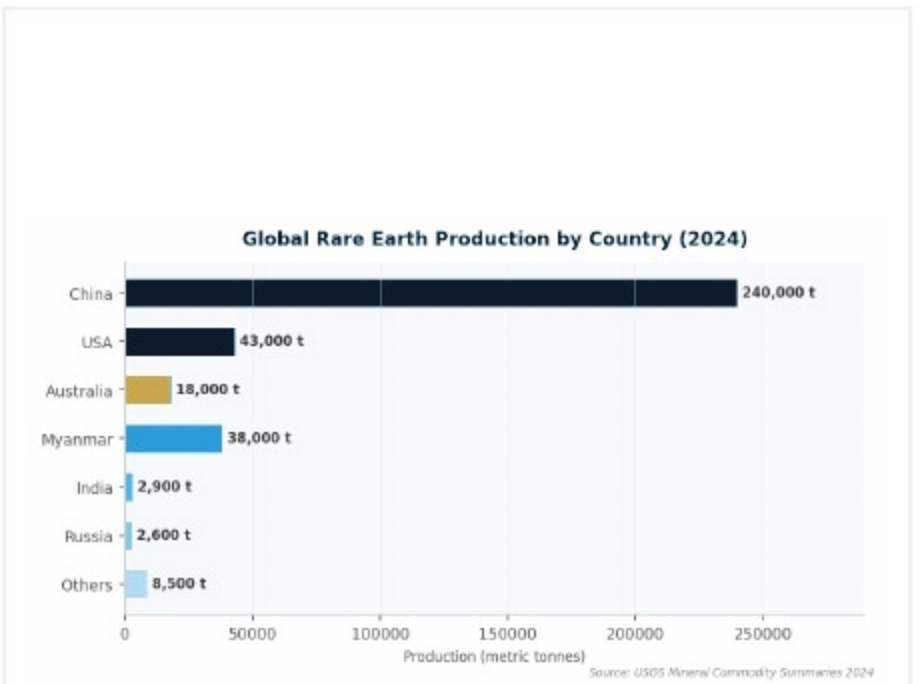
- Lanthanum Metal (99% – 99.9%)
- Lanthanum Oxide (La_2O_3)
- Lanthanum Fluoride
- Lanthanum Chloride
- Lanthanum Carbonate

KEY APPLICATIONS

- **Optical Lenses (Camera, Telescope)**
- **NiMH Batteries (Hybrid Cars)**
- **Petroleum Catalysts**
- **Hydrogen Storage**
- **Phosphors**
- **Steel Additive**



Professional camera lens cross-section — lanthanum glass elements enable superior optical performance



Global Rare Earth Production by Country (2024)

71
Lu
LUTETIUM

Lutetium

Lutetium is the heaviest and densest rare earth element. Its high density and scintillation properties make it essential in PET scan detectors for cancer diagnosis. Lutetium-177 is a radioisotope used in targeted radionuclide therapy for neuroendocrine tumors and prostate cancer.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**174.967 g/mol**
Melting Point	**1,652°C (3,006°F)**
Density	**9.841 g/cm³ (densest REE)**
Scintillation	**Excellent (LSO crystals)**
Crystal Structure	**Hexagonal close-packed**
Classification	**Heavy REE (HREE)**
Purity Available	**99% – 99.99%**

AVAILABLE PRODUCTS

- Lutetium Metal (99% – 99.9%)
- Lutetium Oxide (Lu_2O_3)
- Lutetium Fluoride
- Lutetium Chloride
- LSO Scintillation Crystals

KEY APPLICATIONS

- PET Scan Detectors
- Cancer Radiotherapy (Lu-177)
- Neutron Activation Analysis
- Catalysts
- Specialty Alloys
- Scintillation Crystals

PET scanner for nuclear medicine — lutetium scintillation crystals detect cancer with precision

Market Insights & Strategic Value

Global demand for Lutetium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

59
Pr
PRASEODYMIUM

Praseodymium

Praseodymium is increasingly important as a substitute for neodymium in permanent magnets (NdPr alloys). It also provides the distinctive yellow-green color in didymium glass used by glassblowers and welders, and is used in high-strength aluminum alloys for aerospace applications.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**140.908 g/mol**
Melting Point	**931°C (1,708°F)**
Density	**6.77 g/cm³**
Magnetic Moment	**3.58 μB**
Crystal Structure	**Double hexagonal close-packed**
Classification	**Light REE (LREE)**
Purity Available	**99% – 99.99%**

