Statement of Dr. John P. Holdren
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Executive Office of the President of the United States
to the
Subcommittee on Investigations and Oversight
Committee on Science, Space and Technology
on
The Administration Perspective on a National Critical Materials Strategy
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Chairman Broun, Ranking Member Edwards, and members of the Subcommittee, thank you for the opportunity to testify today on the Administration policies and interagency efforts for addressing the many complex issues associated with the production and use of critical materials.

While recent events may have precipitated this hearing, there is a long history of concerns over the availability of critical materials. Many materials are referred to as "critical" because supply is highly concentrated in either one country or by a few corporate interests, and because they are used in the production of goods that are important economically or for national security. Today, there is particular concern about materials like platinum, tellurium, and rare earth elements because they are essential to the manufacture of products in key high-growth sectors, including clean energy, consumer electronics, and defense, among others.

The Executive Office of the President (EOP) has been focused on this issue for some time. Since March 2010, the Office of Science and Technology Policy (OSTP), in close coordination with the National Economic Council (NEC), the Office of the U.S. Trade Representative (USTR), and the National Security Council (NSC), has been convening an interagency working group to develop the necessary understanding of the critical-materials situation and to focus Administration thinking and resources on risk mitigation. First, I would like to go through some key themes that have emerged as part of this interagency process—themes that will provide the necessary backdrop for our discussion today. Then I will turn my attention to administration action areas already under way.

Production is only indicative of short-term market risk

Concentrated production does not necessarily imply concentrated reserves. China currently accounts for about 95 percent of world production of the rare earth elements (REE), but is host to only a third to half of known reserves. The high concentration of current production creates short-term risks and vulnerabilities, such as high commodity prices and supply disruptions, but in the longer term normal market forces will work to mitigate these risks, as other suppliers come into the market to take advantage of the higher prices and new demand.

Access to critical materials is vital for emerging industries, like clean energy

The U.S. market for the raw oxide form of REE is small—only about 12 percent of global trade, or $170 million per year. But these REE serve as vital ingredients in many advanced technologies in both the commercial domain (including electric vehicles, lighting, computers, wind turbines, ceramics, and medical imaging) and the defense domain (including avionics, radar, precision-guided munitions, and lasers). Supply shortages of critical materials are of concern because they can stall production of high-growth industries such as the emerging clean energy sector.

In assessing risks of supply disruptions, the entire supply chain must be considered

The risks of supply disruptions depend on what form of the material is deemed critical—raw minerals, metals, alloys, components, or finished goods. For example, most electronic components and finished goods containing rare earths are manufactured abroad, so there is probably little cause for concern in the domestic electronics industry if only the raw metals and oxides are being restricted, so long as the U.S. companies can continue to buy the REE-containing components and goods from other countries. In another example, the United States has the largest reserves of tellurium, a materials used in high-efficiency solar technologies, and there is a high level of producer diversity of this material. However, global production of tellurium has not increased with growing global demand, potentially limiting the market development of promising new photovoltaic technologies. For any given material, a detailed analysis of the entire supply chain is necessary to identify potential vulnerabilities and effective mitigation measures. In some cases, domestic manufacturing is as important as domestic mining.

Long-term planning and innovation provide the best opportunity to mitigate supply risks

Concentration of the production of critical materials can cause painful price spikes and supply disruptions. In the short term, the Administration can use trade relations and diplomacy to foster the diversification of critical material supply, as well as take steps to facilitate domestic production. In the long term, the greatest opportunities to reduce the risks associated with critical materials are through investments in R&D and innovation.

The OSTP-convened interagency process is addressing these core themes in both the short and long-term. Presently this interagency effort is organized around the following sets of activities:

- identifying critical materials based on common and agreed criteria;
- promoting more detailed and transparent collection of information on global resource supply and demand to facilitate the proper functioning of markets;
- establishing federal research and development priorities and establishing R&D roadmaps; and
- reviewing—in coordination with our colleagues in the NEC, USTR, NSC and Federal agencies—domestic and global policies that affect the supply of critical materials (permitting, export restrictions, recycling, stockpiling, etc.) and pursuing remedies for roadblocks.

In what follows, I elaborate on the agency and interagency activities currently underway and contemplated in each of these domains.

