FEDERAL PERSPECTIVE ON A NATIONAL CRITICAL MATERIALS STRATEGY

HEARING

BEFORE THE

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

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FEDERAL PERSPECTIVE ON A NATIONAL CRITICAL MATERIALS STRATEGY

HEARING DATE (INCLUDING DAY OF WEEK)

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, DC.

The Subcommittee met, pursuant to call, at 2:39 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Randy Hultgren presiding.

Subcommittee on Investigations and Oversight

The Federal Perspective on a National Critical Materials Strategy

Tuesday, June 14, 2011
2:00 p.m. – 4:00 p.m.

2318 Rayburn House Office Building

Witnesses

Dr. John P. Holdren
Director, Office of Science & Technology Policy

Mr. David Sandalow
Assistant Secretary for Policy and International Affairs, U.S. Department of Energy

Mr. Jeff L. Doebrich
Program Coordinator (Acting), Mineral Resources Program, U.S. Geological Survey

HEARING CHARTER

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON INVESTIGATIONS & OVERSIGHT
U.S. HOUSE OF REPRESENTATIVES

"The Federal Perspective on a National Critical Materials Strategy"

TUESDAY, JUNE 14, 2011
2:00 P.M.—4:00 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

Purpose

On June 14, 2011, the Subcommittee on Investigations and Oversight has invited officials from the Administration to discuss the federal perspective on a national critical materials strategy. This includes rare earth elements as well as other critical materials.

Background

A recent report by the American Physical Society (APS) and Materials Research Society (MRS) defines *energy critical elements* (ECE) as: "a class of chemical elements that currently appear critical to one or more new, energy-related technologies. A shortage of these elements would significantly inhibit large-scale deployment, which could otherwise be capable of transforming the way we produce, transmit, store, or conserve energy."[1]

Located primarily around the center of the Periodic table *(Appendix 2),* there are several reasons why these elements may be considered critical beyond the role they play in electronics and advanced technologies such as electric cars, wind turbines and photovoltaic cells. The joint APS and MRS study explains elements may be critical because they might be "intrinsically rare in Earth's crust, poorly concentrated by natural processes, or currently unavailable in the United States."[2] While many energy critical elements also play important roles in national defense, this hearing is primarily focused on the commercial and energy applications of these materials.

Within the definition of energy critical elements are a group of seventeen chemical elements that are commonly found together, and referred to as the *rare earth elements.* On the Periodic table, fifteen of these elements are located in the Lanthanide series *(see below),* which make up a row of elements with atomic numbers in ascending order from 57 to 71. The other two are Yttrium (atomic number 39) and Scandium (atomic number 21). A list of the rare earth elements below, and their common end uses, is available in *Appendix 3.*

Lanthanide Series*	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	La	**Ce**	**Pr**	**Nd**	**Pm**	**Sm**	**Eu**	**Gd**	**Tb**	**Dy**	**Ho**	**Er**	**Tm**	**Yb**	**Lu**
	138.9	140.1	140.9	144.2	(145)	150.4	152.0	157.2	158.9	162.5	164.9	167.3	168.9	173.0	

[1] *"Energy Critical Elements: Securing Materials for Emerging Technologies,"* a report by the American Physical Society and the Materials Research Society, February 2011, available at: http://www.aps.org/policy/reports/popa-reports/loader.cfm?csModule=security/getfile&PageID=236337 (hereinafter APS/MRS Report)

[2] Ibid.

Rare earths share similar—yet unique—chemical and physical properties that make them critical components of advanced technologies such as high powered magnets, petroleum refining catalysts, batteries, and lasers among others. Like other critical elements, rare earths are important components of everyday items such as cell phones, blackberries, hybrid cars, etc.

Rare earths are further classified into two categories—light and heavy. The lighter elements—basically the first half of the Lanthanide series—are more abundant and have a larger market. The heavier elements—the second half of the Lanthanide series—are scarcer, but equally, if not more critical, even with a smaller market share.

Despite the terminology, rare earths are actually abundant in the Earth's crust. They are however, expensive and difficult to mine, as the process of separating and isolating each individual rare earth element is highly complex and cumbersome—both financially as well as logistically. When initially extracted from the ground as an ore, rare earths are mixed together. The mixed rare earths have to be chemically extracted from the ore concentrates, and further chemically separated from any other metals that exist in the ore. The remaining mix of rare earths then undergoes an additional process to isolate each individual rare earth in a "separation plant."[3] These are expensive facilities to build, and can "easily involve hundreds of repetitive steps taking up to a month to finish a single batch of material, and although batches can be run almost continuously the size of the plant must reflect the optimum large batch size for producing enough volume to make a profit, by selling the resulting commercially pure separated chemical compounds."[4]

International Production

China

From the 1960s to the 1980s, the United States was the dominant producer in the world of rare earths. But the intensive nature of rare earths mining ultimately led to the demise of this industry. The process of mining and separating rare earth elements presents environmental challenges. It creates "hundreds of gallons of salty wastewater per minute, consuming huge amounts of electricity, requiring toxic materials for the refining process and occasionally unearthing dirt that is radioactive."[5] Combined with China's lower environmental standards, labor costs, and government backing of an industry of interest to that nation, the U.S. couldn't remain competitive, and ultimately ceded authority of this industry to the Chinese. The result is that today, China produces about 97% of the world's rare earth oxides—demonstrating the success of a vision eloquently encapsulated in the following 1992 quote by Deng Xiaoping, the architect of China's economic transformation, "There is oil in the Middle East; there is rare earth in China."[6]

But as China's interest in the industry has expanded, so too has its control. Since 2006, "the Chinese Commerce Ministry has been reducing export quotas, as well as limiting and cutting the number of firms that are allowed to export rare earths in their raw form. In 2006, 47 Chinese companies had permits to export rare earths, but by 2010, only 22 companies were allowed to do so."[7]

Understandably, with a reduction in permits has come a reduction in exports. According to the U.S. Chamber of Commerce, "Last year, China slashed exports by 72%, and then by another 35% for the first half of 2011."[8]

Moreover, as of 2007, China has established export taxes on rare earths. "Originally set at between 15 percent to 25 percent, depending on the oxide or concentrate being exported, the rates on many more rare earth products are expected to be raised by 25 percent in 2011."[9]

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[3] Jack Lifton, *"In Xanadu Did Goldman Sachs Decree A Rare Earths Surplus For All To See,"* Technology Metals Research, May 6, 2011, available at: http://www.techmetalsresearch.com/2011/05/in-xanadu-did-goldman-sachs-decree-a-rare-earths-surplus-for-all-to-see/

[4] Ibid.

[5] Tiffany Hsu, *"High-tech's Ace in the Hole,"* Los Angeles Times, February 20, 2011, available at: http://articles.latimes.com/2011/feb/20/business/la-fi-rare-earth-20110220/3 (hereinafter Hsu Article)

[6] Paul Krugman, *"Rare and Foolish,"* New York Times, October 17, 2010, available at: http://www.nytimes.com/2010/10/18/opinion/18krugman.html

[7] Ming Hwa Ting, *"China's Rare Earth Motives,"* The Diplomat, June 5, 2011, available at: http://the-diplomat.com/new-leaders-forum/2011/06/05/chinas-rare-earth-motives/ (hereinafter Ting Article)

[8] Bill Kovacs, "Rare Earth Elements and our Clean Energy Future," ChamberPost, April 19, 2011, available at: http://www.chamberpost.com/2011/04/rare-earth-elements-and-our-clean-energy-future/

[9] Ting Article, *supra,* note 7

China claims these measures are necessary to protect its environment from rogue mining operators, and to sustain its rare earths industry. To that end, China issued guidelines earlier this year that lifts rare earth elements to the level of national strategic reserves. Additionally, existing mines are forbidden from expanding capacity, China is setting up a strategic stockpile system for rare earth metals, and it aims to concentrate 80 percent of the country's heavy rare earth mining assets in the hands of its three largest companies over the next couple of years. [10]

China's actions have created tense relations with American technology and renewable energy industries, leading the U.S. Trade Representative's office to say that "if China continues to rebuff requests to ease export limits on rare earths, it may take the dispute to the World Trade Organization." [11] And, an analyst at the Heritage Foundation had the following to say:

> *"Beijing already faces a losing case at the World Trade Organization (WTO) for its rare earth export quotas. A Chinese embargo would take at least a few months to have an effect and would trigger WTO sanctioned retaliation that would match or exceed the dollar value of rare earth exports. Trade disruptions from that point would harm the PRC far more than the U.S., given the much greater volume of Chinese shipments to America and the jobs associated with them."* [12]

Japan

China's willingness to take advantage of its near monopoly on rare earth elements isn't restricted to export quotas and taxes, nor are its policies directed solely to the United States. While China is the world's largest producer of rare earth elements, Japan conducts a great deal of the world's rare earth processing, and is therefore vulnerable to Chinese export restrictions. Last year, China suspended exports of rare earths to Japan in retaliation for Japan's detention of a Chinese fishing boat captain accused of deliberately ramming two Japanese patrol boats in disputed waters. [13] While Japan kept custody of the fisherman during its investigation, the Chinese government kept raising diplomatic stakes in demanding his freedom, leading to an increasingly tense stand-off between the two nations. Japan eventually relented, and let the Chinese captain go, claiming that the negative impact on the Japan-China relationship wasn't worth the cost. China, meanwhile, denied any embargo on rare earth shipments to Japan—even though it took almost two months before shipment of the minerals resumed. [14]

Australia

Prior to the Japanese incident, in 2009, China sought to expand its influence in other countries. Flush with the cash flow of a bustling economy, the Chinese made multiple unsuccessful bids to purchase significant shares of several companies in Australia's resource industry:

- A $400 million bid for a controlling stake in a rare earths miner fell through;
- For national security reasons, Australia's Defense Department intervened in a proposed joint venture between an Australian subsidiary of a Chinese company and an Australian outback mining venture;
- In a separate deal, again for national security reasons, Australian Treasurer Wayne Swan rejected Minmetals' (a Chinese state-owned firm) $2.6 billion offer for OZ Minerals;
- A $19.5 billion discussion between Chinese-owned metals firm Chinalco and Rio Tinto broke down after Rio backed away from the deal; and
- China Nonferrous Metal Mining (Group) Company ended negotiations to purchase Lynas Corporation because Australia's Foreign Investment Review Board

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[10] Tony Zhu, *"China Tightens Control of Rare Earth Industry,"* Business China, May 20, 2011, available at: http://en.21cbh.com/HTML/2011–5–20/wNMjMyXzIxMDIwNA.html

[11] Hsu Article, *supra,* note 5

[12] Derek Scissors, *"Rare Earths: The U.S. Government Should not Manage Supply,"* Heritage Foundation Web Memo No. 3201, March 21, 2011, available at: http://thf—media.s3.amazonaws.com/2011/pdf/wm3201.pdf

[13] Keith Bradsher, *"Amid Tension, China Blocks Crucial Exports to Japan,"* New York Times, September 22, 2010, available at: http://www.nytimes.com/2010/09/24/business/global/24rare.html

[14] Keith Bradsher, *"China Restarts Rare Earth Shipments to Japan,"* New York Times, November 19, 2010, available at: http://www.nytimes.com/2010/11/20/business/global/20rare.html

required the Chinese company's ownership stake to be below 50% while maintaining a minority of board seats on Lynas. [15]

The Lynas negotiation attracted a great deal of attention given the leverage the Chinese would have had in a company that owns significant deposits of undeveloped rare earths. Had China been successful in this endeavor, it would have further tilted the playing field in its favor, despite the 97 percent control it already enjoys in the production of rare earth oxides.

Domestic Production

The combination of China's aggressive actions—strong-arming Japan, aggressive purchase bids in Australia, reducing the number of rare earth export permits and quotas, and increasing taxes on these exports—has prompted numerous countries to call for a more diversified rare earths market and greater domestic exploration and production. As China's economy and industry grows, its own need for these rare earth materials is increasing. Because of this, it is possible that China could cease rare earth exports, or become a rare earth importer at some point in the future.

These circumstances have led to a renewed interest in domestic production of rare earth elements. Although "[r]are earth element reserves and resources are found in Colorado, Idaho, Montana, Missouri, Utah, and Wyoming . . . [t]here is no rare earth mine production in the United States." [16] The company best positioned to reconstitute domestic production is Molycorp Minerals, LLC. Based in Colorado, the company owns a mine in Mountain Pass, California, a site that once allowed Molycorp to hold the title of largest producer of rare earths in the world. But the mine shut down in 2002, as a result of low priced Chinese imports, strict environment regulations in the U.S., and liabilities associated with environmental contamination. [17] Nevertheless, proving its value, China has attempted to buy the mine three times after it shut down in 2002. [18]

In his testimony before this Subcommittee last year, Mark Smith, Molycorp's Chief Executive Officer, outlined the company's approach toward restarting the mine, and establishing itself as a competitive business. According to Mr. Smith:

> *Many industry observers question how a U.S. producer of rare earths can ever compete with the Chinese, when the possibility always lingers that the Chinese could flood the market and dramatically depress rare earth prices, a practice they have demonstrated previously. We have spent the better part of the past eight years developing the answer to this question. We changed the orientation of our thinking and discovered that by focusing principally on energy and resource efficiency, we could make major improvements in our cost competitiveness while at the same time advance our environmental stewardship.*
>
> *We will incorporate a wide variety of manufacturing processes that are new to the rare earth industry, which will increase resource efficiency, improve environmental performance, and reduce carbon emissions. Specifically:*
>
> - *Our overall processing improvements will almost cut in half the amount of raw ore needed to produce the same amount of rare earth oxides that we have produced historically. This effectively doubles the life of the ore body and further minimizes the mine's footprint;*
> - *Our extraction improvements will increase the processing facility's rare earth recovery rates to 95% (up from 60–65%) and decrease the amount of reagents needed by over 30%;*
> - *Our reagent recycling, through proprietary technology that Molycorp has developed, could lead to even greater decreases in reagent use;*
> - *Our new water recycling and treatment processes reduce the mine's fresh water usage from 850 gallons per minute (gpm) to 30 gpm—a 96% reduction;*
> - *Finally, the construction of a Combined Heat and Power (CHP) plant—fueled by natural gas—will eliminate usage of fuel oil and propane. This will significantly reduce the facility's carbon emissions, reduce electricity costs by 50%, and improve electricity reliability.*

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[15] Rob Taylor, *"China Drops Lynas Bid; Further Strains Australia-China Relations,"* Mineweb, September 24, 2009, available at: http://mineweb.com/mineweb/view/mineweb/en/page72068?oid=89761&sn=Detail

[16] Marc Humphries, *Rare Earth Elements: The Global Supply Chain,* CRS, September 30, 2010, available at http://www.crs.gov/Products/R/PDF/R41347.pdf (hereinafter Humphries/CRS Report)

[17] Keith Bradsher, *"Challenging China in Rare Earth Mining,"* New York Times, April 21, 2010, available at: http://www.nytimes.com/2010/04/22/business/energy-environment/22rare.html

[18] Ibid.

These process improvements fundamentally reverse the conventional wisdom that superior environmental stewardship increases production costs. At the same time, we significantly distinguish ourselves from the Chinese rare earth industry that has been plagued by a history of significant environmental degradation, one that it is just beginning to recognize and rectify. [19]

From a financial perspective, Molycorp's efforts are receiving favorable marks thus far. By the end of last year.[20] Molycorp claimed it had secured all the permits it needed to begin mining ore this year. Molycorp is spending over $500 million on its 2,200-acre facility, and by 2014, plans to dig about 40,000 tons of dirt a year, compared to its current 3,000 tons.[21]

Moreover, as part of its 'mine-to-magnets' strategy, Molycorp and Hitachi Metals Ltd. agreed to "form a joint venture to produce rare-earth alloys and magnets, moving Molycorp a step closer to establishing a rare-earth manufacturing chain in the U.S."[22] This deal would expand Molycorp's business beyond just mining. Hitachi owns a host of patents on neodymium iron boron (NdFeB) permanent magnets, which advances Molycorp's 'mine-to-magnets' strategy. These powerful magnets have played an essential role in miniaturizing consumer electronics (cell phones), and are key components of lightweight, high-power motors and generators (wind turbines, hybrid and electric vehicles.)

From Japan's perspective, where Hitachi is based, this venture would provide the country with some place other than China for a supply of rare earths. Separately, Molycorp also struck a deal with Sumitomo Corporation, another Japanese company, which "agreed to buy $100 million, or more than 3%, of Molycorp's shares and provide $30 million in financing as part of a seven-year rare-earth supply agreement."[23]

Interagency Working Group

Since March 2010, OSTP, in coordination with the National Economic Council and the National Security Council, has been hosting an interagency working group on critical and strategic mineral supply chains, which includes the topic of supply constraints on rare earth elements. The group is initially focusing on four areas:

- Defining, screening and prioritizing critical materials;
- Prioritizing federal research and development;
- Review of domestic and global policies that affect the supply of critical and strategic minerals (e.g., permitting, export restrictions, recycling, stockpiling, etc.) and consideration of methods to mitigate risks through industrial or diplomatic processes; and
- Transparency of resource supply and demand information.

Participants in this group include: Department of Energy, Department of Defense, U.S. Geological Survey, Department of Commerce, Environmental Protection Agency, Department of Justice, Department of State, and the U.S. Trade Representative.

At this time, there are no plans to develop a collaborative report or document to reflect the dialogue and/or exchange of ideas between the participating agencies.

Last December, DOE officials published the "Critical Materials Strategy" report, and indicated that they plan to release an update at the end of this year. The 2010 report examined the role of rare earths and other materials in the clean energy economy. In the report, DOE describes plans to:

i. develop its first integrated research agenda addressing critical materials;

ii. strengthen its capacity for information-gathering on this topic; and

iii. work closely with international partners, including Japan and Europe, to reduce vulnerability to supply disruptions and address critical material needs. [24]

With respect to its critical materials strategy, the DOE report identifies three points:

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[19] Mark A. Smith, CEO, Molycorp Minerals, LLC, Testimony, House Science and Technology Subcommittee on Investigations and Oversight, March 16, 2010 (hereinafter Smith Testimony)

[20] *"Update 1—Rare Earth Producer Molycorp Wins OK for Mine,"* Reuters, December 13, 2010, available at: http://af.reuters.com/article/metalsNews/idAFN1321376420101213

[21] Hsu Article, *supra,* note 5

[22] Tess Stynes, *"Molycorp, Hitachi Metals Reach Rare Earth Deal,"* Wall Street Journal, December 21, 2010, available at: http://online.wsj.com/article/SB10001424052748703581204576033382079826492.html

[23] Ibid.