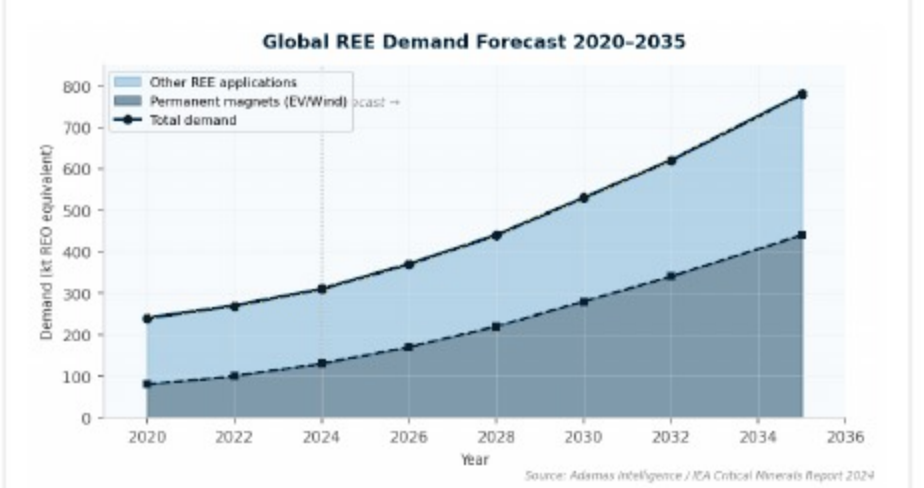
AVAILABLE PRODUCTS

- Praseodymium Metal (99% – 99.9%)
- Praseodymium Oxide (Pr_6O_{11})
- Praseodymium Fluoride
- Praseodymium Chloride
- NdPr Alloy

KEY APPLICATIONS

NdPr Permanent Magnets · **Aerospace Alloys** · **Protective Goggles** · **Fiber Optic Amplifiers** · **Ceramic Pigments** · **Catalysts**

Advanced aircraft cockpit avionics — praseodymium alloys contribute to high-strength aerospace components



Global REE Demand Forecast 2020–2035

72
Hf
HAFNIUM

Hafnium

Hafnium is a refractory metal with exceptional neutron absorption properties, making it the material of choice for nuclear reactor control rods. Its high melting point and chemical stability also make it valuable in superalloys for jet engines and in semiconductor gate dielectrics.

PHYSICAL & CHEMICAL PROPERTIES

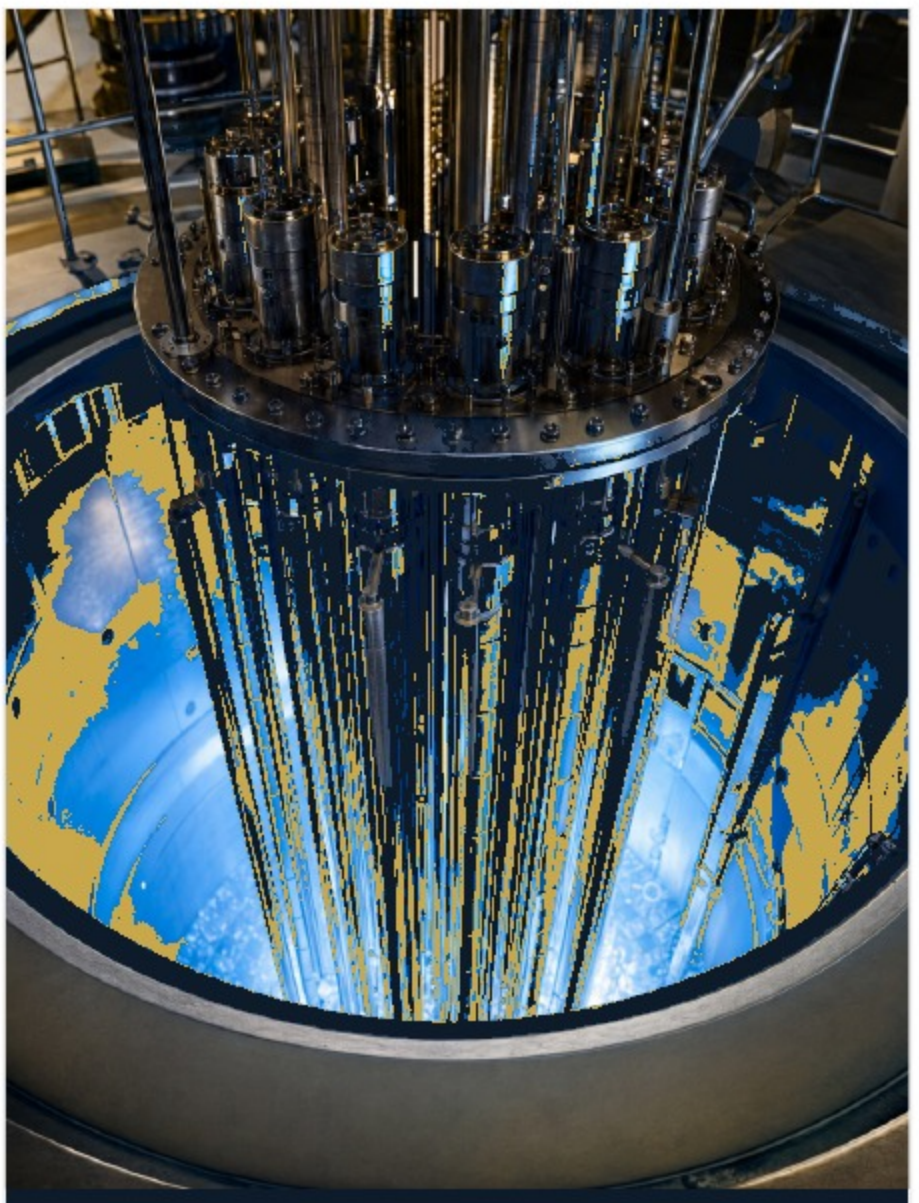
Atomic Weight	**178.486 g/mol**
Melting Point	**2,233°C (4,051°F)**
Density	**13.31 g/cm³**
Neutron Absorption	**Excellent (600 barns)**
Thermal Conductivity	**23.0 W/(m·K)**
Crystal Structure	**Hexagonal close-packed**
Purity Available	**99.5% – 99.99%**

