Statement of
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Before the
Committee on Energy and Natural Resources
Subcommittee on Energy
United States Senate

"Examining the Role of Strategic Minerals in
Clean Energy Technologies and Other Applications"

Washington, D.C.
September 30, 2010

Chairwoman Cantwell, Ranking Member Risch, and Members of the Subcommittee, thank you for the opportunity to testify today.

I am here today to speak about rare earth metals, their importance to clean energy technologies, and the Department of Energy's recent work on this topic. This is an important issue – one that needs priority attention in the months and years ahead. The Administration has been focused on this issue for some time. The Department is working to develop a strategy on rare earths that I announced earlier this year and the Administration is continuing to review S. 3521. We share the goal of establishing a secure supply of rare earth metals, and we look forward to discussions with the Congress on ways to address this issue as we move forward.

Rare earth metals have many desirable properties, including the ability to form unusually strong, lightweight magnetic materials. They also have valuable optical properties including fluorescence and emission of coherent light. These properties and others have made rare earth metals valuable in a number of clean energy technologies, among other important applications. For example, lanthanum is used in batteries for hybrid cars. Neodymium is used in magnets for electric generators found in wind turbines, and europium is used in colored phosphors for energy-efficient lighting.

Ironically, "rare earth" metals are not in fact rare. They are found in many places on Earth, including the United States, Canada and Australia. In fact, the United States was the world leader in production of rare earth metals as recently as the late 1980s. However, rare earth metals are often difficult to extract in profitable quantities. This and other factors have led to geographically concentrated production. Today, more than 95 percent of global production of rare earths comes from China. This concentration of production creates serious concerns. While China holds 37 percent of known reserves and the United States holds 13 percent, and there are significant

reserves in other countries, development of new rare earth mines will require significant investment, and it can take years before new sources yield significant production.

It goes without saying that diversified sources of supply are important for any valuable material. Development of substitute materials and policies for re-use, recycling and more efficient use are also important. If rare earth metals are going to play an increasing role in a clean energy economy, we need to pursue such strategies. The recent maritime dispute between China and Japan, in which there were unconfirmed reports that China threatened or adopted a *de facto* ban on such exports to Japan, underscores the geopolitical risks associated with these issues.

GLOBAL CLEAN ENERGY ECONOMY

This transition to a clean energy economy is already well underway. The world is on the cusp of a clean energy revolution. Other countries are seizing this opportunity, and the market for clean energy technologies is growing rapidly all over the world.

Today, the Chinese government is launching programs to deploy electric cars in over 20 major cities. They are connecting urban centers with high-speed rail and building huge wind farms, ultrasupercritical advanced coal plants and ultra-high-voltage long-distance transmission lines.

India has launched an ambitious National Solar Mission, with the goal of reaching 20 gigawatts of installed solar capacity by 2020.

In Europe, strong public policies are driving sustained investments in clean energy. Denmark is the world's leading producer of wind turbines, earning more than $4 billion each year in that industry. Germany and Spain are the world's top installers of solar photovoltaic panels, accounting for nearly three-quarters of a global market worth $37 billion last year. Around the world, investments in clean energy technologies are growing, helping create jobs, promote economic growth and fight climate change. These technologies will be a key part of the transition to a clean energy future and a pillar of global economic growth.

Here in the United States, we are making historic investments in clean energy. The American Recovery and Reinvestment Act was the largest one-time investment in clean energy in our nation's history – more than $90 billion. At the Department of Energy (DOE), we're investing $35 billion in Recovery funds in electric vehicles; batteries and advanced energy storage; a smarter and more reliable electric grid; and wind and solar technologies, among many other areas. We aim to double our renewable energy generation and manufacturing capacities by 2012. We will also deploy hundreds of thousands of electric vehicles and charging infrastructure to power them, weatherize at least half a million homes, and help modernize our grid.

DOE STRATEGY

In recognition of the importance of rare earth elements in the transition to clean energy, DOE is developing a strategic plan for addressing the role of rare earth metals and other materials in clean energy components, products and processes. As a first step in the development of the plan, we released a public Request for Information (RFI) this past May soliciting information from stakeholders on rare earth metals and other materials used in the energy sector. The request focused not only on rare earths, but also on other elements including lithium, cobalt, indium, and tellurium.

We received over 1,000 pages from about 35 organizations, including Original Equipment Manufacturers (OEMs), mining companies, industrial associations, and national labs. Responses addressed supply, demand, technology applications, costs, substitutes, recycling, intellectual property, and research needs. Many organizations shared proprietary data on material usage that have helped us develop a clearer picture of current and future demand.

Based on these responses and analyses being conducted throughout the Department, the strategy is nearing completion. It focuses on four core technologies that will be crucial to our transition to a clean energy economy: permanent magnets, batteries, photovoltaic thin films, and phosphors. A public draft of the strategy is expected to be available later this fall.

I can broadly outline the approach we are taking to proactively address the availability of rare earths and other important materials required to support and expand clean energy development.

First, we must globalize supply chains for these materials. To manage supply risk, we need multiple, distributed sources of clean energy materials in the years ahead. This means taking steps to facilitate extraction, refining and manufacturing here in the United States, as well as encouraging our trading partners to expedite the environmentally-sound creation of alternative supplies.

Second, we must develop substitutes for these materials. Doing so will improve our flexibility as we address the materials demands of the clean energy economy. In order to meet this objective, we will need to invest in R&D to develop transformational magnet, battery electrodes and other technologies that reduce our dependence on rare earths. DOE's Office of Science, Office of Energy Efficiency and Renewable Energy, and the ARPA-E program are currently conducting research along these tracks.

Third, we must explore opportunities to promote recycling, re-use and more efficient use of strategic materials in order to gain more economic value out of each ton of ore extracted and refined. Widespread recycling and re-use could significantly lower world demand for newly extracted rare earths and other materials of interest. For example, we could develop a process to recycle terbium and europium in the phosphors of compact and conventional fluorescent light

bulbs. Neodymium could be recycled from hybrid and electric vehicles. Additionally, recycling and re-use could reduce the lifecycle environmental footprint of these materials, another critical priority.

With all three of these approaches, we must consider all stages of the supply chain: from environmentally-sound material extraction to purification and processing, the manufacture of chemicals and components, and ultimately end uses.

Managing supply chain risks is by no means simple for a company, much less a country. At DOE, we focus on the research and development angle. From our perspective, we must think broadly about addressing the supply chain in our R&D investments, from extraction of materials through product manufacture and eventual recycling. It is also important to think about multiple technology options, rather than picking winners and losers. We work with other federal agencies to address other issues, such as trade, labor and workforce, and environmental impacts. We are already closely working with our interagency partners to address these important issues.

CONCLUSION

One lesson we have learned through experience is that supply constraints aren't static. As a society, we have dealt with these types of issues before, mainly through smart policy and R&D investments that reinforced efficient market mechanisms. We can and will do so again. Strategies for addressing shortages of strategic resources are available, if we act wisely. Not every one of these strategies will work every time. But taken together, they offer a set of approaches we should consider, as appropriate, whenever potential shortages of natural resources loom on the horizon.

So in conclusion, there's no reason to panic, but every reason to be smart and serious as we plan for growing global demand for products that contain rare earth metals. Recent events underscore this. The United States intends to be a world leader in clean energy technologies. Toward that end, we are shaping the policies and approaches to help prevent disruptions in supply of the materials needed for those technologies. This will involve careful and collaborative policy development. We will rely on the creative genius and entrepreneurial ingenuity of the business community to meet an emerging market demand in a competitive fashion. With focused attention, working together we can meet these challenges.