[24] *Critical Materials Strategy,* U.S. Department of Energy, December 15, 2010, available at: http://www.energy.gov/news/documents/criticalmaterialsstrategy.pdf (hereinafter DOE Report)

- *First, diversified global supply chains are essential;*
- *Second, substitutes must be developed;*
- *Third, recycling, reuse and more efficient use could significantly lower world demand for newly extracted materials.* [25]

The follow-up report "will include additional analysis of rapidly-changing market conditions. It will analyze the use of critical materials in other technologies, such as fluid cracking catalysts in petroleum refineries. Finally, the updated strategy will identify specific steps forward for substitution, recycling and more efficient use of materials identified as critical." [26] There is a need for data on recycling efforts by industry, as well as understanding the potential for substitute materials. Stories such as Toyota's plans to switch from rare earths to a special induction motor in its Prius, [27] and GE's success in developing a new alloy to replace Rhenium, a critical material in its turbine engines, are encouraging. [28]

It would also be beneficial to Congress and private industry if the Administration would address the issue of mining permits. Highlighting the seriousness of this subject, during testimony before a House Natural Resources Subcommittee on Energy and Mineral Resources hearing on May 24, Mr. Hal Quinn, President and CEO of the National Mining Association, made the following observation:

> *"Regulatory costs can slowly drown an enterprise. But the uncertainties and delays in obtaining permits to commence operations can crush the mining enterprise before it even gets in the dirt. Permit delays pose the highest hurdle for domestic mining with necessary government authorizations now taking close to ten years to secure. If commodity cycles are historically 20 years in duration, the ten-years it takes to obtain permits leaves U.S. mining still in the starting blocks with the race half way over."* [29]

Funding Streams

Funding for rare earths and critical materials R&D is spread throughout several DOE programs, making it difficult to isolate specific budget numbers. The following is a list of programs and sub-programs from which funds may be used relative to rare earths and critical materials projects: Office of Energy Efficiency and Renewable Energy; Advanced Research Projects Agency-Energy; Industrial Technologies Program; Next Generation Materials Program; Next Generation Manufacturing Processes; Manufacturing Energy Systems Program; Energy Efficiency Partnership; and Industrial Technical Assistance Program.

Additionally, the USGS Mineral Resources Program supports funding for the collection, analysis, and dissemination of minerals information in the U.S. and around the world.

For examples of rare earths and critical material budget details, please see Appendix 4, which includes selected information from DOE's 2010 "Critical Materials Strategy" Report.

Statutory History

Thirty years ago, the National Materials and Minerals Policy, Research and Development Act was enacted because:

> *. . . [T]he United States lacks a coherent national materials policy and a coordinated program to assure the availability of materials critical for national economic well-being, national defense, and industrial production, including interstate commerce and foreign trade . . .* [30]

The Congress declared it the President's responsibility to coordinate a plan of research and other actions that would ".promote an adequate and stable supply of materials necessary to maintain national security, economic well-being and industrial production with appropriate attention to a long-term balance between resource production, energy use, a healthy environment, natural resources conservation, and so-

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[25] Ibid.

[26] *DOE Announces Second RFI on Rare Earth Metals,* March 22, 2011, available at: http://www.energy.gov/news/10193.htm

[27] Hsu Article, *supra,* note 5

[28] APS/MRS Report, *supra,* note 1

[29] Hal Quinn, President and CEO, National Mining Association, Testimony, House Natural Resources Subcommittee on Energy and Mineral Resources, May 24, , available 2011 at: http://naturalresources.house.gov/UploadedFiles/QuinnTestimony05.24.11.pdf

[30] 30 USC 1601(a) (6)

cial needs."[31] Our current situation with rare earth minerals indicates that successive Administrations failed to carry out this policy.

The 1980 Act directed development of a plan that would, among other outcomes, produce continuing assessments of demand for minerals and materials in the economy; conduct a "vigorous" research and development effort; collect, analyze and disseminate information; and cooperate with the private sector and other nations.[32]

Four years later, dissatisfied with the inaction to the 1980 law, Congress decided in the National Critical Materials Act of 1984 to establish a National Critical Materials Council in the Executive Office of the President to serve as the focal point for critical materials policy. The Council was tasked to assist the President in carrying out the requirements of the 1980 Act.[33] In 1993, through Executive Order 12881,[34] the National Critical Materials Council was terminated, and its responsibilities transferred to the National Science and Technology Council, located within the Office of Science and Technology Policy.

In 1995 and 1996, the NSTC published reports on the Federal Research and Development Program in Materials Science and Technology. No equivalent report has been produced since, however, nor has OSTP produced the "long-range assessments of materials needs related to scientific and technological concerns" or "scientific and technical changes over the next five years" whose annual preparation the statute requires.[35]

Somewhere along the way, there appears to have been a failure in communication between the two branches of government given that multiple Administrations have disregarded responsibilities assigned by Congress in the 1980 Act.

During its hearing on rare earths last March, this Subcommittee revisited policy issues it thought had been settled decades ago to determine how to avoid finding ourselves in similar straits in the future. The full Committee on Science and Technology even held a mark-up in September on H.R. 6160, the Rare Earths and Critical Materials Revitalization Act of 2010, introduced by Rep. Kathleen Dahlkemper a day before the mark-up. Among its provisions, Rep. Dahlkemper's bill repealed the National Critical Materials Act of 1984, and amended parts of the National Materials and Minerals Policy, Research and Development Act of 1980. On September 29, the House approved the bill by a vote of 325–98.

This year, a number of Members have introduced legislation regarding rare earths and critical materials, with at least two of them repealing the 1984 Act. *(See Appendix 1.)*

Issues

R&D Portfolio

The federal government funds a number of research and development programs related to rare earths and critical materials. Recent reports recommend establishing research and development efforts focused on geological deposit modeling, mineral extraction and processing, material characterization and substitution, manufacturing, recycling, and life-cycle analysis. The private sector has a strong incentive to conduct this research as well; however, its focus is primarily on applied research rather than basic or fundamental research. In times of fiscal austerity, some have suggested prioritizing research and development activities in such a manner that precludes duplication, and prevents the crowding-out of private sector work. In other words, the federal government should not only identify what research needs to be conducted to enhance the critical element supply chain, but also what research is actually appropriate for government support versus private sector investment.

Information

Another recommendation for the U.S. government involves improving information related to discovered and potential resources, production, use, trade, disposal, and recycling. Currently, USGS provides the majority of data on element and mineral supplies; however, the agency has very little information on current and future demands. DOE projects the potential demand for energy critical elements, but not for all applications. In order to gather, analyze, and disseminate information on both

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[31] 30 USC 1602

[32] 30 USC 1603

[33] 30 USC Chapter 30

[34] Ex. Ord. 12881, "Establishment of the National Science and Technology Council," November 23, 1993; 58 *Fed. Reg.* 62491. Dr. Gibbons tied the reorganization both to President Clinton's decision to reduce staff within the White House and to the National Performance Review conducted by Vice President Gore. Bill Loveless, *"Gibbons to Propose Formation of Science and Tech Council,"* Federal Technology Report, September 2, 1993; p. 1

[35] 30 USC 1604(b) (2) and (3)

supply and demand, reports have recommended that a "Principal Statistical Agency" should be tasked with regularly surveying emerging technologies and the supply chain throughout the Periodic table, with an aim of identifying critical applications, as well as potential shortfalls.

Loan Guarantees

A number of federal incentives were proposed to address shortfalls in domestic rare earth element production, most notably loan guarantees. Because access to capital was limited after the financial downturn, potential rare earth producers applied for DOE loan guarantees, and several legislative proposals sought to expand similar programs for rare earth elements. Despite the limited access to capital, concerns have been raised about the necessity of such incentives, given the high demand for rare earth elements.

Stockpiling

Recent proposals direct the federal government to stockpile certain rare earth elements and critical materials, especially those vital to national security and defense. The Defense National Stockpile maintains and manages strategic and critical materials, but proposals have suggested similar non-defense stockpiling efforts in addition to this effort. Conversely, other proposals have suggested that stockpiling is not necessary for non-defense related purposes other than helium.

Permitting

Arguments have been made for a streamlined permitting process for miners of rare earths and critical materials, as it can take as long as ten years to obtain the necessary approval. Any effort to revitalize a domestic rare earth industry that can compete with China is contingent upon minimizing administrative burdens. Ensuring that the permitting process is expedited in a manner that respects public health and safety, and the environment, is key to the industry's long term viability.

Witnesses:

- *Dr. John P. Holdren,* Director, Office of Science & Technology Policy (OSTP), Executive Office of The President of the United States

  Dr. Holdren has been invited to talk about the interagency working group on critical and strategic mineral supply chains, which is comprised of OSTP, National Economic Council and the National Security Council. Dr. Holdren will describe the group and its objectives, especially with respect to any research and development plans relative to rare earths and critical materials.

- *Mr. David Sandalow,* Assistant Secretary for Policy and International Affairs, U.S. Department of Energy (DOE)

  Mr. Sandalow will discuss DOE's participation in the above-mentioned interagency working group, and address DOE's activities relative to rare earths and critical materials, especially with respect to any research and development plans.

- *Mr. Jeff L. Doebrich,* Program Coordinator (Acting), Mineral Resources Program, U.S. Geological Survey (USGS), U.S. Department of the Interior

  Mr. Doebrich will explain USGS' participation in the interagency working group, and provide an overview of USGS' research activities relative to rare earths and critical materials.

APPENDIX 1

HOUSE BILLS

- **Rep. Leonard Boswell**—H.R.618, *Rare Earths and Critical Materials Revitalization Act of 2011,* introduced February 10, 2011:

Establishes in the DOE a research, development, and commercial application program.

Directs the Secretary of Energy to:

1. support new or significantly improved processes and technologies (as compared to those currently in use in the rare earth materials industry),
2. encourage multidisciplinary collaborations and opportunities for students at institutions of higher education, and
3. submit an implementation plan to Congress.

Amends the Energy Policy Act of 2005 to authorize the Secretary to make loan guarantee commitments for the commercial application of new or significantly improved technologies for specified projects.

Amends the National Materials and Minerals Policy, Research and Development Act of 1980 to:

1. instruct the Director of the Office of Science and Technology Policy to coordinate federal materials research and development through the National Science and Technology Council (instead of, as currently required, the Federal Coordinating Council for Science, Engineering, and Technology, which is now defunct);
2. modify the duties of the Secretary of Commerce regarding critical needs assessment; and
3. repeal specified reporting and other duties of the Secretaries of Defense and of the Interior.

Repeals the National Critical Materials Act of 1984.

- **Rep. Brad Miller**—H.R.952, *Energy Critical Elements Renewal Act of 2011,* introduced March 8, 2011:

Establishes in the Department of Energy (DOE) a research, development, and commercial application program.

Directs the Secretary of Energy to:

1. support new or significantly improved processes and technologies (as compared to those currently in use in the energy critical elements industry);
2. encourage multidisciplinary collaborations and opportunities for students at institutions of higher education;
3. collaborate with the relevant agencies of foreign countries with interests relating to energy critical elements;
4. establish a Research and Development Information Center to catalogue, disseminate, and archive information on energy critical elements; and
5. submit an implementation plan to Congress.

Directs the President, acting through the Office of Science and Technology Policy, to coordinate the actions of federal agencies to:

1. promote an adequate and stable supply of energy critical elements;
2. identify energy critical elements and establish early warning systems for supply problems;
3. establish a mechanism for the coordination and evaluation of federal programs with energy critical element needs; and
4. encourage private enterprise in the development of an economically sound and stable domestic energy critical elements supply chain.

Amends the Energy Policy Act of 2005 to authorize the Secretary to make loan guarantee commitments for the commercial application of new or significantly improved technologies for specified rare earth materials projects.

Amends the National Materials and Minerals Policy, Research and Development Act of 1980 to:

1. instruct the Director of the Office of Science and Technology Policy to coordinate federal materials research and development through the National Science and Technology Council (instead of, as currently required, the Federal Coordinating Council for Science, Engineering, and Technology, which is now defunct);
2. modify the duties of the Secretary of Commerce regarding critical needs assessment; and
3. repeal specified duties of the Secretaries of Defense and of the Interior.

Repeals the National Critical Materials Act of 1984.

- **Rep. Henry C. "Hank" Johnson, Jr**—H.R.1314, *RARE Act of 2011,* introduced April 1, 2011:

Directs the Secretary of the Interior, through the Director of the USGS, to submit a comprehensive report on global rare earth element resources and the potential future global supply of such resources.

Requires the report to include recommendations on areas of need for future geologic research related to rare earth elements and other minerals that are critical based on the impact of a potential supply restriction and the likelihood of one.

- **Rep. Mike Coffman**—H.R.1388, *Rare Earths Supply Chain Technology and Resources Transformation Act of 2011,* introduced April 6, 2011:

Establishes in the Department of the Interior a task force which shall report to the President through the Secretary of the Interior. The task force will be composed of Secretaries or their designees from the following agencies: Interior, Energy, Agriculture, Defense, Commerce, State, OMB, the Chairman (or designee) of the Council on Environmental Quality, and other members the Secretary of Interior considers appropriate.

The Task Force will review and report on ways for federal agencies to expedite the permitting process and reduce barriers to investment and development of the domestic rare earth industry. The Task Force shall then submit this report to the President, the Senate Committee on Energy and Natural Resources, the House Committee on Energy and Commerce, and the House Committee on Natural Resources.

Using funds from the sale of excess materials in the National Defense Stockpile, the President, acting through the Secretary of Defense, shall establish a neodymium iron boron magnet alloy and dysprosium iron alloy inventory to be managed by the Administrator of the Defense Logistics Agency Strategic Materials. The Secretary of Defense shall encourage domestic neodymium iron boron magnet manufacturing capability by seeking to enter into a long-term supply contract with such producer of such magnets and ensure that a sintered neodymium iron boron magnet producer who is awarded any such long-term contract establishes manufacturing capability for only military-use magnets for sale to the National Defense Stockpile.

- **Rep. Doug Lamborn**—H.R.2011, *National Strategic and Critical Minerals Policy Act of 2011,* introduced May 26, 2011:

Directs the Secretary of the Interior to coordinate a government wide assessment of the Nation's mineral resources and availability to meet current and future strategic and critical mineral needs.

Requires the Secretary of the Interior to evaluate factors impacting domestic mineral development, including workforce, access, permitting and duplicative regulatory requirements as well as identify areas for improvement.

Directs the Interior Department to assemble the report within six months.

Requires an annual progress report, beginning one year after the date of enactment of the Act for the following two years, outlining the progress made in reaching the policy goals described in the bill.

- **Rep. Randy Hultgren**—H.R. 2090, to improve assessments of and research about energy critical elements, and for other purposes, introduced June 2, 2011:

Instructs the Secretary of the Interior and Secretary of Energy (acting through the Energy Information Administration) to improve assessments of energy critical elements that covers discovered and potential resources, production, use, trade, disposal and recycling. This entity will be designated a "principal statistical agency" and will make this information available to the public.

Directs the Secretary of Energy in coordination with the Secretary of Interior to establish a research program to advance basic research and enable expanded availability of energy critical elements. Requires the National Science and Technology Council to submit a report to the Science committee on the status of these endeavors.

SENATE BILLS

- **Sen. Mark Udall**—S.383, *Critical Minerals and Materials Promotion Act of 2011,* introduced February 17, 2011:

Directs the Secretary of the Interior, acting through the USGS, to establish a research and development program to:

1. provide data and scientific analyses for research on, and assessments of the potential for, undiscovered and discovered resources of critical minerals and materials in the United States and other countries;

2. analyze and assess current and future critical minerals and materials supply chains; and (3) cooperate with international partners to ensure that the research and assessment programs provide analyses of the global supply chain of critical minerals and materials.

Directs the Secretary of Energy to conduct a research, development, and demonstration program to strengthen the domestic critical minerals and materials supply chain for clean energy technologies, and to ensure the long-term, secure, and sustainable supply of critical minerals and materials sufficient to strengthen the national security and meet the clean energy production needs of the United States.

Directs the Secretary of Energy to promote the development of the critical minerals and materials industry workforce in the United States by supporting:

1. critical minerals and materials education by providing undergraduate and graduate scholarships and fellowships at institutions of higher education, including technical and community colleges;
2. partnerships between industry and institutions of higher education, including technical and community colleges, to provide onsite job training; and
3. development of courses and curricula on critical minerals and materials.

Expresses the policy of the United States to promote an adequate and stable supply of critical minerals and materials necessary to maintain national security, economic well-being, and industrial production with appropriate attention to a long-term balance between resource production, energy use, a healthy environment, natural resources conservation, and social needs. Directs the President take specified steps to implement such policy.

- **Sen. Kay Hagan**—S.421, *Powering America's Lithium Production Act of 2011,* introduced February 28, 2011:

Amends the Energy Independence and Security Act of 2007 to require the Secretary of Energy (DOE) to provide grants to eligible entities for research, development, demonstration, and commercial application of domestic industrial processes that are designed to enhance domestic lithium production for use in advanced battery technologies.

Defines an "eligible entity" as:

1. a private partnership or other entity that is organized in accordance with federal law and engaged in lithium production for use in advanced battery technologies;
2. a public entity, such as a state, tribal, or local governmental entity; or
1. a consortium of such entities.

Requires such eligible entities to use such grants to develop or enhance:

1. domestic industrial processes that increase lithium production, processing, or recycling for use in advanced lithium batteries; or
1. industrial process associated with new formulations of lithium feedstock for use in such batteries.

- **Sen. Lisa Murkowski**—S.1113, *Critical Minerals Policy Act,* introduced May 26, 2011:

The bill provides clear programmatic direction to help keep the U.S. competitive and will ensure that the federal government's mineral policies—some of which have not been updated since the 1980s—are brought into the 21st century.

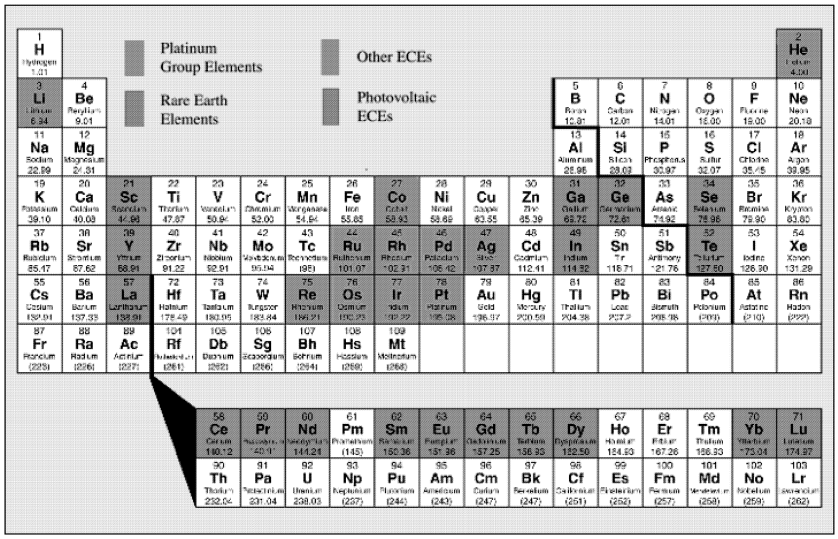
The legislation starts by directing USGS to establish a list of minerals critical to the U.S. economy and, pursuant to those designations, outlines a comprehensive set of policies that will bolster critical mineral production, expand manufacturing, and promote recycling and alternatives—all while maintaining strong environmental protections.

