CLIMATE LEADERSHIP COUNCIL

202 · 919 · 4900
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Critical Minerals Needed for Advanced Energy Technology Manufacturing

Critical minerals are essential to advanced energy technologies that are gaining market share globally. To remain competitive the American firms developing these technologies—like next-generation nuclear fusion and fission, carbon capture, batteries, electric vehicles, solar, and wind—must have reliable, affordable access to mineral inputs.

Policymakers are aware of this challenge; securing mineral supply chains is a top priority in Congress and the administration. However, the expanding official list of critical minerals—currently up to 60 total minerals, each with unique applications, markets, and vulnerabilities—means that there is no one-size-fits-all solution. To aid policymakers, the Council developed a list of critical minerals that are essential to a suite of advanced energy technologies, from lithium-ion batteries to civil nuclear, and outlined key factors impacting mineral-specific vulnerabilities:

Market conditions:
Highlights supply-and-demand imbalances.

- **Oversupply:** The supply on the market exceeds demand.
- **Undersupply:** The supply on the market is less than demand.
- **Balanced:** Supply and demand are roughly equal.

U.S. import reliance:
Shows the extent to which the U.S. depends on foreign sources to meet domestic demand.

- 100% import reliance means that the U.S. is completely dependent on foreign sources.
- 0% import reliance means that the U.S. is not at all dependent on foreign sources.

Chinese control over portions of the supply chain:
Highlights the share of global mining and processing capacity controlled by China.

- 100% share indicates complete Chinese control of a mineral's mining and/or processing.
- 0% indicates no Chinese involvement in a mineral's mining and/or processing.

With market share on the line, critical mineral supply chains are vital to safeguarding American competitiveness and policymakers need a fulsome understanding of the applications and market conditions of each mineral.

Critical Mineral	% of Global Supply Used in Advanced Energy Technology	Primary Advanced Energy Technology Use	Other Advanced Energy Technology Uses	Other Industrial Uses	Market Conditions	U.S. Import-Reliance	Chinese Share of Global Mining/ Primary Extraction	Chinese Share of Global Processing
Lithium	62%	Lithium-ion batteries used in EVs and energy storage	Nuclear	Glass & ceramics, lubricants, greases, air treatment, pharmaceuticals	Oversupply; projected undersupply	>50%	22%	70%
Cobalt	32%		Wind	Metallurgy, chemicals	Oversupply; projected undersupply	79%	<1%	78%
Manganese	10%		Wind, hydrogen, and solar	Steel production, aluminum alloys, fertilizers, chemicalsction, chemicals	Balanced	100%	4%	90%
Natural Graphite Artificial Graphite	32%		Nuclear, solar, fuel cells, and hydrogen	Lubricants, steel production	Projected undersupply	100%	85%	96%
					Oversupply	N/A	*	69%
Nickel	17%		Wind, solar, nuclear, hydrogen, and carbon capture	Metallurgy	Oversupply; projected undersupply of battery-grade	41%	3%	30%
Rare earth elements	21%	Permanent magnets used in EVs and wind turbine generators (Nd, Pr, Dy, Tb)	Hydrogen (La, Ce), nuclear, and solar (Eu, Tb, Y, Ce, Dy)	Steel production, corrosion-resistant equipment, coins	Projected undersupply	89%	61%	91%
Copper	29%	Transmission and distribution	EVs, solar, energy storage, and hydrogen	Electrical wiring, motors, industrial machinery, plumbing, electronics, heat exchangers	Projected undersupply	57%	8%	44%
Zirconium	5%	Nuclear	Hydrogen and Lithium-ion batteries	Ceramics, refractories, chemical equipment	Projected undersupply	<25%	7%	65%
Uranium	>99%		n/a	Negligible	Undersupply	99%	>2%	14%
Silicon	30%	Solar	Energy storage, next generation batteries, and wind	Semiconductors, glass, ceramics, aluminum alloys, chemical industry	Oversupply	>50%	*	70%
Tellurium	40%		Next generation batteries	Semiconductors, glass, ceramics, aluminum, and chemical industry	Projected undersupply	>25%	*	77%
Silver	<30%		Hydrogen, other batteries, EVs, and renewable energy infrastructure	Metallurgy, thermoelectric devices, alloys, rubber, chemicals	Undersupply	77%	13%	>60%
Aluminum	7%	Renewable energy infrastructure	EVs and energy storage	Metallurgy, transportation, packaging, construction, consumer goods, electrical wiring	Oversupply; projected undersupply	60%	60%	60%

* No mining data is provided for artificial graphite and tellurium, which are produced as byproducts of other processes, or for silicon, which is extracted by a variety of means, including from abundantly available materials.

N/A indicates that information is not available

For links to sources, please access this table on the Council website.