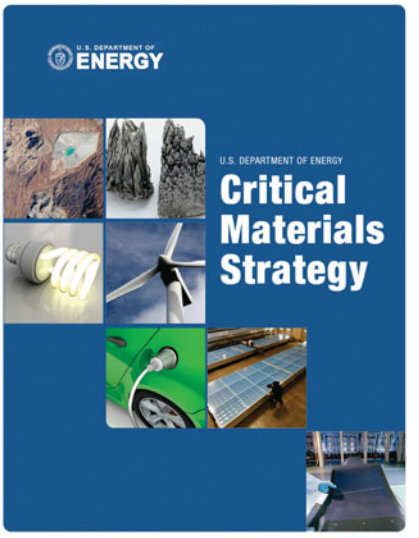
DOE releases strategy to address the availability of critical materials

www.energy.gov/criticalmaterialsstrategy



Key materials critical to advancing clean energy technology are susceptible to major supply chain disruptions, according to a U.S. Department of Energy (DOE) report, *Critical Materials Strategy*, released in December 2010. The report outlines a strategy for reducing the risk of disruptions through research and development, diplomacy, policy, and other means.

The United States depends on rare earth metals and other materials with unique properties for clean energy production, security, transportation, and communications technology, for example. Ensuring access to these materials is absolutely necessary, said Karl Gschneidner, Jr., a senior metallurgist at DOE's Ames Laboratory and one of the report reviewers. "The country has no alternative."

In order to illustrate the risks to access of key materials, the report describes potential sources of disruption along the supply chain for four clean energy component technologies: permanent magnets, advanced batteries, thin-film photovoltaics, and phosphors. Potential risks for these examples range from geographically limited mining sites to intellectual property rights and political, regulatory, and social factors.

To put these risks in context, the report includes an historical analysis of the supply, demand, and prices for key materials; an overview of related DOE and other federal programs; a look at critical materials strategies in other nations; projections for the supply and demand of key materials in the near and mid terms; analysis of the criticality of 14 key materials; and likely program and policy directions for DOE.

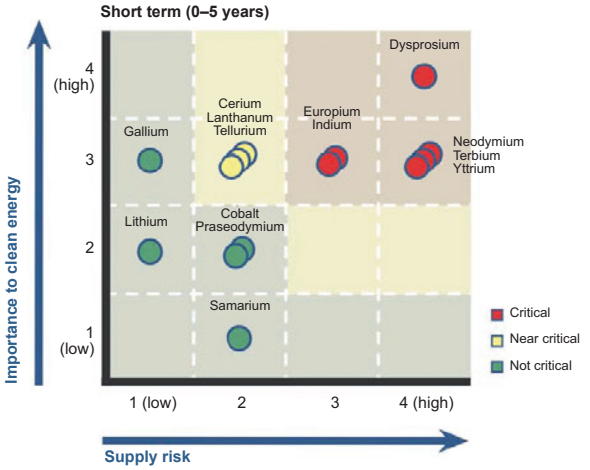
This strategy is a first step toward a new DOE research agenda. "Building on this strategy, DOE will work closely with its national labs, other federal agencies, Congress, and international partners to develop its first integrated research agenda on critical materials," said Diana Bauer, a policy analyst for DOE and Team Leader for the Critical Materials Strategy. Priority topics are likely to include magnets, motors and generators, batteries, photovoltaics and lighting, environmentally sound mining, materials processing, and recycling research and development.

One aim that will be highlighted in the integrated research plan is developing materials, components, and systems that can reduce the need for critical materials that are at risk. Research and development is only a first step. Market uptake is challenging because cost, timeframes, design changes, and changes in manufacturing lines must be factored in, according to Bauer. However, she said, "In the long term, DOE believes that cost-effective substitution is possible for most energy applications that use rare earths."

The DOE research agenda for critical materials will also focus on cutting costs and improving environmental performance across the supply chain. Creating new techniques for recycling critical materials will be emphasized and could reduce the demand for newly mined materials.

The research plan is expected to address potential synergies across DOE, but also potential collaborations with the Department of Defense, National Science Foundation, Department of the Interior, and Environmental Protection Agency. However, the DOE strategy also emphasizes that reliable, sustainable, and economical access to critical materials is not just a national issue; international stakeholders are engaged at every step. Creating clean energy technologies is a global issue that will require diplomacy and international partnerships at many levels.