To avoid the duplication of authorities related to critical minerals, two previous Acts of Congress are repealed, in whole or in part: the National Critical Minerals Act of 1984 and the National Materials and Minerals Policy, Research, and Development Act of 1980.

A savings clause to clarify that nothing in this Act displaces the authorizations included under "Geological Survey" of the first section of the Organic Act of March 3, 1879.

Authorizes a total of $106 million for the various activities, programs, authorizations, and requirements of the Act.

APPENDIX 2 [36]



Possible Energy-Critical Elements (ECEs) are highlighted on the periodic table. The rare earth elements (REEs) include lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Tb), and lutetium (Lu). The closely related elements scandium (Sc) and yttrium (Y) are often included as well. The REEs are considered as a family, although Pm is unstable, and Ho, Er, and Tm have no energy-critical uses at present and are omitted from our list. Y together with the Tb—Lu form the heavy rare earth elements (HREE), and Sc plus Ce—Gd constitute the light rare earths (LREE). The platinum group elements (PGEs) include ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), and platinum (Pt). Additional ECE candidates include gallium (Ga), germanium (Ge), selenium (Se), indium (In), and tellurium (Te), all semiconductors with applications in photovoltaics. Cobalt (Co), helium (He), lithium (Li), rhenium (Re) and silver (Ag) round out the list.

[36] APS/MRS Report, *supra,* note 1

APPENDIX 3 [37]

Rare Earth Elements (Lanthanides)
Selected End Uses

Light Rare Earths (more abundant)	**Major End Use**	**Heavy Rare Earth (less abundant)**	**Major End Use**
Lanthanum	hybrid engines, metal alloys	***Terbium***	phosphors, permanent magnets
Cerium	auto catalyst, petroleum refining metal alloys	***Dysprosium***	permanent magnets, hybrid engines
Praseodymium	magnets	***Erbium***	phosphors
Neodymium	auto catalyst, petroleum refining, hard drives in laptops, headphones, hybrid engines	***Yttrium***	red color, fluorescent lamps, ceramics, metal alloy agent
Samarium	magnets	***Holmium***	glass coloring, lasers
Europium	red color for television and computer screens	***Thulium***	medical x-ray units
Gadolinium	magnets	***Lutetium***	catalysts in petroleum refining
		Ytterbium	lasers, steel alloys

[37] Humphries/CRS Report, supra, note 16

APPENDIX 4

Rare Earth Elements and Critical Material Funding

Department of Energy

The following information is from Chapter 4 of DOE's 2010 "Critical Materials Strategy" report:

Several U.S. Department of Energy (DOE) data and information programs, research and development (R&D) programs and financial instruments address rare earths and other key materials. Current programs focus on the component and end-use technology stages of the supply chain and address both the economic and the innovation dimensions of the clean energy sector.

DOE also supports R&D addressing specific materials and alternatives across the supply chain. In Fiscal Year (FY) 2010, the Office of Science, the Office of Energy Efficiency and Renewable Energy (EERE) and the Advanced Research Projects Agency-Energy (ARPA–E) together provided approximately $15 million for research on rare earth materials and possible substitutes for magnets. An additional $35 million was spent by ARPA–E on next generation battery technologies that don't require rare earths.

At the basic science end of the pipeline, the Materials Sciences and Engineering (MSE) Division of the Office of Basic Energy Sciences supports broad-based, fundamental materials research. MSE seeks to illuminate the atomic basis of materials properties and behavior and improve materials performance at acceptable costs through innovative design, synthesis and processing. This research was funded at a level of about $5 million/year in FY 2010.

Most of the supported work has been performed at Ames Laboratory. A key component of the Ames Laboratory program is the Materials Preparation Center (MPC). The MPC was established in 1981 to provide high purity metals (including the rare earths, uranium, thorium, vanadium, chromium); and intermetallics, refractory, inorganic compounds and specialty alloys; none of which are available commercially in the required purity or form/shape needed by the requestor on a cost recovery basis.

Moving along the pipeline to applied research via feasibility research, technology development and demonstration, ARPA–E supports two initial projects totaling $6.6 million specifically targeted to developing substitutes for rare earth magnets. The goal of this $4.4 million project is to develop materials to allow the United States to fabricate the next generation of permanent magnets (PMs) with magnetic energy density (maximum energy product) up to two times higher than the current value of the strongest commercially available neodymium-iron-boron (Nd-Fe-B) magnets. If successful, this project will lead to cheaper, more energy-efficient, more power-dense magnets for deployment in a wide range of clean energy technologies.

In another ARPA–E project, General Electric Global Research (GE) is developing next-generation permanent magnets with a lower content of critical rare earth materials. For the $2.2 million project, GE is developing bulk nanostructured magnetic materials with a dramatic increase in performance relative to state-of-the-art magnets. These new magnets will increase the efficiency and power density of electric machines while decreasing dependence on rare earth minerals.

Addressing the challenge of rare-earth and critical-materials-containing batteries, particularly in the emerging hybrid and electric vehicle transportation sectors, the Batteries for Electric Energy Storage in Transportation (BEEST) program invested $35 million in first-of-kind demonstration of new batteries and storage chemistries, structures and technologies.

The Office of Energy Efficiency and Renewable Energy (EERE) is supporting an applied magnet research project valued at $2 million (FY 2010) at Ames Laboratory. This project is focused on fabricating high-performance, cost-effective PMs that can be used for traction motors with an internal PM rotor design.

In addition to the magnet material research, EERE's Vehicle Technologies Program supports two projects valued at a total of $1.4 million (FY2010) at Oak Ridge National Laboratory investigating alternative motor designs that do not use rare earth PMs.

In addition, in 2009, the Vehicle Technologies Program awarded $9.5 million to Toxco, to expand an existing battery recycling facility in Ohio and become the first U.S. facility to recycle lithium-ion vehicle batteries.

For wind power applications, reducing magnet size by developing higher flux density magnets is more important than consistent properties at elevated temperatures. EERE's Wind and Water Technologies Program is supporting QM Power, Inc., with to develop a higher flux density PM generator. There are also much larger investments within EERE in battery, PV and lighting R&D that have key materials use implications.

The Loan Guarantee Program (LGP) was established under Title XVII of the Energy Policy Act (EPAct) of 2005. The LGP is authorized to provide loan guarantees to support domestic manufacturing of component technologies that use critical materials if those technologies meet the statutory tests. Projects supported by the program have the potential to affect market demand for key materials.

The Advanced Technology Vehicles Manufacturing (ATVM) Loan Program provides loans to automobile and automobile part manufacturers to re-equip, expand or establish manufacturing facilities in the United States to produce advanced technology vehicles or qualified components, and for the associated engineering integration costs. Vehicles with efficiency standards that will contribute to a clean energy economy are included in the definition of advanced technology vehicles. The ATVM lacks authority to directly support extraction and production of key materials. However, the ATVM issued loans to companies for projects that may affect the market demand of nickel metal hydride (NiMH) or Lithium ion batteries and NdFeB permanent magnet motors. These companies include Ford Motor Company ($5.9 billion), Nissan North America ($1.6 billion), Tesla Motors ($465 million) and Fisker Automotive ($529 million). [38]

Since this report was published, there have been two notable additions according to DOE congressional affairs staff:

- ARPA–E issued a $30 million funding announcement for projects on rare earth alternatives in green technologies being funded out of the FY 2011 appropriations; and
- A $20 million request to create a critical materials innovation hub in the FY 2012 appropriations request.

US Geological Survey

According to USGS congressional liaison office, USGS' FY 2012 request of $44.2 million for its Mineral Resources Program represents "about an 18 percent reduction from the FY 2010 enacted level of $53.8 million. As a result, [USGS] will eliminate collection, analysis, and dissemination of minerals information for about 180 other countries; domestic minerals information activities will continue. This is the information that goes into the Mineral Commodity Summaries and Volume III–Area Report: International, of the Minerals Yearbook. In addition, [USGS] will eliminate mineral resources research and field studies in Alaska and will eliminate about 50 scientific and technical positions [out of a total of about 350] across the United States."

[38] DOE Report, *supra,* note 24

Mr. HULTGREN. The Subcommittee on Investigations and Oversight will come to order. Good afternoon. Welcome to today's hearing titled "The Federal Perspective on a National Critical Materials Strategy." Chairman Broun is unable to attend due to a family emergency, so I am sitting in for him today. You will find in front of you packets containing our witness panel's written testimony, biographies, and Truth-in-Testimony disclosure.

I recognize myself for five minutes for an opening statement.

The subject of today's hearing is one which this Subcommittee is very familiar with. A little over a year ago, under the then-Democratic majority, the Investigations and Oversight Subcommittee held a hearing on rare earth minerals. Rare earths, as most of you know, possess unique physical and chemical properties that make them particularly suitable for use in advanced technologies such as high-powered magnets, petroleum refining catalysts, batteries, and lasers, among others. They are also important components in everyday items that everyone in this room probably has right now, such as cell phones and Blackberrys.

This Committee did some very good work last year as we heard from industry folks, academics, and scientists. Today, we follow up on that work and take the next step in this process by hearing from government officials.

I am pleased to welcome our distinguished guests. While they represent different agencies within the Administration, they are here today because of their collaboration on an interagency working group on critical and strategic materials supply chains.

Critical materials include rare earth elements which are more widely recognized today than they were when this Committee last addressed this topic. That the issue is still of interest to Congress is evident by the number and variety of bills introduced in both the House and the Senate. I myself recently introduced H.R. 2090, the Energy Critical Elements Advancement Act, and Mr. Miller from the Democratic side has a bill also.

In 1980, the National Materials and Minerals Policy, Research and Development Act was enacted because the United States lacked a coherent national materials policy and a coordinated program to assure the availability of materials critical for our national economic well being, national defense, and industrial production, including interstate commerce and foreign trade. Thirty-one years later, this Committee is presented with similar issues and, to quote Yogi Berra, "it's deja vu all over again."

Our witnesses today will provide us with some insight into the Administration's perspective on critical materials. Dr. Holdren will discuss the activities of the interagency working group that was created last year. Mr. Sandalow and Mr. Doebrich will discuss their respective agencies' involvement in the group, as well as provide us with an overview of their agencies' responsibilities relative to the topic of this hearing.

Taking it a step further, I look forward to some honest conversations about appropriate roles that should and shouldn't be played by the Federal Government. While I appreciate the need for federal research, I believe we should distinguish between basic and applied research, recognizing that the government may have a role to play

in the former, but that it should not duplicate nor preempt work that is rightfully done by industries.

For about 2 decades, the price of rare earths and critical materials were low, perhaps artificially so, because of Chinese policies. As a result of these policies and our own stringent rules regarding environmental standards, U.S. suppliers were unable to compete. Now that the Chinese have restricted exports, prices have gone up because non-Chinese suppliers have all but vanished. These policies have led to various international trade protests that remain unresolved.

Conversely, there are those who say that we shouldn't fret over these conditions because the financial markets will ultimately correct the situation. The expansion of Lynas Corporation in Australia and the growth of Molycorp in the United States provide hope that alternatives to Chinese rare earths will be available shortly. In the interim, though, we still need a plan, one that should assess issues such as stockpiling, permitting, researching and development, workforce development, recycling, information gathering, and manufacturing and production incentives. I look forward to exploring these options and hearing from our government witnesses today.

The Chair now recognizes Ms. Edwards for an opening statement.

[The prepared statement of Representative Hultgren follows:]

PREPARED STATEMENT ACTING CHAIRMAN RANDY HULTGREN

The subject of today's hearing is one which this Subcommittee is very familiar with. A little over a year ago, under the then-Democratic Majority, the Investigations and Oversight Subcommittee held a hearing on rare earth minerals. Rare earths, as most of you know, possess unique physical and chemical properties that make them particularly suitable for use in advanced technologies, such as high powered magnets, petroleum refining catalysts, batteries, and lasers, among others. They are also important components in everyday items that everyone in this room probably has right now, such as cell phones and blackberries.

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For about two decades, the price of rare earths and critical materials were low, perhaps artificially so, because of Chinese policies. As a result of these policies, and our own stringent rules regarding environmental standards, U.S. suppliers were unable to compete. Now that the Chinese have restricted exports, prices have gone up because non-Chinese suppliers have all but vanished. These policies have led to various international trade protests that remain unresolved.

Conversely, there are those who say that we shouldn't fret over these conditions because the financial markets will ultimately correct the situation. The expansion of Lynas Corporation in Australia, and the growth of Molycorp in the United States, provides hope that alternatives to Chinese rare earths will be available shortly.

In the interim though, we still need a plan, one that should assess issues such as: stockpiling, permitting, research and development, workforce development, recycling, information gathering, and manufacturing and production incentives. I look forward to exploring these options, and hearing from our government witnesses today.

I now turn to the Ranking Member from Maryland.

Ms. EDWARDS. Thank you, Mr. Chairman. And thank you in advance to our witnesses today. I want to thank the Chairman for taking up this important issue. And I also want to acknowledge the work of the former Chairman of the Subcommittee, Mr. Miller, who held the first hearing on this matter for the Committee and who also worked with his then-vice chair, Kathy Dahlkemper from Pennsylvania, to craft legislation designed to help address the shortage of rare earth elements.

Rare earths are just one class of materials that are crucial to our economy and our national security. This Committee has a 30-year-long history of trying to establish an ongoing institutionalized focus on potential shortages of such materials, but at different times, both Republican and Democratic administrations have let this matter slip off the table. That said, I congratulate the Obama Administration for grasping the challenge of critical materials and organizing to develop a coherent set of policies. I am very pleased to see Dr. Holdren here today to talk about those efforts.

The public focus on shortages is largely on rare earth elements, but tomorrow, the challenge may indeed be scarce isotopes or metals or minerals. I think we need to recognize that government should have an ongoing capacity to work to identify potential shortages and adopt policies designed to avoid or diminish the disruptions that come with shortages. Some argue that rare earth element—that the rare earth element story will end up validating the power of markets to address demand. It is true that there are aggressive efforts underway in Malaysia, the United States, and other places to develop rare earth extraction capacity. However, even if those efforts prove fruitful, the reality is that China's aggressive use of access to their rare earth reserves will have succeeded in moving manufacturing facilities and jobs to China. Once there, those facilities are highly unlikely to move away.

Further, there is nothing to keep China from reversing its rare earth policies if they face competitors. At the moment, China has cut export quotas to create incentives for farms to move there and to capture exorbitant profits from those reserves they do export. There is nothing to stop the Chinese Government from reversing course in the future and flooding markets with rare earths to drive their competition out of business. And when faced with a state-con-

trolled economy the size of China's, we cannot assume that markets alone can solve our problems.

I want to warn that those who blame our loss of mining and rare earths on environmental regulations that they are overlooking the reality that the key lever the Chinese use to win a virtual global monopoly in mining in the first place was cutthroat pricing. That said, rare earth mining and processing has proven to be a very dirty business in the past with pollution, including radioactive waste, a trademark of this industry. I expected our work to develop a domestic industry that will not ignore the real dangers inherent in earth mining and process and that we will see Molycorp and others set a global standard for environmental compliance and safety.

I look forward to the testimony today and hope that this marks the beginning of an ongoing dialogue about how to protect our jobs, our economy, and our national security for unfair trade practices and resource scarcities.

I would like to yield my remaining time to my distinguished colleague, Mr. Miller of North Carolina.

[The prepared statement of Ms. Edwards follows:]

PREPARED STATEMENT OF RANKING MEMBER DONNA F. EDWARDS

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The public focus on shortages is largely on rare earth elements, but tomorrow the challenge may be scarce isotopes or metals or minerals. I think we need to recognize that the government should have an on-going capacity to work to identify potential shortages and adopt policies designed to avoid or diminish the disruptions that come with shortages.

Some argue that the rare earth element story will end up validating the power of markets to address demand. It is true that there are aggressive efforts underway in Malaysia, the United States and other places to develop rare earth extraction capacity.

However, even if those efforts prove fruitful, the reality is that China's aggressive use of access to their rare earths reserves will have succeeded in moving manufacturing facilities and jobs to China. Once there, those facilities are unlikely to move away. Further, there is nothing to keep China from reversing its rare earth policies if they face competitors.

At the moment, China has cut export quotas to create incentives for firms to move there and to capture exorbitant profits from those reserves they do export. There is nothing to stop the Chinese government from reversing course in the future and flooding markets with rare earths to drive their competition out of business.

When faced with a state-controlled economy the size of China's, we cannot assume that markets alone can solve our problems. I want to warn that those who blame our loss of mining in rare earths on environmental regulations that they are overlooking the reality that the key lever the Chinese used to win a virtual global monopoly in mining in the first place was cut-throat pricing.

That said, rare earth mining and processing has proven to be a very dirty business in the past, with pollution-including radioactive wastes-a trademark of this industry. I expect that our work to develop a domestic industry will not ignore the real dangers inherent in rare earth mining and process and that we will see

Molycorp, and others, set a global standard for environmental compliance and safety.

I look forward to the testimony today and hope that this marks the beginning of an ongoing dialogue about how to protect our jobs, our economy and our national security from unfair trade policies and resource scarcities.

I would like to yield my remaining time to my distinguished colleague, Mr. Miller of North Carolina.

Mr. MILLER. Thank you, Ms. Edwards.

Ensuring reliable and stable supply of energy-critical elements is obviously vital to our national security and our economic interest, and this has been an issue of interest to me for some time. As both Ms. Edwards and Mr. Hultgren have said, I chaired a Committee hearing—a Subcommittee hearing on this a year ago. As a result of that hearing, this Subcommittee did develop legislation. Our Democratic staff did great work. Ms. Dahlkemper, who was the vice chair of the Committee introduced the legislation, and I have introduced that—very similar legislation again that is based upon the work of the Subcommittee last year.

But that really was not the first legislation of this kind. We are not new to this issue. We recognize the importance of critical materials in the '80s and past National Materials and Minerals Policy, Research and Development Act. I say "we"—I mean Congress, but obviously I was not here then. But Executive Branch efforts really have been nonexistent for almost two decades now. It is time that we do start focusing on the issue. We cannot allow ourselves to lose the competitive advantage that we have had in the past or have those materials—access to those materials used to leverage other economic advantages. And I look forward to working with the Office of Science and Technology Policy, the Department of Energy, and I am glad that they are paying attention to this issue as well.

Thank you very much.

Mr. HULTGREN. Thank you, Ms. Edwards and Mr. Miller. If there are members who wish to submit additional opening statements, your statements will be added to the record at this point.

At this time, I would like to introduce our panel of witnesses: first, Dr. John Holdren, Director of the Office of Science and Technology Policy; next, Mr. David Sandalow is the Assistant Secretary for Policy and International Affairs at the U.S. Department of Energy; and Mr. Jeff Doebrich is the Acting Program Coordinator for the Mineral Resources Program at the U.S. Geological Survey. Thank you all for being here.

As our witnesses should know, spoken testimony is limited to five minutes each, after which the members of the Committee will have five minutes each to ask questions. Your written testimony will be included in the record of the hearing.

It is the practice of the Subcommittee on Investigations and Oversight to receive testimony under oath. Do any of you have any objection to taking an oath? Let the record reflect that all witnesses were willing to take an oath.