AVAILABLE PRODUCTS

- Hafnium Metal (99.5% – 99.9%)
- Hafnium Sponge
- Hafnium Oxide (HfO_2)
- Hafnium Chloride
- Hafnium Sputtering Targets

KEY APPLICATIONS

- Nuclear Reactor Control Rods
- Jet Engine Superalloys
- Semiconductor Gate Dielectrics
- Plasma Cutting Tips
- Rocket Engines
- Refractory Coatings



Nuclear reactor core — hafnium control rods regulate the fission chain reaction with precision

Market Insights & Strategic Value

Global demand for Hafnium is projected to grow significantly over the next decade, driven by its critical role in advanced technologies. Supply chain resilience and strategic sourcing remain key priorities for industrial consumers worldwide. As technological applications expand, securing reliable, high-purity supply lines becomes a competitive advantage.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**< 15% (End-of-life)**
Primary Growth Driver	**High-tech & Green Energy**

62
Sm
SAMARIUM

Samarium

Samarium-cobalt (SmCo) magnets are the second strongest permanent magnets after NdFeB, but offer superior temperature stability and corrosion resistance. They are preferred in high-temperature applications such as aerospace, military systems, and precision motors where reliability is paramount.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**150.360 g/mol**
Melting Point	**1,072°C (1,962°F)**
Density	**7.52 g/cm³**
Max Operating Temp	**350°C (SmCo magnets)**
Coercivity	**Very high (SmCo)**
Classification	**Light REE (LREE)**
Purity Available	**99% – 99.99%**