To inform the forthcoming integrated research plan, DOE held three technical workshops on rare earth



The short-term criticality matrix shows analyses that combine the importance of a material to the clean energy economy and supply risk with respect to that material. *Source*: U.S. Department of Energy, *Critical Materials Strategy*, December 2010.

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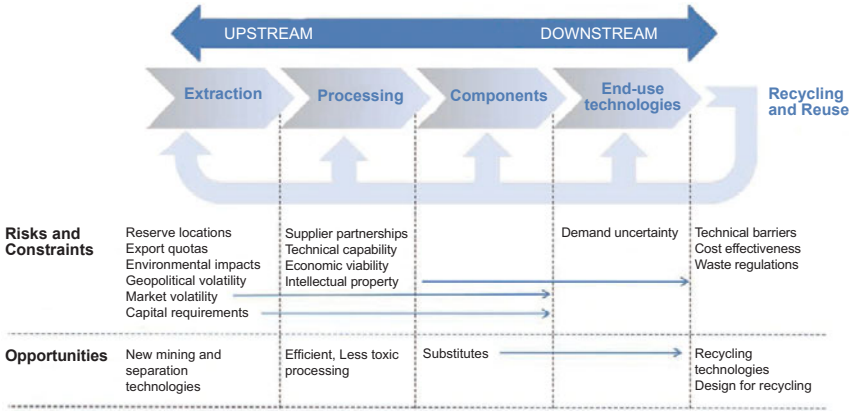

Program and policy directions and the critical material supply chain. *Source*: U.S. Department of Energy, *Critical Materials Strategy*, December 2010.

metals and other critical materials in late 2010, including a U.S.-Japan workshop, a U.S.-European Union workshop, and an Advanced Research Projects Agency-Energy (ARPA-E) workshop. "The three pillars of the strategy are globalization of supply, development of substitutes, and efficient use, and we hope that the research community can offer insight on addressing these pillars in an environmentally and economically sound way," said Bauer.

The report also cites a workforce challenge related to reducing the risks associated with critical materials. As mining, manufacturing, and materials processing has moved largely to other countries, the size of the U.S. workforce knowledgeable about rare earths and other critical materials has decreased, said Gschneidner. "We need to build up our educational capital," he said. DOE aims to do this through education and workforce training, largely in the materials sciences.

"In the years ahead, materials sciences will receive increasing attention in DOE's internships, fellowships and scholarships," reads the report. DOE will also encourage universities and laboratories to engage students and postdoctoral fellows in research related to critical materials, specifically in mineral and mining engineering, mineral economics, materials recycling technology, and manufacturing engineering.

The report can be accessed from the DOE blog at http://blog.energy.gov, posted on December 15, 2010.

Kendra Redmond

New Zealand announces members of science and innovation boards

www.msi.govt.nz

In New Zealand, the Research, Science and Technology Minister Wayne Mapp announced in January the membership of the two new boards that will decide funding for science and innovation.

The Science Board and the Innovation Board will be associated with the new Ministry of Science and Innovation. The Science Board will allocate science funding to research organizations. The Innovation Board will make funding decisions related to business-facing programs.

"These boards will be key players in the government's reforms to improve the science and innovation system," Mapp said. "They will help ensure that New Zealand businesses are innovative, internationally competitive, and contributing to economic growth. They will fund the high-quality research needed to increase productivity and raise our standard of living."

Mapp has also appointed three new members to the Marsden Fund Council, which oversees New Zealand's premier fund for basic research.

Members to both boards and the council represent various science fields, including the physical sciences. Specifically in the materials research field is inventor and entrepreneur Grant Ryan, who has founded a number of companies, including YikeBike, GlobalBrain.net, SLI Systems, RealContacts, and Eurekster. Ryan has a degree in mechanical engineering and a PhD degree in ecological economics from the University of Canterbury. He was appointed to the Innovation Board.

Richard Blaikie of the University of Canterbury is director of the MacDiarmid Institute for Advanced Materials and Nanotechnology. He has been appointed to the Science Board.

David Williams, convenor of the Physics, Chemistry and Biochemistry panel for the Marsden Fund Council, is Professor of Electrochemistry at the University of Auckland. His research interests are in medical diagnostic tools, surface chemistry of oxides, electrochemistry sensors, and imaging electrochemical reactions. □

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