You may also be represented by counsel. Do any of you have counsel here with you today? Let the record reflect that none of the witnesses have counsel.

If all of you would now please stand and raise your right hand.

Do you solemnly swear or affirm to tell the whole truth and nothing but the truth, so help you, God?

Let the record reflect that all the witnesses participating have taken the oath. Thank you very much. You may be seated.

I now recognize our first witness, Dr. Holdren. Thank you.

STATEMENT OF DR. JOHN P. HOLDREN, DIRECTOR, OFFICE OF SCIENCE & TECHNOLOGY POLICY, EXECUTIVE OFFICE OF THE PRESIDENT OF THE UNITED STATES

Dr. HOLDREN. Well, Chairman Hultgren, Ranking Member Edwards, members of the Subcommittee, I want to start by thanking you for the opportunity to testify today on administration policies and interagency efforts for addressing the issues that surround the production and use of critical materials.

There is, as you have already mentioned, a number of you, a long history of concerns about the availability of critical materials, which we call that because their supply is highly concentrated in either one country or in a few corporate entities, and because they are used in the production of goods that are important economically or for national security.

The Executive Office of the President in this Administration has been focused on this issue for well over a year—since March 2010, in fact. The Office of Science and Technology Policy in close coordination with the National Economic Council, the U.S. Trade Representative, and the National Security Council has been convening—as you mentioned, Mr. Chairman—an interagency working group to develop the necessary understanding of the critical materials situation and to focus Administration thinking and resources on risk mitigation.

Four points have emerged from that process as key to understanding the overall situation. The first one is that concentrated production does not necessarily mean the reserves are equally concentrated. China currently accounts for about 95 percent of world production of the rare earth elements but is host to only a third to a half of the known reserves. In situations of that kind, market forces will work over the long term to mitigate risks as other suppliers come into the market to take advantage of higher prices and new demand.

Second point is that market size does not necessarily predict disruptive potential. For example, the U.S. market for raw oxide forms of rare earths is small. It is only about $170 million a year or about 1/1000 of a percent of U.S. GDP. But these rare earths serve as vital ingredients in many advanced technologies in the commercial and defense domains, including the emerging clean energy sector, which are worth much more.

Third, the risks of supply disruptions depend on what form of the material is deemed critical: raw minerals, metals, alloys, components, or finished goods. For any given material, a detailed analysis of the entire supply chain is necessary in order to identify where the vulnerabilities are and to identify effective mitigation measures.

Fourth, in the short term, the Administration can use trade relations and diplomacy to foster the diversification of supply of critical materials, as well as taking steps to facilitate domestic production. In the long term, the greatest opportunities to reduce the risks as-

sociated with critical materials are through investments in research and innovation.

In the rest of my time, I want to elaborate on some agency and interagency activities that are currently underway and contemplated to address those issues. First of all, it is important to identify proactively and continuously which materials are critical based on an agreed-upon set of criteria. A number of departments, agencies, and outside entities, including the National Academy of Sciences, have been and are conducting such analyses and developing frameworks that will ultimately allow us to anticipate material shortfalls before they actually happen in the market.

Second, given the growing interdependence among countries supplying and using these resources, a shared and accurate understanding of global raw material flows, location of resources, and material demand is essential. The OSTP convened interagency process is investigating the best ways to accomplish that.

Third, USTR is closely examining China's policies, restricting exports of raw materials including rare earths, and continues to press China to remove those restrictions both through bilateral dialogues and through international venues.

Fourth, and for the longer term, the Administration proposes to initiate additional research activity on critical materials issues. The President's fiscal year 2012 budget includes $20 million for a DOE innovation hub in that domain, and I suspect that Assistant Secretary Sandalow will describe that hub and other relevant DOE R&D activities in more detail.

In closing, let me emphasize that the Obama Administration is taking the topic of critical materials and their supply chains very seriously indeed. Federal agency efforts are being coordinated through the White House-led interagency process as I mentioned. We remain in close communication with the scientific, technical, and business communities, and certainly we look forward to working with this Subcommittee, with the full Committee, and with other Members of Congress to improve our national capabilities in this domain.

I will be happy to try to answer any questions you have. Thank you.

[The prepared statement of Dr. Holdren follows:]

PREPARED STATEMENT OF DR. JOHN P. HOLDREN, DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY, EXECUTIVE OFFICE OF THE PRESIDENT OF THE UNITED STATES

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.

Identifying critical materials based on agreed criteria

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. In its 2010 Critical Materials Strategy, the Department of Energy (DOE) developed a methodology for assessing energy-critical materials. 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. In support of this effort, the USGS recently completed a DOD-funded inventory of known domestic rare-earth reserves and resources. 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 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 de-

veloped 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.

Mr. HULTGREN. Thank you, Dr. Holdren. Thank you for being here.

I now recognize our next witness, Mr. Sandalow. Thank you.

STATEMENT OF MR. DAVID SANDALOW, ASSISTANT SECRETARY FOR POLICY AND INTERNATIONAL AFFAIRS, U.S. DEPARTMENT OF ENERGY

Mr. SANDALOW. Thank you, Mr. Chairman, Ranking Member Edwards, and members of the Subcommittee. I join Director Holdren in thanking you for holding a hearing on this important topic today.

Earlier this year, I visited the Mountain Pass Mine in Southern California. I was impressed by the facility and its potential to provide a domestic source of rare earth metals. According to the facility's owners, the mine will produce at an annual rate of about 19,000 tons of rare earth by the end of 2012 and 40,000 rare earth—tons of rare earth by the end of 2014 and doing that using modern technologies at a globally competitive cost. Now, that is an important step in the right direction.

The issue of critical materials is important and needs priority attention in the months and years ahead. At the Department of Energy, we share the goal of establishing a stable, sustainable, and domestic supply of critical minerals, and we look forward to working with the Congress on this issue as we move forward.

Members of the Committee, the world is on a cusp of a clean energy revolution. Here in the United States, we are making historic investments in clean energy. The American Recovery Act was the largest one-time investment in clean energy in our Nation's history. At DOE, we are investing $35 billion in Recovery Act funds in electric vehicles, batteries, and advanced energy storage, a smarter and more reliable electric grid, wind and solar technologies, among many other areas.

Now, other countries are also seizing this opportunity. For example, the Chinese Government is launching a program to deploy electric cars in over 25 major cities while building huge wind farms, ultra-supercritical advanced coal plants, ultra high voltage long-distance transmission lines and more. India has launched an ambitious national solar mission, and in Europe, strong public policies are driving sustained investments in clean energy.

In recognition of the importance of certain materials in the transition to clean energy, DOE is working to address the use of critical materials in clean energy components in products and processes. As a first step, last year we released a critical materials strategy, the first of its kind ever released by the Department of Energy. The report found that four clean energy technologies—wind turbines, electric vehicles, photovoltaic cells, and fluorescent lighting—use materials at risk of supply disruptions in the next five years. In the

report, five rare earth elements—dysprosium, neodymium, terbium, europium, and yttrium, as well as indium—were assessed as the most critical in the short term. For this purpose, criticality was a measure that combined the importance of the clean energy economy and the risk of supply disruption.

Our critical materials strategy highlighted three pillars to address the challenges associated with these materials in the clean energy economy. First, substitutes must be developed. Second, recycling, reuse, and more efficient use can significantly lower global demand for newly-extracted materials. And finally, diversified global supply chains are essential. That means encouraging other nations to expedite alternative supplies and exploring other potential sources of materials, in addition to facilitating environmentally sound extraction and processing right here in the United States because domestic production is the most secure. With all three of these approaches, we must consider all stages of the supply chain from sound material extraction to purification and processing to manufacture of chemicals and components and ultimately to end uses.

This year, DOE is updating our analysis. We have in recent months sent out to the public a request for information and, in the process, received back over 500 pages of information from over 30 respondents with a variety of information on multiple topics. One lesson we have learned through this 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.

We must be smart and serious as we plan for a growing global demand for products that contain critical minerals. With focused attention, working together we can meet these challenges. Thank you.

[The prepared statement of Mr. Sandalow follows:]

PREPARED STATEMENT OF DAVID SANDALOW, ASSISTANT SECRETARY OF ENERGY FOR POLICY AND INTERNATIONAL AFFAIRS, U.S. DEPARTMENT OF ENERGY

Chairman Broun, Ranking Member Edwards, and Members of the Subcommittee, thank you for the opportunity to testify today about the Federal perspective on a national critical materials strategy and the Department of Energy's ongoing work on this topic.

Earlier this year I visited the Mountain Pass Mine in southern California. I was impressed by the facility and its potential to provide a domestic source of rare earth metals. According to the owners, the mine will produce at an annual rate of about 19,000 tons of rare earths by end of 2012 and 40,000 tons by early 2014, using modern technologies at a globally competitive cost. That's an important step in the right direction.

The issue of critical minerals is important and needs priority attention in the months and years ahead. The Department shares the goal of establishing a stable, sustainable and domestic supply of critical minerals, and we look forward to discussions with the Congress on ways to address this issue as we move forward.

GLOBAL CLEAN ENERGY ECONOMY

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 are working to deploy hundreds of thousands of elec-

tric vehicles and charging infrastructure to power them, weatherize at least half a million homes, and help modernize our grid.

Other countries are also seizing this opportunity, and the market for clean energy technologies is growing rapidly all over the world. For example, the Chinese government is launching programs to deploy electric cars in over 25 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 earns more than $4 billion each year in the wind turbine 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 in 2009. Around the world, investments in clean energy technologies are growing, helping create jobs, promote economic growth and fight climate pillar of global economic growth.

DOE STRATEGY

In recognition of the importance of certain materials in the transition to clean energy, DOE has begun to address the use of critical materials in clean energy components, products and processes. As a first step, DOE released its Critical Materials Strategy last December. The report found that four clean energy technologies-wind turbines, electric vehicles, photovoltaic cells and fluorescent lighting-use materials at risk of supply disruptions in the next five years. In the report, five rare earth elements (dysprosium, neodymium, terbium, europium and yttrium), as well as indium, were assessed as most critical in the short term. For this purpose, "criticality" was a measure that combined importance to the clean energy economy and the risk of supply disruption.

The Critical Materials Strategy highlighted three pillars to address the challenges associated with critical materials in the clean energy economy. First, substitutes must be developed. Research and entrepreneurial activity leading to material and technology substitutes improves flexibility to meet the material demands of the clean energy economy. Second, recycling, reuse and more efficient use can significantly lower global demand for newly extracted materials. Research into recycling processes coupled with well-designed policies will help make recycling economically viable over time. Finally, diversified global supply chains are essential. To manage supply risk, multiple sources of material are required. This means encouraging other nations to expedite alternative supplies and exploring other potential sources of material (such as existing mine here in the United States. 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.

Since the Critical Materials Strategy was released last year, DOE's work in this area has ramped up considerably. Earlier in 2011, ARPA–E issued a $30 million Funding Opportunity Announcement (FOA) on Rare Earth Alternatives for magnets in wind turbines and motors. EERE's Vehicle Technology and Wind Programs have also issued relevant FOAs this year. In addition, the President's FY 2012 budget supports a Critical Materials Hub. These activities build on DOE's longstanding expertise on these topics. For example, the Office of Basic Energy Sciences (BES) has funded research at Ames Laboratory on the production of high quality rare earth magnets, magnetic technologies, synthesis technologies and superconductors for a number of years. The Office of Energy Efficiency and Renewable Energy (EERE) has funded several projects at Ames Laboratory and Oak Ridge National Laboratory addressing alternate magnet and motor designs.

This year, DOE will update its analysis in light of rapidly-changing market conditions. DOE is analyzing the use of critical materials in petroleum refineries and other applications not addressed in last year's report. In addition, DOE may identify specific strategies for materials identified as critical, including strategies with respect to substitution, recycling and more efficient use. In support of this year's analysis, DOE issued a Request for Information that focused on critical material content of certain technologies, supply chains, research, education The RFI closed last month. We received nearly 500 pages of responses from 30 organizations, including manufacturers, miners, universities, and national laboratories. Many organizations shared proprietary data on material usage that will help us develop a clearer picture of current and future market conditions.

Within this larger context, we do intend to address domestic production of critical materials in our 2011 report. Production within the United States is important for at least three reasons. First, domestic production is the most secure. Second, the

United States' considerable reserves of some critical materials could add significantly to total global production and to greater diversity in the global supply of these materials. Third, U.S. technology and best practices developed during mine operations can help promote safe and responsible mining in other countries, further contributing to supply diversity and the sustainable development of resources. With regard to mining in the United States, it is important to point out that permits are not the only requirements that can extend the time required to open a mine. The required accumulation of hundreds of millions of dollars of capital for mine development can also lead to delay.

Managing supply chain risks is by no means simple. At DOE, we focus on the research and development angle. From our perspective, we must think broadly about addressing the supply chain in our research and development (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.

The White House Office of Science and Technology Policy has been convening an interagency effort on critical materials and their supply chains. In fact, this group met last week to discuss a number of important developments on these topics.

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 critical minerals. 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.

Mr. HULTGREN. Thank you, Mr. Sandalow.

I now recognize our final witness, Mr. Doebrich.

STATEMENT OF MR. JEFF L. DOEBRICH, ACTING PROGRAM COORDINATOR, MINERAL RESOURCES PROGRAM, U.S. GEOLOGICAL SURVEY, U.S. DEPARTMENT OF THE INTERIOR

Mr. DOEBRICH. Good afternoon and thank you for the opportunity to appear before you today to discuss the role of the USGS in informing decisions regarding a national critical minerals strategy.

The USGS is responsible for conducting research and collecting data on a wide variety of non-fuel and mineral resources. We conduct research to understand the geologic processes that concentrated known mineral resources at specific localities in the earth's crust, and to estimate quantities, qualities, and areas of mineral resources. We collect, analyze, and disseminate data and information on current production and consumption for about 100 mineral commodities both domestically and internationally.

We also conduct research on the interactions of mineral resources with the environment, both natural and as a result of resource extraction to better predict the degree of impact the resource development may have on human and ecosystem health. This full spectrum of mineral resource science allows for comprehensive understanding of the complete lifecycle of mineral resources and mate-

rials: resource formation, discovery, production, consumption, use, recycling, and reuse, and allows for an understanding of environmental issues of concern throughout the lifecycle.

Global demand for critical mineral commodities is on the rise with increasing applications in consumer products, computers, automobiles, aircraft, and other advanced technology products. The USGS has recently completed an inventory of known domestic rare earth reserves and resources. This study reviews current U.S. consumption and imports of rare earths, current knowledge of domestic resources, and possibilities for future domestic production. The report also includes an overview of known global rare earth resources and discusses the reliability of alternative foreign sources.

Though rare earth elements are currently of most concern to many—including the Department of Defense which funded this inventory—it should be noted that in 2010 the United States was 100 percent dependent on foreign suppliers for 18 mineral commodities and more than 50 percent dependent on foreign sources for 43 mineral commodities. The import partners include Brazil, Canada, China, France, Germany, Japan, Mexico, Russia, Venezuela, and many others.

The USGS is a member of the OSTP convened interagency process on critical and strategic mineral supply chains. USGS information on domestic and global mineral production and consumption and expertise in understanding this information are being provided to the interagency group to help inform decision-making and to support the ongoing activities that relate to a national critical mineral strategy.

In particular, the USGS is taking a lead role with other interagency members in the recently-established sub-working group to identify high-priority critical minerals and to establish a methodology and criteria necessary to make those determinations. This work will enable the Federal Government to anticipate material shortfalls before they happen in the market and will be a core competent in establishing a national critical minerals strategy.

The USGS stands ready to fulfill its role as the federal provider of unbiased research on known mineral resources, assessment of undiscovered mineral resources, and information on domestic and global production and consumption of mineral resources for use in global critical mineral supply chain analysis.

Thank you for the opportunity to explain the role of the USGS on this very important topic, and I will be happy to answer any questions.

[The prepared statement of Mr. Doebrich follows:]

PREPARED STATEMENT OF MR. JEFF L. DOEBRICH, PROGRAM COORDINATOR (ACTING), MINERAL RESOURCES PROGRAM, U.S. GEOLOGICAL SURVEY, U.S. DEPARTMENT OF THE INTERIOR

Good afternoon, Mr. Chairman and Members of the Subcommittee. Thank you for the opportunity to appear before you today to discuss the role of the USGS in informing decisions regarding a national critical minerals strategy.

The USGS is responsible for conducting research and collecting data on a wide variety of nonfuel mineral resources. Research is conducted to understand the geologic processes that concentrated known mineral resources at specific localities in the Earth's crust and to estimate (or assess) quantities, qualities, and areas of undiscovered mineral resources, or potential future supply. USGS scientists also conduct research on the interactions of mineral resources with the environment, both

natural and as a result of resource extraction, to better predict the degree of impact that resource development may have on human and ecosystem health. USGS mineral commodity specialists collect, analyze, and disseminate data and information that document current production and consumption for about 100 mineral commodities, both domestically and internationally for 180 countries. This full spectrum of mineral resource science allows for a comprehensive understanding of the complete life cycle of mineral resources and materials—resource formation, discovery, production, consumption, use, recycling, and reuse—and allows for an understanding of environmental issues of concern throughout the life cycle.

Global demand for critical mineral commodities is on the rise with increasing applications in consumer products, computers, automobiles, aircraft, and other advanced technology products. Much of this demand growth is driven by new technologies that increase energy efficiency and decrease reliance on fossil fuels. To begin the process of understanding potential sources of critical mineral commodities, the USGS has recently completed an inventory of known domestic rare-earth reserves and resources (Long and others, 2010). This study restates basic geologic facts about rare earths relevant to assessing domestic security of supply and reviews current U.S. consumption and imports of rare earths, current knowledge of domestic resources, and possibilities for future domestic production. The report also includes an overview of known global rare-earth resources and discusses the reliability of alternative foreign sources of rare earths.

Though rare earth elements are currently of most concern to many, including the Department of Defense, which funded the inventory, it should be noted that in 2010 the United States was 100 percent dependent on foreign suppliers for 18 mineral commodities and more than 50 percent dependent on foreign sources for 43 mineral commodities. Import partners include Brazil, Canada, China, France, Germany, Japan, Mexico, Russia, and Venezuela. In 2008, a National Research Council committee, funded largely by the USGS, developed a ?criticality matrix? that combines supply risk with importance of use as a first step toward determining which mineral commodities are essential to the Nation's economic and national security (National Research Council, 2008).

The USGS is currently preparing for a national assessment of undiscovered resources which will include an assessment of rare-earth and other critical mineral resources. The recent inventory of known rare-earth resources will be followed by other critical mineral inventories and used as a foundation for the assessment of domestic undiscovered critical mineral resources. The preparation for the assessment involves research and data collection on mineral deposit types that represent the primary sources of minerals to be assessed, research on techniques to assess for resources that are concealed below the earth's surface, and research on techniques to characterize environmental aspects of mineral resources, prior to, during, and subsequent to resource development.