<u>Identifying critical materials based on agreed criteria</u>

Identifying which materials are critical based on an agreed set of criteria should be done proactively and continuously. The National Academy of Sciences and the American Physical Society/ Materials Research Society recently published reports that include methodologies for defining critical minerals.[1] [2] In its 2010 *Critical Materials Strategy*, the Department of Energy

[1] APS/MRS, *Energy Critical Elements: Securing Materials for Emerging Technologies* (American Physical Society, Washington D.C., 2011). www.aps.org/policy/reports/popa-reports/loader.cfm?csModule=security/getfile&PageID=236337

(DOE) developed a methodology for assessing energy-critical materials.[3] Concurrently, the Department of Defense (DOD) is conducting a congressionally mandated assessment of demand for individual rare earth elements from defense applications with an interim report due in July 2011.[4] In support of this effort**,** the USGS recently completed a DOD-funded inventory of known domestic rare-earth reserves and resources.[5] These analyses and frameworks provide the foundation for developing a robust and on-going analytical capability, one that allows the Federal government to anticipate material shortfalls in multiple civilian and defense related sectors long before they happen in the market. Our newly established interagency working group formed a sub-group co-chaired by the Departments of Energy and Defense to perform this task.

Depth and transparency of information

The growing interdependence between countries supplying and using raw materials underlines the importance of ensuring that global markets are open and well-functioning, on the basis of known material flows, clear price signals, and fair and transparent regulations. A shared and accurate understanding of global raw materials flows, location of resources, and material demand is essential to ensure the smooth functioning of materials markets. Data availability for many critical raw materials is limited due to relatively small market sizes and a limited number of producers. In addition, assessing the supply and demand outlook is complicated because many critical raw materials are mined or coproduced with other materials. More accurate and timely market information will help industry and governments make better strategic decisions. The OSTP-convened interagency process can support the collection, dissemination, and quality assurance of global information that builds on existing government data-collection processes. For example, enhanced cooperation among national geological services could substantially improve collective knowledge on the availability of raw materials and facilitate the identification of resource location.

Federal R&D needs and priorities

The Department of Energy is initiating new R&D activity on these issues. The President's FY 2012 Budget includes a proposal for a DOE Energy Innovation Hub ($20 million) on critical materials to help reduce U.S. reliance on materials such as rare earth elements (REE). The Hub activity will focus on finding ways to reduce the content of such critical materials in existing components; identifying new chemical compositions, material designs, and approaches that are not reliant on critical materials; and pursuing technologies that decrease the cost of separating critical elements from recycle streams and ores. Furthermore, DOE's Advanced Research Projects Agency-Energy (ARPA-E) issued a solicitation in FY 2011 to fund early-stage technology alternatives that reduce or eliminate dependence on rare earths by developing

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[2] National Research Council, *Minerals, Critical Minerals, and the U.S. Economy* (National Academy Press, Washington D.C., 2008). www.nap.edu/catalog.php?record_id=12034

[3] U.S. Department of Energy, *Critical Materials Strategy*, Washington D.C., 2010. www.energy.gov/news/documents/criticalmaterialsstrategy.pdf

[4] Public Law 111–383, Ike Skelton National Defense Authorization Act for Fiscal Year 2011, sec. 843, Assessment and Plan for Critical Rare Earth Materials in Defense Applications. www.gpo.gov/fdsys/pkg/PLAW-111publ383/pdf/PLAW-111publ383.pdf.

[5] Long, K.R., Van Gosen, B.S., Foley, N.K., and Cordier, Daniel, 2010, *The principal rare earth elements deposits of the United States—A summary of domestic deposits and a global perspective: U.S. Geological Survey Scientific Investigations Report 2010–5220*, 96 p. Available at http://pubs.usgs.gov/sir/2010/5220/

substitutes in two key areas: electric vehicle motors and wind generators. Up to $30 million will be made available for this program area.

Addressing global trade policies

In October 2010, USTR initiated an investigation into allegations concerning China's export restraints on REE, tungsten, and antimony, pursuant to a petition brought by the United Steelworkers under Section 301 of the Trade Act of 1974, as amended. Although no formal action was taken by USTR under Section 301 on the REE allegations, USTR is closely examining China's policies restricting exports of raw materials, including REE, and continues to press China to remove its export restraints on REE and other raw materials. Moreover, the United States is actively working through international organizations such as the World Trade Organization (WTO), the G-20, the Organization for Economic Cooperation and Development (OECD), and through bilateral dialogues to increase transparency about problematic export restraint policies in China and other countries, and to reduce barriers to global trade and investment in raw materials.

In closing, let me emphasize again that the Executive Office of the President and the Federal agencies are taking the topics of critical materials and critical mineral supply chains very seriously. The Federal agency efforts are coordinated through the EOP-led interagency process. Despite that process being in its infancy, we have developed a shared understanding of the problems and issues of critical materials with our interagency partners, have formulated a game plan for addressing both short and long-term concerns with critical materials and are executing on that plan. We remain in close communication with the scientific, technical, and business communities; and we look forward to continuing to work with this committee and other members of Congress to help ensure growth in our national capabilities in this domain.

Thank you.