

Finding Strategic Advantage amid Materials Scarcity

Raw materials could soon be in short supply. Because of the rapid rise of new energy and industrial technologies, demand uncertainty, geopolitical tensions, and tariff shocks, we might not have enough critical materials by 2030 to build the transition technologies we need.

But a great [new article from the BCG Henderson Institute](#) explains how a combination of smart investment and targeted innovation will allow early movers not just to adapt to scarcity but to create competitive wins.

From Short Supply to Opportunity

Interconnected value chains, concentration risk, and uncertainties around the energy transition constrain efforts to secure and scale production of needed materials. But identifying those scarcities can reveal value creation opportunities.

For example, companies and governments can secure supply while a material is still undervalued, through long-term contracts, backward integration, or investment in recycling infrastructure.

Another path? Innovation—developing and selling alternative materials, components, or technologies that reduce or eliminate the need for scarce inputs. For instance, some wind turbine producers are designing systems that avoid rare earth magnets.

Three Kinds of Risk

The authors untangle the complexity of this endeavor by charting the pathways—from material to component to finished product—for technologies essential to the power grid, energy production, transportation, buildings, and other industrial sectors. They found 135 materials within those pathways for which demand is growing faster than global GDP.

They then uncovered three broad risks that a core group of these materials are facing:

- **Persistent Shortages.** Permanent magnets, for example, are essential for electric vehicle motors and wind turbine generators, requiring rare earth elements such as neodymium, dysprosium, and praseodymium. These elements are subject to supply pressure in all 6,000 transition scenarios the authors modeled. And demand is driven by overlapping growth in e-mobility and offshore wind. A surge in one sector increases shortages in another.
- **Ongoing Uncertainty.** Unknowns related to evolving industrial needs, technology adoption, and shifting market dynamics are another risk. For instance, demand for large transformers in the electrical grid—along with critical materials such as grain-oriented electrical steel (GOES)—is highly uncertain because it's difficult to predict the speed and scale of the expansion of power networks. On the supply side, the production of GOES is technically complex and costly.
- **Concentrated Production.** Even when global supply and demand appear balanced, supply concentration of materials at the country or company level effectively gives outsize influence to international regulations, trade policies, and the actions of dominant players. It can exacerbate existing materials scarcities due to cross-sector competition or create new shortages in regional markets.

Navigating Through Scarcity

For suppliers, buyers, and policymakers, success will depend on

anticipating disruptions, mitigating supply chain shocks, navigating interconnected value chains, and driving innovation. The earlier and more accurately leaders can foresee shortages, the sooner they can address risks.

To build supply chain resilience, companies must identify and secure alternative sources of critical materials. By partnering with or investing in upstream suppliers, they can help secure future availability. This will all help reduce exposure to geopolitical risk, price volatility, and regulatory bottlenecks, making the overall system more resilient.

Companies, industry associations, and governments can also pursue collaborative strategies to address supply chain vulnerabilities while accelerating innovation. For example, the European Battery Alliance brought together more than 800 industrial and public stakeholders to build a competitive and sustainable battery value chain in the EU.

The potential is significant. Companies that act early won't just stay ahead of these challenges. They'll have the chance to shape the economy of the future.

Until next time,

A handwritten signature in dark ink, appearing to read "Rich", with a stylized flourish at the end.

Rich Lesser
Global Chair

Further Insights



Turning Materials Scarcity into Competitive Advantage

Companies that combine smart investment with targeted innovation in their value chains can achieve competitive advantage.

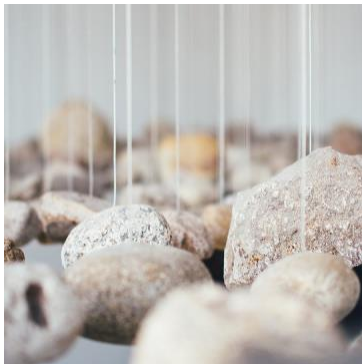
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