The USGS continuously collects, analyzes, and disseminates data and information on domestic and global rare-earth and other critical mineral reserves and resources, production, consumption, and use. This information is published annually in the USGS Mineral Commodity Summaries (USGS, 2011) and includes a description of current events, trends, and issues related to supply and demand.

The USGS is a member of the OSTP-convened interagency process on critical and strategic mineral supply chains. USGS domestic and global mineral production and consumption information and expertise in understanding this information are being provided to the interagency group to help inform decision-making and support the on-going activities that relate to a national critical minerals strategy. In particular, the USGS is taking a lead role, with other interagency members, in the recently established sub-working group to identify high-priority critical materials and establish the methodology and criteria necessary to make those determinations. This work will enable the Federal government to anticipate material shortfalls before they happen in the market and will be a core component in establishing a national critical minerals strategy.

The USGS stands ready to fulfill its role as the federal provider of unbiased research on known mineral resources, assessment of undiscovered mineral resources, and information on domestic and global production and consumption of mineral resources for use in global critical-mineral supply chain analysis.

Thank you, Mr. Chairman, for the opportunity to explain the role of the USGS on this very important topic. I will be happy to answer any questions you or the other Members may have.

Mr. HULTGREN. I thank the panel for their testimony.

Reminding members of the Committee that Committee rules limit questioning to five minutes. The Chair will at this point open

the round of questions. The Chair recognizes himself for five minutes.

First question, Dr. Holdren, I wonder if you could help me with this, just some understanding on the interagency working group. The interagency working group has met over the—for the last year now. I wonder will it produce any deliverables? And then I also wonder if you can comment on any proposed legislation that may complement or duplicate the efforts of the working group?

Dr. HOLDREN. Sure. I would actually argue that the working group has already produced some deliverables. It will certainly produce more. But its meetings have been working sessions where the agencies is under the direction of the Executive Office of the President are actually doing things and committing to do additional things. Examples include the studies that have already been mentioned by my fellow witnesses, the reports that have come out of the DOE and the USGS, World Trade Organization, litigation from the USTR, the new R&D programs out of DOE, proactive engagement with industry by the Department of Commerce and the Office of the Trade Representative, over a dozen high-level, bilateral meetings between the Department of State and foreign counterparts on these issues. And so we have already been actually generating products, doing things, taking action.

Your question about the legislation, as you know, there are a number of bills, Mr. Chairman, including one of yours. We have not taken a formal position as an Administration on the specific characteristics of these different bills, but there is a lot in them. And again, I would point to yours in particular that we are clearly very much in agreement with. Your bill calls particularly for three focuses. One is on better information, one is on recycling, and one is on research. We agree with all of that. And we are already pursuing all of those avenues.

I would say the additional approaches which we regard as important and clearly warranted are diversification through discussion and encouragement not only with companies in this country but companies located among our friends and allies. And also, really I would add, negotiation, which includes discussions with China in both bilateral and multilateral forums to try to make clear to China that it is actually not in China's interest to restrict trade in these materials.

Mr. HULTGREN. Changing course a little bit, Dr. Holdren, but again asking you a couple questions here if I may. Just specifically, according to press reports, the DOD sees that no rare—there really is no rare earth crisis right now. I wondered if you concur with the DOD's observation? And then following up on that, what is your assessment of the rare earth and critical materials situation in the United States relative to nondefense applications? And should the United States be engaged in stockpiling critical materials for nondefense applications?

Dr. HOLDREN. Just jotting notes so I can remember all three parts of your question. First of all, the DOD assessment, we are actually still awaiting a formal and comprehensive assessment from the Department of Defense, which is due out next month. Earlier statements I think were perhaps incomplete, but I think the basis for them was probably that the quantities required by the Depart-

ment of Defense are relatively small compared to the quantities required in the commercial sector. And I think the Department's assumption is probably that given those small quantities and given the very small fraction they represent of the cost of the systems to which they are important, the Department is assuming it would continue to be able to get what it needs, even if at higher cost, without significant impact on the overall cost of the weapons systems and the programs. But again, I don't want to preempt the appearance of their actual comprehensive study on this, which is due next month.

Your second question was on the overall situation with respect to these materials in the commercial sector. And certainly they are very important. The value added by the use of these materials, even though, as I said, the price of the materials themselves is a relatively modest share of our GDP, the value added is much larger. And their importance to emerging sectors, particularly the clean energy sector that Assistant Secretary Sandalow was talking about is very great. So we really have to be focused on our capacity to maintain access to these materials over time.

When the National Academy conducted its study that came out just three years ago on minerals, critical materials, and the U.S. economy, they developed actually a methodology for defining and quantifying how critical is critical, and they looked actually at 11 minerals and mineral families. And among those, the rare earths were the most critical, exceeded only by platinum and rhodium if you look at the methodology and you look at the results, criticality in terms of importance and in terms of the risk associated with our supply of those materials. That is pretty strong stuff that among all the minerals we import—and again, my colleague from the USGS talked about the fact that we are 100 percent dependent for our supply of 18 minerals and over 50 percent dependent for our supply of 43—out of all of those dependents as rare earths are right there at the top in terms of criticality.

One can talk about some very specific ones. Europium, which has no substitute in red phosphors that are used in our LCD screens and color cathode ray tubes. That stuff is now going for around $2,000 a kilogram. And again, there is no substitute. Erbium, there is no substitute for erbium and its special properties for use in fiber optic cables. It is going for about $1,000 a kilogram.

Other materials, cerium has unique attributes that are used in lens and glass polishing, for example, mirror polishing for telescopes. It is much cheaper than the others but it has such unique attributes that one has to consider it critical. A whole set of them—of the rare earths, neodymium and several others, samarium, gadolinium, and more are essential in permanent magnets, in memory sticks, in DVDs. So when you ask what is the situation in the United States, very important stuff, a lot of it is critical. We have got to be paying attention.

Your last question was about stockpiles. I think stockpiles have a very checkered history. The government investing in stockpiles can be a pipeline by which taxpayer money bids up the price and gets the private industry out of the business of having their own stockpiles. I certainly would have serious reservations about the government investing in stockpiles. The private sector does have

some incentive for stockpiling. It does do some, and that is one of the reasons that our short-term situation is perhaps not as serious as the percentage dependences would indicate.

Mr. HULTGREN. Thank you. I now recognize Ms. Edwards.

Ms. EDWARDS. Thank you, Mr. Chairman, and thank you to the witnesses.

Dr. Holdren, over the last 30 years we have seen the government's commitment to addressing critical materials, both in the Executive Branch and the Congress wax and wane as different specific crises have emerged and receded, and I think one of the key things that we need in place is a structure that is going to remain in place even after you and I have left our current positions to ensure our government is better able to anticipate and supply—anticipate supply problems with critical materials in the future. And so I wonder if you have any specific recommendations on how to accomplish that, and I wonder if you could tell me whether you think Administration policy—either this Administration or past Administration—actually contribute to the lack of industry development? And I would note the closing of the AIMS Information Center in the early part of the last decade and the—you know, the shift at the same time of the industry almost to—well, pretty much to zero. And so I wonder if you could comment on that, Dr. Holdren, and then I will turn to you, Mr. Sandalow.

Dr. HOLDREN. I have to admit, Ranking Member Edwards, that I am not an authority on the history of this industry. It is my impression that the decline of the industry in the United States and basically the transfer of the production—so much of the production of these materials to China was, as you mentioned in your opening statement, largely a matter of economics. The Chinese simply underbid everybody else. They did it in part, I think, by neglecting environmental impacts of the mining of these materials, which are often severe. They are now coming around to recognizing that and starting to try to rectify it. I am very much encouraged myself looking forward by Molycorp's announcements about new technology that they have developed that will enable production in the United States to be both more efficient and much cleaner than production was in the last round. I think this has substantial potential for restoring our own productive capacity. But I don't think it was particularly U.S. policies that caused the decline in this country. Again, I think it was the Chinese underbidding everybody else.

Ms. EDWARDS. Well, let me just turn to Mr. Sandalow because in your statement you mention, one, your visit to Mountain Pass and the importance of what you were seeing there, but at the same time, Molycorp has had a bit of a difficulty in securing a loan guarantee, for example, from the Department. And so that is about Administration policy because how do you begin to stand up an industry that then can thrive on its own and have the capacity to produce in a competitive market when we are not—I mean we can't provide, obviously, the level of support that China can provide because you can do that when you have just got a government that says we are just going to spend here and we are not going to spend anywhere else, and where we also have a regulatory structure in place that I think is actually really important to protecting the public health and the public interest.

So, you know, Mr. Sandalow, can you just tell me, have you given any thoughts to what steps need to be taken to protect our domestic capacity to mine and sell critical materials in the face of the price pressure from the likes of a China?

Mr. SANDALOW. Thank you for the question, Ranking Member Edwards. And there is no question we need a wide range of policy tools in order to be able to develop this industry going forward. The Department of Energy's loan guarantee authority today does not extend to mining operations, and so there are limits in the ability of the Department in this respect.

But what we identified in our strategy was a three-pronged approach, and that includes areas that are particularly in the competence of the U.S. Department of Energy. For us, research and development is particularly central. The Department of Energy is the Nation's leading funder of the physical sciences, and so research and development in substitutes is particularly important, research and development into more efficient use and reuse is particularly important, and then developing a globalized supply chain, including domestic supply is important as well.

Ms. EDWARDS. Let me ask Dr. Holdren because you also mentioned, obviously, our need to develop a more robust manufacturing capacity. We could talk about that across all kinds of lines. But it does seem to me that our manufacturing capacity—21st Century manufacturing capacity is actually tied to our ability to produce the domestic supplies that we need without being held to whatever quotas might be imposed from those who, in fact, are investing in mining of critical materials.

Dr. HOLDREN. I can only agree with that, Ranking Member Edwards, and I think the whole domain of advanced manufacturing is immensely important. The President's Council of Advisors on Science and Technology recently completed a study in that vein. The President has been out there talking about what we need to do to lift our game in advanced manufacturing and restore some real strength to the manufacturing sector in this country. And I agree with you that attending to these matters of critical minerals is going to be an important part of that strategy.

Mr. HULTGREN. Thank you. I now recognize Dr. Bucshon for five minutes.

Mr. BUCSHON. Thank you, Mr. Chairman.

This, again, seems to be another area where our country is dependent on foreign nations for sources of minerals, oil, whatever you want to call it, and it is quite distressing actually. And I think that this is a great hearing to have because we do need a strategy to reverse that, just as we do with our dependence on foreign oil.

The basic question I have is pretty simple. What are the one or two things that we need to do in our country to decrease our dependence on China for these type of minerals going forward? It is pretty simple. I can start with Dr. Holdren and then everyone can comment.

Dr. HOLDREN. Well, Congressman Bucshon, I would just say again that recycling and diversification are two of the most important things we can do early, and diversification includes both the development of sources domestically and the development of sources in friends and allies—Australia, Canada—countries on

which we can really rely not to cut us off. Recycling also has very substantial potential and we need to emphasize it. But over the longer run, research to develop substitutes is going to be crucial.

Mr. SANDALOW. I would—Congressman, thank you for your question and I would echo the thoughtful comments of Director Holdren and just say as well this is an area that government and business can work together and work together well and that a partnership between government and business institutions can only make a difference for our country. I think it is a place where government can do the initial research, some of the R&D, can help to create the knowledge base, and then working together. We are all headed in the same direction I think. This is one where we can really come together to help solve the problem.

Mr. DOEBRICH. Yes, Congressman, particularly with regards to supply risk that we are facing with regards to rare earths, diversifying supply, understanding where our potential future supply may be able to come from, and that is a role USGS can help with in terms of assessments for undiscovered rare earth resources both domestically and internationally.

Mr. BUCSHON. I guess the last time we lost our domestic production was based on economic factors primarily. That is what I am hearing. What prevents economic factors, competitive factors to just keep our companies out of business again in the future, for example, as some people are saying in their testimony, China just floods the market?

Dr. HOLDREN. Well, I would say first of all that the strength of America, American companies, American manufacturing has always been innovation. And we have to, as the President has said, out-innovate our competition. And I think it is going to be innovation that enables us to compete. We have already heard about some of the innovations that Molycorp itself has pursued and achieved. And I think that what one finds is over the long run the strategy of flooding the market with cheap stuff could drive out your competitors doesn't work very well. I think China would pay a very high price for doing that, but we can't, as some other comments have suggested, rely on good sense from that quarter, and therefore, we have to make—take the steps and make the investments we need to make sure that on our own we can do what is necessary and together with our friends and allies to diversify those sources.

Mr. BUCSHON. Mr. Sandalow, any comments on that?

Mr. SANDALOW. I think that is very well said.

Mr. BUCSHON. I yield back. Thank you.

Mr. HULTGREN. Thank you, Doctor.

I now recognize Mr. Miller for five minutes.

Mr. MILLER. Thank you, Mr. Chairman.

Dr. Holdren or Mr. Sandalow, in the past the rare earths research was carried on at the Rare Earth Information Center at the Ames laboratory and DOE is now proposing an energy innovation hub on critical materials. What are the advantages of using a hub or a center to carry out the research?

Mr. SANDALOW. Thank you for the question, Congressman. This is a model that DOE is using now and brings together some of the best minds in a single place to focus on a challenge of especial national importance. And that is a goal with something like a hub.

And with concentrated funding, with funding that will sustain itself over a number of years, bringing together the best minds and creating synergies between different disciplines, we think we can make progress. And this is just a perfect area for doing something exactly like that.

I would say the Ames National Lab, which you point to, has been a historic leader in this area. It has been a leader for, you know, since World War II with extraordinary expertise, and so we want to build on that at the Department of Energy with substantially augmenting what they have already done with substantial new capabilities.

Mr. MILLER. Okay. Is it more or less cost effective to do the research in a hub or a center?

Mr. SANDALOW. Yes, it is more cost effective and more productive, more productive to bring different disciplines together in one place creating synergies and complementarities.

Mr. MILLER. Okay. Again, to any of the panelists, do you think we have the researchers now in the United States who have the skills and the knowledge to carry out the critical materials research that we need done, either in the private sector or in government?

Mr. SANDALOW. In my view, Congressman, we do not. We need concentrated effort in this country to build up the intellectual capital, not just the industrial base in this country—you know, in this area. That means, you know, training chemists with, you know, experts in lanthanide chemistry and a broad range of other disciplines who can make sure that we are innovating in a way that will transform this industry and make a difference for the future.

Dr. HOLDREN. If I may just add to this, I think candor does require that we confess that there is some real financial challenges in this whole domain. You have raised the question—really the question of our science and technology education and training in this country. And we know we have to lift our game in that domain. We have to train more scientists and more engineers. And we train those at every level from our community colleges to our great research universities, and we have some real funding challenges in that domain.

As you know, the President proposed shortly after he came into office that we should be aiming to double the investments in our basic science, our most important basic science agencies, the NSF, the DOE, Office of Science and the NIST laboratories. And that money radiates out into the research universities. And it is going to be a real challenge to do that in the current budget environment. The President has been clear he wants to do it, but obviously we are going to need the help of the Congress to pull that off.

Even—and I will say this because my colleague from the USGS might not want to—the budget of the USGS is an important issue here. The capacity of the USGS to deliver the analysis and the information that we need to identify the most critical areas, to identify the shortfalls potentially before they materialize, it requires that you maintain those capabilities with the USGS and the current USGS budget makes it a great stretch to do that.

Mr. MILLER. Okay. Dr. Holdren, you said that R&D reduces the risk associated with critical material shortages. I think I know

what you mean by that and how that works, but could you elaborate on that some?

Dr. HOLDREN. Sure. One of the things that R&D, particularly in material science, leads to is substitutes. You know, we used to think we were going to rely on copper for all our communication circuits. Now, we rely very heavily on fiber optic cables. That is as a result of research that enabled us to do that. Research will unquestionably lead to better ways—in many cases less expensive ways—to achieve some of the tasks for which we now depend on materials that we have to import.

Mr. MILLER. Okay. I yield back my time.

Mr. HULTGREN. Thank you. I now recognize Dr. Benishek for five minutes.

Mr. BENISHEK. Well, thank you, Mr. Chairman. I thank the gentlemen for coming. It is a pleasure listening to your testimony.

Dr. Holdren, I have a question for you concerning your previous answer. How are you going to convince China it is not in their interest to control the market on these materials? Because I don't see how we can do that nicely.

Dr. HOLDREN. I am not sure we can do it nicely, but there are a couple dimensions. First of all, they might believe it is in their interest to control the market, but if we out-innovate them, they won't be able to. If their only strategy is to try to drive out the competition by flooding the market with very inexpensive material, they are going to lose their shirts.

Mr. BENISHEK. Well, they have done that and they are making money.

Dr. HOLDREN. They have done it from time to time in the past, but I think going forward, if we apply our comparative advantage in innovation, it is going to be harder for them to do it going forward.

Mr. BENISHEK. How is that? They control the market now so how are you going to do that?

Dr. HOLDREN. Well, 20 years ago they didn't control the market; we did. And again, they captured it by underbidding everybody for the time. But their capacity to do that indefinitely is limited because———

Mr. BENISHEK. How is that?

Dr. HOLDREN. —we will out-innovate them.

Mr. BENISHEK. How is that? How do we out-innovate them? We don't have the material.

Dr. HOLDREN. We do have the material. The United States has very substantial reserves of this material.

Mr. BENISHEK. Okay. How do we get that material to market here in this country faster?

Dr. HOLDREN. I think we have been talking about how we do that here. We encourage U.S. corporations to make the investments. We help them———

Mr. BENISHEK. My information here is that it takes———

Dr. HOLDREN. —in research and development and partner———

Mr. BENISHEK. —7 to ten years to get a permit for some of these mines.

Dr. HOLDREN. The question of permitting is one that I would defer to colleagues———

Mr. BENISHEK. But that is the central issue here, though.

Dr. HOLDREN. —about permits, but let me simply say about that I am not sure where the 7 to ten years comes from. I suspect that part of that is hesitation and delay over whether one can compete economically and not actually the inability———

Mr. BENISHEK. No, this is an inability to get a permit. People are willing to do it; they just can't get a permit.

Dr. HOLDREN. Well, no, I hear you, Congressman. I have not looked at these analyses of how it takes ten years. I think if it is taking ten years, that is problematic and we should fix it.

Mr. BENISHEK. All right. Thank you. Mr. Doebrich, what could the Administration do as far as you are concerned about, you know, making it easier for us to develop these resources here at home other than talking the Chinese out of controlling the market?

Mr. DOEBRICH. Well, from a scientific standpoint, just providing better information, understanding what our resources are, where they are, how much there is. I think also beyond the United States, there are known and potentially future supplies as well outside of China. And I think that is an important point to make as well with those who are perhaps a little bit friendlier trading partners.

Mr. BENISHEK. Well, I think part of the problem myself—and I didn't hear any of you address this—was the fact that, you know, the uncertainty in the permitting process, the uncertainty in the regulations that they are going to change from one year to the next as far as, you know, the requirements for the EPA and all that sort of thing, do you think that has had any effect on the ability to raise money and market these big projects?