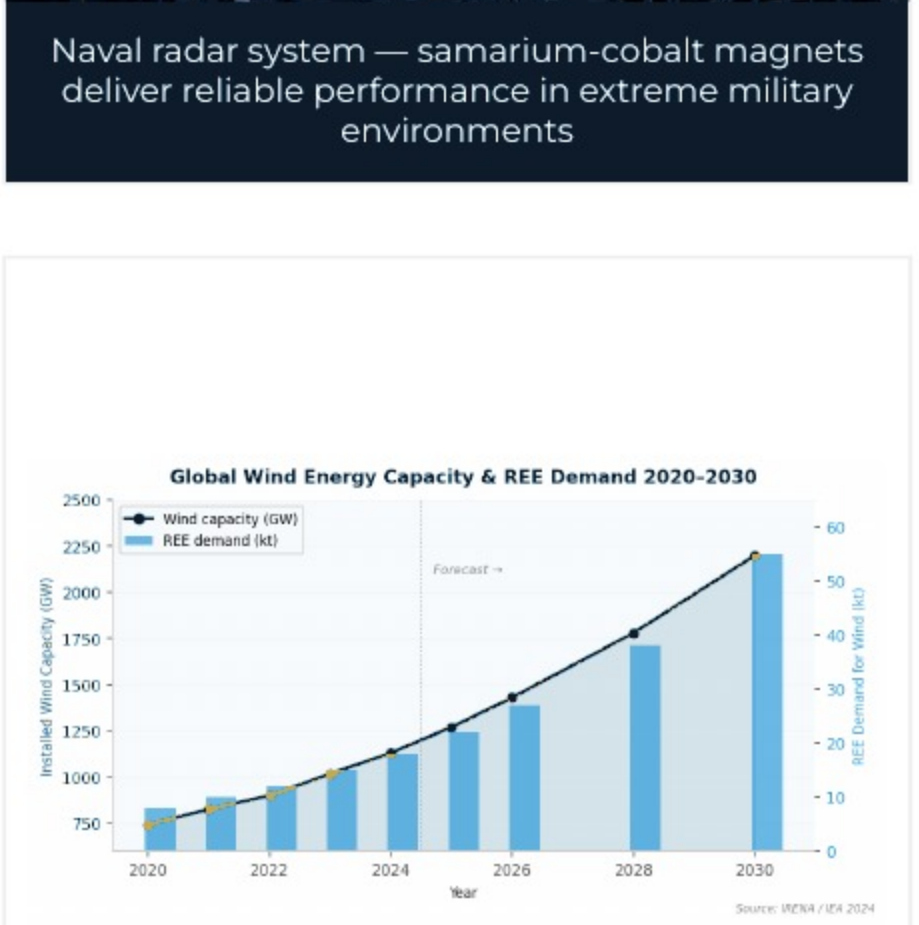
AVAILABLE PRODUCTS

- Samarium Metal (99% – 99.9%)
- Samarium Oxide (Sm_2O_3)
- SmCo Magnet Alloy
- Samarium Fluoride
- Samarium Chloride

KEY APPLICATIONS

- SmCo Permanent Magnets
- Military & Defense Systems
- Aerospace Motors
- Radar Equipment
- Precision Instruments
- Nuclear Reactors

Naval radar system — samarium-cobalt magnets deliver reliable performance in extreme military environments



Wind Energy Capacity & REE Demand 2020–2030

51
Sb
ANTIMONY

Antimony

Antimony is a metalloid with unique flame-retardant properties, making it indispensable in plastics, textiles, and electronics. It is also a critical component in lead-acid batteries and semiconductor manufacturing, where high-purity grades are essential.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**121.760 g/mol**
Melting Point	**630.6°C (1,167°F)**
Density	**6.697 g/cm³**
Crystal Structure	**Rhombohedral**
Thermal Conductivity	**24.4 W/(m·K)**
Classification	**Metalloid**
Purity Available	**99.5% – 99.999%**

AVAILABLE PRODUCTS

· Antimony Metal (99.5% – 99.999%)
· Antimony Trioxide (Sb2O3)
· Antimony Ingot
· Antimony Powder
· Antimony Sputtering Targets

KEY APPLICATIONS

Flame Retardants **Lead-Acid Batteries** **Semiconductor Doping** **Alloys & Solders** **Infrared Detectors** **Pigments & Glass**

Antimony metal ingots — critical flame retardant synergist

Market Insights & Strategic Value

Global demand for Antimony is driven by its critical role in flame retardant synergists and battery technologies. China controls over 50% of global production, creating significant supply chain risks for Western manufacturers.

Supply Risk Index	**High**
Global Recycling Rate	**< 20% (End-of-life)**
Primary Growth Driver	**Flame Retardants & EVs**

24

Cr

CHROMIUM

Chromium

Chromium is a lustrous, hard metal essential for stainless steel production and corrosion-resistant coatings. Its high hardness and resistance to oxidation make it indispensable in aerospace alloys, automotive parts, and decorative chrome plating.

PHYSICAL & CHEMICAL PROPERTIES

Atomic Weight	**51.996 g/mol**
Melting Point	**1,907°C (3,465°F)**
Density	**7.19 g/cm³**
Crystal Structure	**Body-centered cubic**
Thermal Conductivity	**93.9 W/(m·K)**
Classification	**Transition Metal**
Purity Available	**99.0% – 99.99%**

AVAILABLE PRODUCTS

· Chromium Metal (99.0% – 99.99%)

· Chromium Oxide (Cr2O3)

· Ferrochrome Alloy

· Chromium Powder

· Chromium Sputtering Targets

KEY APPLICATIONS

Stainless Steel **Chrome Plating** **Superalloys**

Refractory Materials **Pigments & Dyes**

Leather Tanning

Chrome-plated components — Chromium ensures corrosion resistance

Market Insights & Strategic Value

Chromium is classified as a critical raw material by the EU and US. Demand is strongly tied to stainless steel production and the aerospace sector. South Africa and Kazakhstan hold the majority of global chromite reserves.

Supply Risk Index	**Moderate to High**
Global Recycling Rate	**25% (End-of-life)**
Primary Growth Driver	**Stainless Steel & Aerospace**

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