Mr. DOEBRICH. Again, from a scientific standpoint, I can't comment on that.

Mr. BENISHEK. Dr. Holdren, do have any—Dr. Holdren, do you have any comment on that?

Dr. HOLDREN. Well, I did see a statement the other day that Senator Bingaman offered in which he made the argument that profitability and not permitting had been the real obstacle and it is profitability that we have to work on. But I am prepared to agree with you that we need to simplify the permitting as well. And I would note that this Administration, this President has issued an Executive Order on simplifying regulatory regimes. And a lot of progress has been made on that and more will be made because we understand that unpredictability and regulation is an obstacle to investment in business and we want to improve that situation. We are taking steps to do it.

Mr. BENISHEK. If you could provide this Committee with some examples of that streamlining process?

Dr. HOLDREN. Oh, absolutely. I will submit that for the record.

Mr. BENISHEK. Thank you.

Dr. HOLDREN. Happy to do that.

Mr. BENISHEK. With that, I yield back.

Mr. HULTGREN. Thank you, Dr. Benishek. I now recognize Mr. McNerney for five minutes.

Mr. MCNERNEY. Thank you, Mr. Chairman.

Mr. Doebrich, I would like to get an idea of how much of environmental damage was done at Mountain Pass Mine before it was

closed. Is that a significant amount of damage or is it not that significant?

Mr. DOEBRICH. Sir, I don't have specifics on that but I can perhaps look into that and provide some information for the record.

Mr. MCNERNEY. Mr. Sandalow, do you have an idea on that?

Mr. SANDALOW. Congressman, I don't know the detailed history. I did tour the site and I did see the environmental management techniques that they are applying right now, which certainly, from a tour, looked very impressive.

Mr. MCNERNEY. So you have confidence in Molycorp's claims? You think they are reliable? You think they will be as good as their word on that?

Mr. SANDALOW. Well, I hope so, Congressman.

Mr. MCNERNEY. So do—we all do. What I am wondering is can economic drivers alone, you know, the high cost of water, the high cost of power, can those considerations alone force—not force but encourage American mining and reprocessing operations to clean up and do a good job or are we going to need some other guidelines to help make sure that that happens?

Mr. DOEBRICH. Again, from the Department of the Interior's standpoint, I mean that would be a question perhaps to the BLM and I would have to defer to them on that.

Dr. HOLDREN. I guess I would add a comment on that. I wouldn't say that market forces alone will lead to all the kinds of environmental controls that one would want, but we do have in place a very substantial number of laws passed by the Congress that affect air and water quality and the protection of land. And my assumption is we will continue to enforce those laws. And that those together with economic incentives to become more efficient and cleaner will push us in the right direction.

Mr. MCNERNEY. And that Molycorp should be able to compete economically with the China producers within a few years, is that their estimate? Is that your estimate?

Dr. HOLDREN. They are saying they can. And I would bet on it.

Mr. SANDALOW. And yeah, I heard that personally as well. And to just broaden the point, there is no market that American innovators cannot compete in and win, and this is one of them.

Mr. MCNERNEY. Good. Thank you.

Now, what I want to know is do you feel, Mr. Sandalow, that the real risk with the current imbalance—trade imbalance—on this issue is that China will force industries and jobs to China that won't return? Is that the real underlying risk that we are looking at here?

Mr. SANDALOW. That is a concern to be sure, Congressman. I think there are other concerns as well. All of these concerns could be addressed if we are smart and serious about the way that we do this, with R&D on substitutes and efficiency and on globalizing supply chains.

Mr. MCNERNEY. Well, I mean I hear that—I hear you saying if we do recycling, which means people using their cell phone batteries when they die and that kind of stuff will produce a significant quantity of these materials, and also innovation—I mean, what are the potentials there for the recycling part of this?

Dr. HOLDREN. I will take recycling on. The potential for recycling depends on a number of factors. It depends on the value of the material, it depends on how expensive the processing is for getting that material out of the products it is in, it depends on the logistics of how concentrated the sources of product are that you are going to process to get the stuff out, and I would say the answer is that recycling looks good for some of these materials and less good for others. Recycling is also not going to be adequate in situations where a market is very rapidly expanding, because the stuff that you are recycling from is not as large in quantity as what you need for the expanding sector.

And so, for example, if you look at permanent magnets for the wind turbine market where wind turbines are growing very rapidly, recycling is not going to do that for us. I think we have to be realistic and we have to discriminate between different circumstances, some where recycling will help a lot, others where it won't, and we have to rely on other kinds of measures, including diversification.

Mr. MCNERNEY. Is there a sort of a unified or coordinated program to put research money in areas where substitution would be a good alternative, Mr. Sandalow?

Mr. SANDALOW. Yeah, this is something that we are investing money in at the Department of Energy in our Energy Efficiency Renewable Energy Program in particular, and it is something we are looking at. We are talking to colleagues around the government about it as well.

Mr. MCNERNEY. So you are trying to avoid duplication or———

Mr. SANDALOW. Absolutely, Congressman.

Mr. MCNERNEY. Thank you. I yield back.

Mr. HULTGREN. I recognize Ms. Adams for five minutes.

Mrs. ADAMS. Thank you, Mr. Chair.

Dr. Holdren, I listened to the back and forth with you and Mr. Benishek, and I have a question. If you haven't researched all the factors, how can you make that assertion that China would not flood the market?

Dr. HOLDREN. I don't have a clear crystal ball congresswoman and so I can't assert that China would not. I can only assert that there would be some disadvantages to China in doing that. I would also point out that we are engaged with China in the World Trade Organization, that China has a considerable economic interest in maintaining good trade relations with the United States and other countries, and so there is some leverage there. Nonetheless———

Mrs. ADAMS. You know they do have a lot of our debt.

Dr. HOLDREN. They do and that also means it is not particularly in their interest to try to devastate our economy because they would drop the value of the U.S. securities that they hold. But I am not claiming I have a clear crystal ball. I am simply claiming here———

Mrs. ADAMS. So it is possible.

Dr. HOLDREN. It is possible but there are a number of things we can do, certainly, to reduce the risk from that very substantially.

Mrs. ADAMS. In your written testimony you say that USTR is closely examining China's policies restricting exports of raw materials, include RE and continues to press China and remove its ex-

port restraints on RE and other raw materials. Can you elaborate on the state of the conversations between USTR and PRC? Are we making any headway?

Dr. HOLDREN. It is my impression that we are making some headway there but I can't really elaborate. I think it would be appropriate to defer to the USTR on that point for an up-to-date assessment of the state of their interactions.

Mrs. ADAMS. Okay. There is a greater issue, a bigger issue than rare earths. We have been talking about critical materials and rare earth today but the Committee has identified similar failures in other fields. Recent unforeseen shortages in Helium-3—you know, the ones that used for radiation detectors—suggest this is an issue greater than just rare earths. What is the Administration doing to characterize and forecast supplies and demands of other materials such as rare isotopes and strategic minerals that may be impacted by policies decisions outside of the market?

Dr. HOLDREN. Well, certainly our focus in the Administration and the focus of outside entities such as the National Academy that have looked at these issues is not restricted to rare earths. I commented a while ago that rare earths are judged to be among the most critical but they are not the only critical elements and we are looking at the others. The DOD is looking at the others; the DOE is looking at the others; the USTR is looking at the others; the Department of Commerce. We are certainly not confining our attention to rare earths.

Mrs. ADAMS. Like plutonium-238?

Dr. HOLDREN. Well, plutonium-238 is, of course, indispensible for radioisotopic thermal power generators as we use on our Mars missions and other such technologies. Helium-3 is essential. And yes, we are looking at that. The DOE looks at that closely.

Mr. SANDALOW. Just to add, Congressman, in our critical materials strategy last year we looked not just at rare earths but also at indium, gallium, tellurium, lithium, and cobalt. And then in the request for information that we just submitted to the public, we asked about other materials that might be important, of interest. So it is very much an area beyond just rare earths that we are looking at.

Mrs. ADAMS. Thank you. I yield back.

Mr. HULTGREN. Thank you very much. I know a couple of the witnesses—panel members need to leave at 4 o'clock, so we want to be conscious of your time. I see that we still—it is a few minutes before 4 o'clock, about 20 minutes until, so my hope is to go through another round of questions. Our Committee rules say that we are limited to five minutes each, but if we can be shorter than that, that would be nice to be able to try and get through all of us. So if that is all right with you all, we will start going through another round of questions and wrap up at 4 o'clock so one of you can catch a plane and others have other things that you need to get to.

Dr. Holdren, one of the provisions of the bill I introduced instructs the Secretary of the Interior and the Secretary of Energy to specify a principal statistical agency. I wonder what your thoughts are on the efficacy and effectiveness of specifying a principal statistical agency?

Dr. HOLDREN. Well, I guess my response would be I believe we have had a principal statistical agency in the USGS and the—where the rubber meets the road would be what additional responsibilities the USGS would have under such a provision and whether they would have the budget to carry out those responsibilities.

Mr. HULTGREN. I think the challenge is can they identify what the demand is without that. Any thoughts on that or not?

Dr. HOLDREN. I agree with you.

Mr. HULTGREN. Okay. Do any of the other two witnesses have thoughts on that?

Mr. DOEBRICH. As Dr. Holdren said, this would apply to one part of the Mineral Resources Program that provides minerals information, and we would like to better understand what such a designation would truly mean, the ramifications of it. And we would be happy to answer that more fully for the record.

Mr. HULTGREN. Okay. We can get you that and that would be great if you could submit a response to that. That would be very helpful.

Quickly, just with another minute or two here, I know one of the challenges is, again, making sure that we have got people who are capable to be doing this work and certainly we are talking about the resources but also the intellectual resources are so challenging here. Specifically, we need students who have a better grasp of the industrial sciences versus a specific education in rare earths. I wondered if any of you have heard concerns about this and what the government, if it were to spend funds targeting and strengthening industrial science programs, how would it ensure retention of this talent in the United States after subsidizing their education?

Mr. SANDALOW. Well, I will just start and then turn to Dr. Holdren, I just want to thank you for emphasizing this point, Chairman. It is vitally important. It is vitally important that we have the intellectual capital in this country to invest in this area. I often hear that the expertise follows the research money, and so when the research money is available, then the expertise will be developed. And so it just underscores the importance of maintaining federal support for basic R&D in this area, and in particular, in the areas you point to in industrial sciences. Industrial manufacturing processes and efficiency are absolutely critical for U.S. competitiveness in the decades ahead. So it is vital that we maintain federal funding support in that area.

Dr. HOLDREN. I would add I think it is also important as the formulation your question suggests that we look at ways to make it easier for foreign talent that gets educated in this country, particularly getting advanced degrees in science and engineering, that makes it easier for them to stay here. Right now, I think we make it too hard for them to stay here. Some, obviously, are going to want to go back to their countries. That is not an entirely bad thing because science and engineering in some respects is not a zero sum game, but we certainly shouldn't be making it hard for foreign nationals who are educated here and want to stay to do so.

Mr. HULTGREN. To give everyone else a chance, questions as well, I now recognize Ms. Edwards.

Ms. EDWARDS. Thank you, Mr. Chairman. I just have a couple of quick questions.

Dr. Holdren, I just want to point to you. I was looking at the fourth quarter 2010 reports from Molycorp as another suggestion about why China might be rethinking things. In this—in the report, the CEO of Molycorp noted that senior government leaders in China consistently stress China's intent to continue to restrict rare earth exports and the possibility of China becoming a net rare earth importing nation by 2015. CEO Smith also said, "These dynamics are why we believe rare earth pricing will remain robust for the foreseeable future." It is also why Molycorp recently committed to expanding its production capacity from 19,050 metric tons per year in 2012 to 40,000 metric tons per year, which is expected to be achieved by 2013. And he says that that will position Molycorp to capture new markets and customers and benefit from continued strong pricing, hence, a competitor for China, but I think it is important and highlights the reason that the United States needs to step up its game, our government needs to step up its game in order to be able to stand up industries that can compete.

And I would also note that Molycorp secured all of its critical government permits that enabled it to proceed with construction of a new rare earth oxide manufacturing facility in Mountain Pass. They broke ground ahead of schedule. They are constructing their new manufacturing facility and they recommenced mining operations for the first time since 2002. And that is with environmental regulations in place that are actually going to protect the American consumer and those who live in and around Mountain Pass from the dangers that have befallen the Chinese and the reason that the Chinese, in fact, are having to make these changes and different decisions about what they do with respect to their mining.

And I wonder for USGS, Mr. Doebrich, if you could comment whether from an environmental perspective what sort of concerns we need to be aware of regarding potential environmental contamination as a result of these mining operations and how that impacts what we need to consider in the United States in terms of our own industry with respect to competition with China?

Mr. DOEBRICH. Thank you, Congresswoman.

With regard to rare earths in particular, many of these rare earth minerals contain radioactive components, and so radiation is an environmental issue of concern when developing rare earth resources. So this is an area of research that we are actually getting more involved with to understand what the impact—the natural impact of the known resource in the ground even before resource development, developing baseline information to understand what the natural baseline geochemical signature is of these resources to help us better understand what the impact of resource development would be for different types of these rare earth deposits. So that is an area of research that we are involved with right now.

Ms. EDWARDS. In any case, the goal would not be to throw out environmental regulations. That is not what is going to stand up our industry. Thank you, and I will yield back.

Dr. HOLDREN. I strongly agree.

Mr. HULTGREN. I now recognize Mr. Miller.

Mr. MILLER. Thank you, Mr. Chairman.

The subject of Helium-3 came up, which is also a subject that was—that this Subcommittee dealt with in the last couple of years. The problem with Helium-3 was we didn't know how much of it we had. That was the biggest problem. We didn't have an assessment of what the demand was and what the supply was, and the reason was that Helium-3 was produced by the decay of tritium, which was used in nuclear weapons and how much tritium there was and, therefore, how much Helium-3 there was was all classified, so nobody knew how much there was. And we spent billions of dollars developing a technology that depended on a lot of Helium-3 and then found out there wasn't that much Helium-3.

The Administration actually appears to have done a pretty good job of dealing with that problem once you realize you had a problem, kind of assessing what the supply was and figuring out what the demand was and making decisions about priorities. But that appears not to have been unique to Helium-3. There are other problems of identifying supply and demand. Dr. Holdren, I think you addressed that at least somewhat in your testimony of identifying the supply and demand.

And there is still a problem—both in the government and the private sector—of that information not being available, whether it is treated as a trade secret or confidential for business reasons or whatever else. How much of a problem is that, and how are we going to get at that problem to identify what the demand is and what the supply is?

Dr. HOLDREN. Well, first of all, Congressman Miller, the first item on my list consistent with your question of what we need to do is information. We need to do better with information, and there I think again the USGS has been a mainstay of our ability to get that information and my judgment should continue to be.

My understanding is that companies are becoming more forthcoming with the kinds of information we need to make these assessments. I think we are doing better at public-private partnerships in this domain and in some other domains as well. Of course, the problem with classified information that you referred to in the case of tritium is, as always in the case of those kinds of materials, going to be something of an obstacle. But it is not true that nobody knew how much tritium we had. It is just that nobody knew in the public domain how much we had, and there was probably a lack for a time of connecting the dots as they say among the different people who had the requisite information.

But I do believe we are doing better going forward. We have an approach to open government and transparency in this Administration that is yielding, I think, real benefits in terms not only of the kinds of data and databases that the government is making available but also in terms of an increasing tendency toward transparency in business.

Mr. MILLER. Okay. Anyone else?

Mr. SANDALOW. Thank you. If I might add, this is a topic that I hear about from businesses when I talk about this issue with them. And they say that government really has an important role to play in collecting the information. And we were encouraged at the U.S. Department of Energy to inquire about this in the last request for information that we put out. And we did so and, among

other things, we said that we would keep information proprietary and collected it on that basis if businesses wanted us to do that. So we have collected proprietary information, looking at ways in which we might be able to share it while protecting the confidential nature of it by aggregation or other types of tools. But I hear about this all the time from the industry as an important area.

I would note, too, that on our Energy Information Administration (EIA), which is our statistical agency, have plans to scale up its work in this area but as the result of the latest round of budget pressures and cuts is unable to pursue its additional work in this area, which I think is unfortunate. But this is an area that, no question, that we hear about all the time in the Energy Department.

Mr. MILLER. Okay. Just for purposes of clarifying something, which was reasonably clear already, but when you say "flooding the market," you really mean that the Chinese are selling rare earths below cost to drive out competitors is what—it is called the antitrust law's predatory pricing so that other suppliers will not compete because they have a dominant position in the market and they have got a government behind them funding it all. Is that generally what you mean when you say "flooding the market?"

Dr. HOLDREN. Well, Congressman, I didn't use the term "flooding the market." Your colleagues used it. But I think what they have in mind is not what the Chinese are doing now. The Chinese are, I believe, not losing money under current pricing. But the concern is that as we start to develop more effective competition with the Chinese at current prices, the concern is they could undercut those———

Mr. MILLER. Right.

Dr. HOLDREN. —as happened some decades ago in the international oil market where we developed some expensive alternatives to conventional oil and the—and OPEC cut its prices to undercut those technologies. That history causes people to worry about that possibility. And as I have said before, it is a possibility. I don't have a crystal ball clear enough to rule it out, but I think our strategy needs to be prepared for a wide variety of possible scenarios. And the way you get prepared for that, again, is better information, it is diversification, it is recycling, it is research.

Mr. MILLER. Thank you.

Mr. HULTGREN. I want to thank the witnesses for their valuable testimony and for the members for their questions. The members of the Subcommittee may have additional questions for the witnesses and we will ask you to respond to those in writing if that is all right. The record will remain open for two weeks for additional comments from members. The witnesses are excused and the hearing is now adjourned.

[Whereupon, at 3:54 p.m., the subcommittee was adjourned.]

Appendix I:

Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

Responses by Dr. John P. Holdren, Director, Office of Science & Technology Policy (OSTP):

Questions submitted by Chairman Paul C. Broun

Q1. What are the Administration's short, medium and long-term plans to ensure adequate supplies of rare earths and critical materials for U.S. industries?

A1. In the short term, the Administration is using trade relations and diplomacy to foster the diversification of critical material supply, as well as taking steps to facilitate domestic production. In the long term, the greatest opportunities to reduce the risks associated with supply shortfalls of 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 R&D priorities and roadmaps; and
- reviewing-in coordination with our colleagues in the National Economic Council, the Office of the U.S. Trade Representative, the National Security Council, and Federal departments and agencies-domestic and global policies that affect the supply of critical materials (permitting, export restrictions, recycling, stockpiling, etc.) and pursuing remedies for roadblocks.

Q2. What role is OSTP playing to promote public/private collaboration in the development of recycling technologies—including technical standards, guides and best practices—to strengthen recycling for key materials and to facilitate innovative materials use throughout economic value chains?

A2. The potential for recycling depends on a number of factors. It depends on the value of the material, the ease of disassembly or separation, and how concentrated the material is within a product. Recycling may be a viable option for some materials but not for others. Recycling will not be adequate in situations where a market is rapidly expanding, because the supply of recovered material will not be sufficient to meet expanding demand.

The President's FY 2012 Budget includes a proposal for a Department of Energy (DOE) Energy Innovation Hub on critical materials to help reduce U.S. reliance on critical materials including rare earth elements (REE). Hub activities on recycling would include R&D on efficient separation technologies that could be economically applied to both mined ores and recycled product streams, as well as other strategies that could significantly lower world demand for newly extracted critical materials.

Q3. Has the development of technical standards and standard reference materials been integrated into the Administration's Critical Materials Strategy? Will the National Institute of Standards and Technology (NIST) be tasked to lend its technical expertise—particularly in the development of standard reference materials that help in the identification and classification of rare and other materials, and that could facilitate their re-use from electronic scrap, cell phones, magnets and magnet applications, and batteries?

A3. While NIST has not specifically been tasked with integrating its activities and expertise into the Administration's Critical Materials Strategy, NIST's longstanding technical expertise in reference materials and technical standards could play an important role in any Federal efforts to develop standards and reference materials related to critical materials. Of NIST's 1300 Standard Reference Materials (SRMs), several metal alloys and geological materials have measurement information on rare earths. A series of calibration standards is available for calibrating the determination of rare-earth elements using a wide variety of chemical analysis methods.

Q4. Our current situation with raw materials is not unique to the United States. To what extent is the U.S. government coordinating strategies with other nations in an effort to address this issue by learning for each other's actions? What nations are more active in these discussions? What are some of the ideas and strategies that have been discussed in these collaborative efforts?

A4. I believe the United States government must be prepared for a wide range of scenarios in this area in the years ahead. The United States is interested in working

with like-minded trading partners to determine the best way forward to ensure reliable supplies of critical materials from all sources. We have been working bilaterally and multilaterally (at the G20, the Asia-Pacific Economic Cooperation (APEC) Forum, the World Trade Organization (WTO), and other fora) to seek progress on the issue. We have also hosted direct conversations with: Japan, South Korea, Germany, Australia, Canada, China, the European Union, European Commission, and the European Parliament among others. These conversations have covered collaboration in: research and development, promoting an open and transparent global market including sharing of supply and demand information, and the responsible development of future supply chains.

Q5. Recent articles have described a potential relationship between China and Taiwan, where Taiwan would benefit from a special rare earths arrangement. Can you comment on the significance of such an agreement and its potential impact on the U.S. and other countries? [1]

A5. At this point, without specific knowledge of the details of a potential arrangement, any comments on how Taiwan could benefit or how other countries would be impacted would be speculative at best.

Q6. In an ideal world, what provisions would you want to see in a rare earths/critical materials bill?

A6. I would welcome provisions that strengthen our capabilities to: (1) educate and train scientists and engineers in this country; (2) identify critical materials and establish an appropriate early warning mechanism; (3) perform a more detailed and transparent collection of information on global resource supply and demand; (4) support federal research and development priorities in the areas of substitute materials and technologies, more atom-efficient use of materials, environmentally superior mineral extraction and processing, and recycling; (5) pursue an adequate and diversified supply of critical materials; (6) identify downstream supply chain vulnerabilities (e.g. metals, alloys, components, or finished goods) and propose effective mitigation measures; and (7) review domestic and global policies that affect the supply of critical materials and pursue remedies for roadblocks. Such provisions could strengthen efforts the Administration is already pursuing in these areas.

Q7. Congress visited the issue of strategic minerals in 1980 with the National Materials and Minerals Policy, Research and Development Act, and again in 1984, with the National Critical Materials Act. The 1980 Act included certain reporting requirements by the National Science and Technology Council, which is housed in the Office of Science and Technology Policy. Are you familiar with those reporting requirements? Understanding that this occurred before your time, do you have any insight as to why those requirements are not being met? How can we ensure that we are vigilant in our monitoring of critical materials? Do you believe annual updates are necessary?

A7. I am familiar with those reporting requirements but do not know the history of why those had lapsed in previous Administrations. This Administration, in contrast, has taken the National Materials and Minerals Policy, Research and Development Act, and the National Critical Materials Act seriously. It began coordination on this topic early in the first year of the Administration.

While there are no current plans for the Executive Office of the President to release documents on the topic, there will be a continuous stream of reports from our colleagues in the Federal agencies (e.g. DOD, DOE, USGS) that reflect the collective thinking and analysis of our interagency process. The set of issues on critical materials is fluid and dynamic. The market and geopolitical landscape change rapidly and so too must the U.S. government response.

Q8. Do you have any suggestions to modify or amend the National Materials and Minerals Policy, Research and Development Act of 1980, to ensure the Act is effective? Are there any additional authorities or restrictions that Congress should consider to ensure compliance with the Act?

A8. These Acts are comprehensive but could benefit from an update to reflect nuances in the present market landscape. One such area that may deserve additional emphasis is in full supply-chain considerations. The risks of supply disruptions depend on what form of the material is deemed critical-raw minerals, metals, alloys, components, or finished goods. Another area that deserves additional emphasis is

[1] Mozur, Paul and Liu, Fanny, "Taiwan, China Discuss possible Rare-Earths Deal," *The Wall Street Journal,* May 18, 2011

training of the next-generation workforce in materials through STEM-based education programs.

Responses by David Sandalow, Assistant Secretary of Energy for Policy and International Affairs, U.S. Department of Energy

Questions submitted by Chairman Paul C. Broun

Q1. What are the Administration's short, medium and long-term plans to ensure adequate supplies of rare earths and critical materials for U.S. industries?

A1. DOE's 2010 Critical Materials Strategy features three strategic pillars to address supply risk for rare earth and other critical materials specific to the clean energy economy in the short, medium and long term. These pillars address both the supply and demand for materials. First, diversified and sustainable sources of materials are required. This means taking steps to facilitate extraction, processing and manufacturing here in the United States, as well as encouraging other nations to expedite alternative supplies. In all cases, extraction and processing should be done in an environmentally sound manner. Second, substitutes must be developed. Research leading to material and technology substitutes will improve flexibility and help meet the material needs of the clean energy economy. Third, recycling, reuse and more efficient use could significantly lower world demand for newly extracted materials. Research into recycling processes coupled with well-designed policies will help make recycling economically viable over time.

In support of these strategic pillars, DOE is pursuing current and proposed research and development that addresses materials separation and processing; developing substitute materials and technologies; reducing material intensity in energy technologies; and recycling.

DOE's strategic pillars and research initiatives for critical materials align well with the three core objectives established by the EOP interagency process on Critical and Strategic Mineral Supply Chains led by the White House Office of Science and Technology Policy (OSTP). These objectives are to: (1) promote supply diversification of critical minerals, (2) mitigate long term risks associated with a dependence on critical minerals with careful consideration for the full domestic manufacturing supply chain, and (3) improve information transparency to improve government and industry decision making.

Q2. In your written testimony, you say, "With regard to mining in the United States, it is important to point out that permits are not the only requirements that can extend the time required to open a mine. The required accumulation of hundreds of millions of dollars of capital for mine development can also lead to delay."

- Can you elaborate on that for us – what has the private sector told you about difficulties getting permits versus raising capital?
- Is there a connection between challenges in raising funds and the long permitting process?

A2. According to input from the private sector received by DOE on rare earth mining in particular:

- Developing a rare earth mine and processing plant is capital intensive.
- The estimated financial investment needed to start a rare earth mine in the U.S. is in the hundreds of millions of dollars.
- Rare earth mining generally does not appeal to the major miners because:
    1) It requires unique and extensive mineral processing knowhow that is not transferrable from other operations,
    2) The market is less predictable, less transparent, and more subject to political risks than other commodity markets, and
    3) It is a small market relative to commodity mining.
- Though some mining companies (such as Molycorp) have successfully secured financing, junior miners who are developing rare earth mines may find it difficult to raise capital from traditional financial markets.
- The permitting process does add uncertainty and complexity to mine development and financing.

Q3. In the absence of DOE Innovation Hubs, do you have any other plans for coordinating rare earths and critical materials information in the federal government?

A3. The proposed DOE Critical Materials Innovation Hub will pursue research and development (R&D) and gather information on critical materials among DOE, industry and academic stakeholders. Because the Hub will be competitively awarded to a consortium of co-located experts, it will promote cooperation and information sharing among participants on a regular basis. The consortium model will allow scientists and engineers to develop solutions to pressing critical materials problems and promptly transfer the knowledge to industrial partners who will be able to incorporate solutions into the market. Furthermore, the high profile of the Hub should attract highly qualified researchers from related fields to apply their expertise to critical materials problems. The proposed Hub will focus on flexible and adaptable materials processing, efficient separation techniques, and other novel approaches to reducing dependencies on critical materials.

The Hub is intended to complement other DOE R&D and information coordination efforts. Since the beginning of the year, DOE has issued new funding opportunities from ARPA-E and DOE's Vehicle Technologies and Wind Programs that address critical material demand by developing motor and generator substitutes, as well reducing critical material content in magnets. Before issuing their funding opportunity, ARPA-E convened all of the relevant agencies within DOE for a workshop to coordinate and determine if there is a 'white space' for ARPA-E investment. DOE will include these and other items in a department-wide R&D plan expected later this year.

As part of its ongoing work on critical materials, DOE has also issued two public requests for information (RFIs), which allowed the Department to collect information from stakeholders in industry, government and academia. DOE has shared this information with other Federal agencies.

DOE also collaborates across the federal government through an EOP interagency process on Critical and Strategic Mineral Supply Chains led by the White House Office of Science and Technology Policy (OSTP). This forum provides DOE and other agencies opportunities to collaborate on a range of topics. DOE also meets individually with other government organizations such as USGS, DOD, DOS, DOC, and USTR to discuss specific topics of mutual interest. In addition, DOE also participates in outreach through conferences and forums that include government, industry and academia.

Q4. Your testimony mentions ARPA-E investments in rare earth alternatives. ARPA-E has been subject to some criticisms for providing funding to companies that already received venture capital. Can you assure the Committee that taxpayer dollars will only be used on high-risk, high-reward research that industry is not willing to pursue?

A4. Yes, ARPA-E can assure the Committee that taxpayer dollars will only be used on high-risk, high-reward research that industry is not willing to pursue. ARPA-E is careful to adhere to its statutory mandate to accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty. Companies that have received venture capital are eligible for ARPA-E funding, but only for projects that the company would not otherwise pursue. ARPA-E does not fund any specific and discrete technical idea that has previously received money from industry.

ARPA-E makes investments in transformational and disruptive energy technologies that private sector investors are not likely to fund at their present stage of development. The safeguards and criteria in place to ensure DOE funding is only disbursed to projects not already being pursued by the private sector include: the nature of the projects ARPA-E funds, the type of Program Directors recruited, ARPA-E's rigorous program development process, and mandatory disclosure requirements for applicants.

ARPA-E makes investments in early-stage, transformational and disruptive energy technologies that have both high technical risk and high market risk, whereas private capital generally undertakes projects with minimal technical risk and known market potential. ARPA-E hires Program Directors with a background in science and industry in order to make precise determinations of the types of high risk projects that are appropriate for ARPA-E to fund. Program Directors connect with world experts and lead

a competitive, thorough review process to identify and support projects not being funded by the private sector.

That technologies are not being addressed elsewhere is a critical factor in the Selection Official's decision. Further, to guide and standardize the selection decisions the Funding Opportunity Announcements contain program policy factors such as: the degree to which the proposed project optimizes use of available ARPA-E funding to achieve programmatic objectives; availability of funding from public and private sources to support the proposed project; whether the project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty; if the lead organization is a large business, why this RD&D project is not being sponsored internally; if the lead organization is a small business sponsored by private investors, why this RD&D project is not being supported by its investors; if the lead organization is a startup not sponsored by private investors, why this RD&D project has been unable to attract private financing; if the lead organization is a university, nonprofit, or FFRDC, what sort of institutional resources will be leveraged, and why has this leverage not been available to date. In addition, the Merit Review Plan requires the Chair of the Merit Review Board to analyze for each project that he is recommending whether the project already has sufficient private or public support. This analysis will be included (verbatim or in edited form) in ARPA-E's annual report, consistent with new statutory requirements enacted in December 2010.

In addition, each applicant for ARPA-E funding must fully disclose all sources of funding (past, current, or pending) for all potentially related or identical projects. Once the award is issued, recipients are required to fully disclose any additional funding that it receives

from any public or private source. This ensures transparency and enables ARPA-E to make appropriate funding determinations.

Q5. Earlier this year, DOE posted a grant solicitation as part of a $30 million project entitled "Rare Earth Alternatives in Critical Technologies" (REACT). The grant seeks to fund "early-stage technology alternatives that reduce or eliminate the dependence on rare earth materials by developing substitutes in two key areas: electric vehicle motors and wind generators." Please discuss the program, identifying the types of applications received, including, to the extent you can, the entities that applied for the funding and whether applicants were expected to match awards with private funds.

A5. ARPA-E's REACT program seeks to fund early-stage technology alternatives that reduce or eliminate the dependence on rare earth materials by developing substitutes in two key areas: electric vehicle motors and wind generators. Rare earths are naturally-occurring minerals with unique magnetic or other properties that are used in many emerging energy technologies. As demand for these technologies continues to increase, rare earths are rapidly becoming more expensive due to limited global industrial supply – prices of many have increased 300–2500% from July 2010 to August 2011. Rising rare earth prices have already escalated costs for some energy technologies and may jeopardize the widespread adoption of many clean energy solutions by U.S. manufacturers.

ARPA-E expects to see submissions for high-impact technologies that have not received significant previous funding from public or private sources due to their high degree of technical risk. Some of the technical areas where ARPA-E expects to see submissions are:

New high energy density, low-rare earth content permanent magnetic materials, including materials developed through the use of ab-initio computational materials simulation combined with high throughput combinatorial screening of new compositions or structures

- Advanced non-permanent magnet motors (including induction and reluctance motors) that leverage the use of advanced solid-state drive electronics, coupled with advanced high-permeability low-loss soft magnetic materials
- Magnetic materials that utilize novel approaches to magnetic circuit design based on short-range correlations of magnetic phenomena
- Radical new technologies for un-geared hydraulic transmission systems that achieve high torque and power densities for wind drive train systems
- Advanced high-temperature superconductor generators (HTSCG) that can attain high reliability and low materials costs to allow practical use in wind generators

While we cannot comment on an ongoing solicitation, ARPA-E to date has funded 121 projects. 40% of projects have been led by universities, 31% by small businesses, 22% by large businesses, 5% by national labs, and 2% by non-profits.

By law, every Project Team is required to provide greater than or equal to 20% of the Total Project Cost as cost share, with certain exceptions. Every cost share contribution must be allowable under the applicable Federal cost principles. Project Teams may provide cost share in the form of cash or in-kind contributions. Cash contributions may be provided by the Prime Recipient or Sub-recipients.

In addition, under Technology Investment Agreements and "other transaction" agreements, Prime Recipients are required to pay greater than or equal to 50% of the Total Project Cost as cost share.

Q6. Besides the REACT grant, please list all DOE projects that fund 1) the recycling of rare earths and critical materials, 2) the development of substitutes, 3) and the development of miniaturization technologies.

- What role should the government play in these efforts?
- What areas are better left to the private sector?

A6. The Department of Energy is playing a proactive and leading role in funding R&D projects focused on recycling of, efficient use of, and substitutes for rare earths and critical materials. As in other areas, the government is well-positioned to make crucial investments in transformational technologies or processes that private sector investors are not likely to fund at early stages of development. The government has a role both to accelerate clean energy technology developments that reduces costs in order to streamline market uptake and also to fund transformative projects that have high technical risk and high market risk. The development of substitutes for certain critical materials, system (technology) level substitution, more atom-efficient functional materials, and economically viable recycling techniques can benefit from government support, which can then stimulate private sector investment.

The Vehicle Technology Program (VTP) in the Office of Energy Efficiency and Renewable Energy (EERE) runs projects aimed at reducing or eliminating the need for rare earth permanent magnets used in hybrid and electric vehicle traction motors. Approaches include new non-rare earth magnet materials, thermal management that reduces the need for critical rare earth materials in magnets, and alternative motor designs to eliminate rare earth permanent magnets. Additionally, VTP sponsored an American Recovery and Reinvestment Act (ARRA) project to recycle Li-ion and rare earth batteries

from hybrid and electric vehicles. The EERE Wind Program recently awarded six projects over two years to develop next-generation drivetrain systems to decrease the cost of energy improve torque density, improve maintenance times, and reduce deployment costs. Projects funded include superconducting technology and/or innovative geared and direct-drive designs, which would reduce or eliminate the need for rare earth permanent magnets. The goal of these EERE projects is to continuously reduce the cost of efficient and renewable technologies and streamline their movement into commercial markets. These projects have very specific cost, performance and lifetime targets designed to be competitive with fossil fuels on an unsubsidized basis.

Complementing EERE programs, ARPA-E is focused on creating entirely new learning curves through transformative and disruptive new high-risk technologies. Prior to REACT, the Advanced Research Projects Agency – Energy (ARPA-E) has supported two projects targeted at developing substitutes for rare earth magnets and increasing material efficiency. The research in these projects is ongoing. One project is focused on developing the next generation of permanent magnets with magnetic energy density (maximum energy product) up to two times higher than the current value of the strongest commercially available neodymium-iron-boron (Nd-Fe-B) magnets. If successful, this project will lead to cheaper, more energy-efficient, more power-dense magnets for deployment in a wide range of clean energy technologies.

Another ARPA-E project is developing next-generation bulk nanostructured magnetic materials with a dramatic increase in performance relative to state-of-the-art magnets.

These new magnets will increase the efficiency and power density of electric machines while decreasing dependence on rare earth minerals.

Q7. What role is DOE playing to promote public/private collaboration in the development of recycling technologies - including technical standards, guides and best practices - to strengthen recycling for key materials and to facilitate innovative materials use throughout economic value chains?

A7. The Department of Energy (DOE) has pursued electric vehicle battery recycling research for some time. For example, the Energy Efficiency and Renewable Energy (EERE) Vehicle Technology Program has supported Argonne National Laboratory for a number of years in work evaluating the potential for recycling of lithium-ion batteries with respect to improved processes and maximized material recovery. DOE has also supported some recycling infrastructure. In 2009, the EERE supported TOXCO to expand their current battery recycling operations in Lancaster, Ohio.

Research into recycling of materials identified as critical in last year's Critical Materials Strategy is of increasing focus for DOE, with the intent of pursuing R&D that has the best potential to contribute to an economical supply of critical materials. For example, the proposed Critical Materials Hub will pursue separation technologies that can be economically applied to both mined ores and recycled product streams.

While DOE intends to pursue recycling as part of a strategy to address material criticality, it is important to keep in mind that post-consumer collection and logistics is primarily in the domain of other federal and state agencies. Furthermore, there may be opportunities to recycle from industrial waste streams.

Q8. The recommendation to develop a "Principal Statistical Agency" (PSA) has sparked a debate over whether that should be housed in DOE and modeled after the Energy Information Agency (EIA), or housed at USGS and modeled after the Mineral Resources Program (MRP). One difference between DOE and USGS is the designation of the EIA as a PSA. Can you comment on the roles and potential overlaps of EIA and MRP and how a PSA designation for both offices would impact your efforts?

A8. The Department has no concern that the development of a statistical activity or agency within the USGS to address matters pertaining to rare earths would adversely affect our activities in this area, but would defer to the Department of the Interior (DOI) on whether USGS is the appropriate agency to house such a PSA within the DOI. EIA already interfaces with other statistical agencies in collecting price, economic, and trade data related to energy markets.

EIA would continue to focus on its mission of collecting, analyzing, and disseminating independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. Pursuant to its mission, EIA develops energy data and projections that provide information pertaining to the demand for rare earths associated with energy technology applications.

For example, EIA conducts an annual survey of existing and planned electric generating units in the United States, including renewable technologies. This survey is periodically revised, normally when the survey is scheduled for re-clearance by Office of Management and Budget (OMB) under the Paperwork Reduction Act. For the next revision and clearance of the capacity survey, scheduled to be effective in 2014 to collect data for calendar year 2013, EIA is considering proposing the addition of new questions

aimed at identifying which generating units being deployed or proposed utilize rare earths and critical materials. These questions will be subject to public comment and ultimately must be approved by OMB.

Q9. Has your agency commented on any House or Senate rare earths/critical materials bills? If yes, please provide those comments.

A9. In addition to my June 14 testimony before your Subcommittee, I have testified twice in the past year before the Energy Subcommittee of the Senate Energy and Natural Resources Committee when rare earth/critical materials bills were being considered. During my September 30, 2010 testimony, S.3521 was under consideration. During my June 9, 2011 testimony, relevant bills were S. 383, S. 421 and S. 1113. As I stated in my testimony before your subcommittee, "we look forward to discussions with the Congress on ways to address this issue..."

Q10. In an ideal world, what provisions would you want to see in a rare earths/critical materials bill?

A10. In order to help achieve U.S. energy and economic goals it is important to: (1) educate and train scientists and engineers in this country; (2) identify critical materials and establish an appropriate early warning mechanism; (3) perform a more detailed and transparent collection of information on global resource supply and demand; (4) support federal research and development priorities in the areas of substitute materials and technologies, more atom-efficient use of materials, environmentally superior mineral extraction and processing, and recycling; (5) pursue an adequate and diversified supply of critical materials; (6) identify vulnerabilities across the full supply chain (e.g. metals, alloys, components, or finished goods) and propose effective mitigation measures; and (7) review domestic and global policies that affect the supply of critical materials and pursue remedies for roadblocks. Such provisions could strengthen efforts the Administration is already pursuing in these areas.

Responses by Mr. Jeff L. Doebrich, Program Coordinator (Acting), Mineral Resources Program, U.S. Geological Survey (USGS):

Questions submitted by Chairman Paul C. Broun

Q1. In this year's (2011) USGS Mineral Commodities Summary: Rare Earths, China is listed as having around 48% of the world's rare earth elements, which is a significant up tick from last year's (2010) report which listed China's number at around 37%.

a. What is the reason for China's elevated numbers this year?

A1 a. The USGS estimate of China's Rare Earth reserves in Mineral Commodity Summaries 2011 (MCS 2011) was changed from the previous year's estimate based upon improved understanding of Chinese reserve and resource definitions and the comparison of those definitions to USGS reserve and resource definitions. The concepts are explained for all countries in Appendix C (Part B) on page 196 of MCS 2011 (http://minerals.usgs.gov/minerals/pubs/mcs/2011/mcs2011.pdf); the correspondence of the Chinese and USGS terms are discussed in USGS Open File Report 2011–1042 (http://pubs.usgs.gov/of/2011/1042/).

b. How does USGS determine the presence of rare earths, i.e., what methods and technologies does it employ?

A1 b. The USGS employs a variety of geologic investigations and analytical techniques to characterize a region or site for the existence of rare-earth-bearing mineral resources. Reconnaissance geologic mapping and use of satellite remote sensing are used to identify specific rock types known to contain rare-earth minerals. These rocks are then investigated further through more detailed mapping, higher-resolution satellite or airborne remote sensing, sampling for geochemical analysis, and geophysical surveys to determine the presence of rare-earth mineral concentrations in the rock. Once surface evidence of concentrations is documented through these techniques, a drilling program is initiated to begin to explore the subsurface and to outline identified resources. In the United States, it is at this point that private industry enters the process to define identified resources and reserves through drilling and feasibility studies of developing an ore reserve. In some countries governments will conduct the initial phases of drilling to define an attractive resource to interest private investment. The USGS does not explore for nor drill mineral resources but conducts research on a deposit to understand the parameters of its formation that can then be used to predict where other deposits may be found. This research may rely on samples from drilling that was done by private industry or be confined to surface or remote examinations as described above.

The USGS National Minerals Information Center (NMIC) collects, analyzes, and publishes identified resource and reserve information that is released by private industry and national governments. National reserves information for rare earths found in the Mineral Commodity Summaries report, including those for the United States, is derived from a variety of sources. Lacking national assessment information by governments, sources such as academic articles, company reports, presentations by company representatives, and trade journal articles, or a combination of these, serve as the basis for national reserves information reported in the mineral commodity sections of this publication. The USGS collects information about the quantity and quality of mineral resources but does not directly measure reserves. Reassessment of reserves is a continuing process, and the intensity of this process differs for mineral commodities, countries, and time period. Some countries have specific definitions for reserves data, and reserves for each country are assessed separately, based on reported data and definitions. In the Mineral Commodity Summaries report, an attempt is made to make reserves consistent among countries for a mineral commodity and its byproducts.

c. Does USGS have the best tools and employees to accomplish its mission competently?

A1 c. The USGS Mineral Resources Program, including its National Minerals Information Center, has the tools and employees needed to accomplish its core mission competently but lacks capacity to expand its functions to accommodate increased activity called for in some of the pending critical minerals legislation. The Mineral Resources Program has been proposed for budget cuts every year but one [2010] since FY 2001; for FY 2012, the Administration's budget request proposed a reduction of $9.6 million (18%) from the FY 2010 funding level of $53.8 million, which will require the elimination of 49 scientific and technical positions and the elimination of

important research, assessment, and mineral information program activities both within the United States and internationally. Furthermore, the past and current proposed reductions to MRP funding make it more difficult to recruit and retain high-caliber scientists.

d. Given the jump in China's numbers, should we have expected to see a jump in resources for other areas such as in Africa and Australia?

A1 d. No. Given the answer to the first question, there is no reason to think that new information about and improved understanding of the classification system used by the Chinese to report their mineral reserves would cause a change in reserve estimates for Africa or Australia.

Q2. The recommendation to develop a "Principal Statistical Agency" (PSA) has sparked a debate over whether that should be housed in DOE and modeled after the Energy Information Agency (EIA), or housed at USGS and modeled after the Mineral Resources Program (MRP). One difference between DOE and USGS is the designation of the EIA as a PSA. USGS has stated in the past that it has concerns about such a designation as it may threaten the ,goodwill? it currently enjoys with industry contacts because a PSA designation would require companies to report to USGS, potentially hurting the existing relationship.

a. Can you comment on the roles and potential overlaps of EIA and MRP and how a PSA designation for both offices would impact your efforts?

A1 a. The EIA and the National Minerals Information Center (NMIC) of the MRP are both organizational units that collect, analyze, and disseminate statistical data and information, provide industry analysis, and conduct supply and demand forecasting. The EIA is responsible for reporting on four nonrenewable energy commodities (oil, gas, coal, uranium) and five renewable sources of energy (biofuel, solar, wind, hydroelectric, geothermal). The NMIC is responsible for reporting on more than 80 nonrenewable nonfuel mineral commodities. There is no overlap in the responsibilities of the EIA and the NMIC.

In a 1997 Order Providing for the Confidentiality of Statistical Information, OMB established "a uniform policy for the principal statistical agencies" but appears to have used the term principal statistical agency informally. The Order lists twelve agencies under the heading "Designated Statistical Agencies or Units". These agencies were determined by OMB to be subject to the 1997 Order and thus obliged to implement certain policies on confidentiality of information (Federal Register, v. 62, No. 124, p. 35044–35050)[1]. The Energy End Use and Integrated Statistics Division of the EIA is included as one of the twelve agencies or units listed in the 1997 Order. The USGS is not one of the twelve agencies listed in the 1997 Order, nor is any unit within the USGS.

The Confidentiality Information Protection and Statistical Efficiency Act of 2002 (CIPSEA) defines a statistical agency or unit as "an agency or organizational unit of the executive branch whose activities are predominantly the collection, compilation, processing, or analysis of information for statistical purposes."[2] OMB, which coordinates the implementation of CIPSEA, recognized 14 statistical organizational units as statistical agencies or units for the purposes of CIPSEA in its 2007 guidance on implementing the Act[3]. The EIA is designated as a statistical agency or unit under CIPSEA. Neither the USGS as a whole, nor any part of the USGS, is designated as a statistical agency or unit under CIPSEA.

The designation of an agency or unit as a statistical agency or unit for the purposes of CIPSEA subjects the agency to different confidentiality standards. CIPSEA statistical agencies or units must implement higher standards to protect data confidentiality than other statistical units. This involves increased physical and IT security measures, confidentiality training for all personnel, additional record keeping, informing respondents about the confidentiality protection and use of information, ensuring that information is used only for statistical purposes, ensuring that identifiable information is not disseminated, and supervising and controlling agents who have access to confidential information.

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[1] Order Providing for the Confidentiality of Statistical Information http://www.gpo.gov/fdsys/pkg/FR–1997–06–27/pdf/97–16934.pdf

[2] Confidential Information Protection and Statistical Efficiency Act of 2002 P.L. 107–347, title V http://www.gpo.gov/fdsys/pkg/PLAW–107publ347/pdf/PLAW–107publ347.pdf

[3] Confidential Information Protection and Statistical Efficiency Act of 2002 P.L. 107–347, title V http://www.gpo.gov/fdsys/pkg/PLAW–107publ347/pdf/PLAW–107publ347.pdf; ys/pkg/FR–2007–06–15/pdf/E7–11542.pdf

CIPSEA does not convey specific authority to an agency—including the authority to require companies to report to the USGS, contrary to our previous understanding. Rather, each agency's authority is defined in the statutes governing that agency. For example, some CIPSEA statistical agencies have mandatory data collection authority. In addition, there are differences in how the agencies are funded.

If a unit within USGS, such as the NMIC, were to be designated as a statistical unit under the provisions of CIPSEA, that unit would have to implement additional IT and administrative security measures, increase personnel training, and meet additional reporting requirements to comply with the higher confidentiality standards. The confidentiality of data collected by the NMIC is currently governed by subsection (f) of the National Materials and Minerals Policy, Research, and Development Act of 1980 (30 U.S.C. 1604(f)).

b. What are the cost and implications of such a designation for USGS?

A1 b. The USGS has not conducted an analysis of cost required to implement the higher confidentiality standards of statistical agency designation under CIPSEA. The USGS believes that such a designation would have little impact on the quantity and quality of data currently collected through a long-standing trust-based voluntary system and does not anticipate that such a designation would improve our ability to serve clients.

Q3. Has your agency commented on any House or Senate rare earths/critical materials bills? If yes, please provide those comments.

A3. The USGS provided testimony to the House Natural Resources Committee, Subcommittee on Energy and Minerals on H.R. 1314 on June 3, 2011 and to the Senate Energy and Natural Resources Committee on S. 383 and S. 1113 on June 9, 2011.

These testimonies can be found at the following links:

- H.R. 1314: http://naturalresources.house.gov/UploadedFiles/DoebrichTestimony06.03.11.pdf
- S. 383: http://energy.senate.gov/public/—files/BurkeTestimonyS383.pdf
- S. 1113: http://energy.senate.gov/public/—files/BurkeTestimonyS1113.pdf

A4. In an ideal world, what provisions would you want to see in a rare earths/critical materials bill?

Legislative authorizations that apply to mineral resource work of the USGS are quite old, dating back to the 1980s and earlier. Much has transpired since then and it would be helpful to update authorizations to reflect the current scope of work performed by the USGS Mineral Resources Program (MRP). There are two very important areas of MRP work that lack specific up-to-date authority. These are the work of the National Mineral Information Center (NMIC) and the environmental science conducted by the MRP.

The NMIC is a function that was transferred to the MRP in 1996 from the U.S. Bureau of Mines (USBM) at the time of its closure. This transfer authority was provided in appropriations language only. The transfer authority should specify data analysis of the domestic and international supply of and demand for minerals and materials essential to the U.S. economy and national security.

Specific authorization language that recognizes the importance of the mineral environmental science conducted by the MRP would be helpful. This work is key to understanding the parameters for environmentally responsible development of mineral resources. The MRP conducts research on the interactions of mineral resources with the environment, both natural and as a result of resource extraction, to better predict the degree of impact that resource development may have on human and ecosystem health. Environmental issues related to mineral resources have required research to help mitigate impact.

Any bill related to critical minerals should clarify the roles of specific federal agencies involved in nonfuel mineral resource data collection, information dissemination, and research on identified and undiscovered resources. These roles and responsibilities should be consistent with the expertise that resides in such agencies. The bill should also ensure that there is no overlap or redundancy in effort expended on accomplishing the objectives of the bill.

The USGS would welcome adequate and sustainable support for unbiased and objective nonfuel mineral research, assessment, and information gathering and analysis that it conducts. These activities are federal responsibilities that are essential for

informing decisions and policy related to mineral supply sustainability and land management of resources.

Appendix II

Additional Material for the Record

ADDITIONAL MATERIAL FOR THE RECORD

Letter submitted Dr. John P. Holdren, Director,
Office of Science & Technology Policy (OSTP),
in response to Representative Dan Benishek question found on page 41

AS PREPARED FOR DELIVERY
Cass Sunstein, *Administrator, Office of Information and Regulatory Affairs*
American Enterprise Institute
5/26/11

Thank you, Chris, for that generous introduction. You have been a friend and colleague for many years, and I greatly appreciate the hospitality that you and AEI have offered me not only today, but also on numerous occasions in the past.

I am also grateful for the excellent work on regulatory policy that has been done at AEI for many years. For a long period, AEI and Brookings operated a joint center for regulatory studies, and the careful research done by the center, and by both AEI and Brookings since that time, has helped to illuminate a wide range of regulatory problems.

Such research is a valuable corrective to a national debate over regulation that has become far too polarized and stylized.

In recent months, some people have stressed the crucial importance of regulatory safeguards -- including rules that reduce deaths on the highways, prevent fraud and abuse, keep our air and water clean, and ensure that the food supply is safe.

Other people have objected to expensive regulations and burdensome mandates that impair growth, competitiveness, and innovation -- and that cost jobs.

In the abstract, both sides have legitimate points. But we can't solve serious problems in the abstract, and in important ways, the polar positions are stuck in outmoded and decreasingly helpful debates from decades ago.

In recent years, we have learned a great deal about regulation. As a result of conceptual and empirical advances, we know far more than during the New Deal and the Great Society, and we have also learned a great deal since the 1980s and 1990s.

We are now equipped with state-of-the-art techniques for anticipating and cataloguing the consequences of regulation, including both benefits and costs.

We know that risks are part of systems, and that efforts to reduce a certain risk may increase other risks, perhaps even deadly ones, thus producing ancillary harms – and that efforts to reduce a certain risk may reduce other risks, perhaps even deadly ones, thus producing ancillary benefits.

We know that flexible, innovative approaches, maintaining freedom of choice, are often desirable, both because they preserve liberty and because they cost less.

We are aware that large benefits can come from seemingly modest and small steps – including simplification of regulatory requirements, provision of information, and sensible default rules, such as automatic enrollment for retirement savings.

We know, more clearly than ever before, that it is important to allow public participation in the design of rules, because members of the public will have valuable and dispersed information about likely effects, existing problems, creative solutions, and possible unintended consequences.

We know that if carefully designed, disclosure policies can promote informed choices and save both money and lives.

We know that intuitions and anecdotes are both unreliable, and that advance testing of the effects of rules, as through pilot programs or randomized controlled experiments, can be highly illuminating.

We know that it is important to explore the effects of regulation in the real-world, to learn whether they are having beneficial consequences or producing unintended harm.

To go beyond an increasingly stale and unhelpful debate, we need to begin with these understandings. Above all, we need to obtain a careful and objective analysis of the anticipated and actual effects of regulations, whether positive or negative. We need to look at evidence and data. We need careful assessments before rules are issued, and we need continuing scrutiny afterwards.

Of course it is true that people's values differ, and in some cases, the relevant values will lead in a certain direction even if the evidence is clear. What I want to emphasize here is the opposite possibility – that when the evidence is clear, it will often lead in a certain direction even there are differences with respect to underlying values.

If, for example, a regulation would save a lot of lives and cost very little, people are likely to support it regardless of their party identification; and if a regulation would produce little benefit but impose big costs on real people, citizens are unlikely to favor it, regardless of whether they like elephants or donkeys.

On January 18th of this year, President Obama offered a fresh approach to federal regulation – an approach that reflects a lot of new thinking about regulation. The very first paragraph of the executive order he issued on this topic emphasizes that our regulatory system "must measure, and seek to improve, the actual results of regulatory requirements."

In Executive Order 13563, the President laid the foundations for a regulatory system that protects public health and welfare while also promoting economic growth, innovation, competitiveness, and job creation. The President's approach promises to eliminate unnecessary regulatory burdens and costs on individuals, businesses both large and small, and state and local governments.

Among other things, the President called for an unprecedented government-wide "lookback" at federal regulation. The lookback requires all agencies to reexamine their significant rules, and to streamline, reduce, improve, or eliminate them on the basis of that examination.

Today, I am able to announce the initial results of this review.

Thirty departments and agencies have risen to the President's challenge and released action plans to remove what the President has called unjustified rules and "absurd and unnecessary paperwork requirements that waste time and money."

We are taking immediate steps to eliminate hundreds of millions of dollars in annual regulatory burdens. Over the next several years, these steps have the potential to eliminate billions of dollars in regulatory burdens on individuals, small businesses, and state and local governments.

In fact, over $1 billion in savings are anticipated from just a few initiatives from the Department of Transportation, the Department of Labor, and EPA. And all in all, the plan's initiatives will save tens of millions of hours in annual paperwork burdens on individuals, businesses, and state and local governments. Eliminating paperwork burdens can make a big difference for individuals and small businesses, which can find it hard to grow if there is too much red-tape.

The sheer range of the plans is truly extraordinary. Some plans list well over fifty reforms. DOT offers seventy regulations on which action will be taken and fifty-five for further study. EPA put forward sixteen high-priority initiatives, intended for completion in the short-term; it also offers fifteen high-priority initiatives for the longer term.

Many of the proposals focus on small business. Indeed, a number of the initiatives are specifically designed to reduce burdens on small business and to enable them to do what they do best, which is to create jobs. Going forward, the Transportation department specifically identifies 19 reforms that would reduce burdens on small business.

Some of the proposed initiatives represent a fundamental rethinking of how things have long been done – as, for example, with numerous efforts to move from paper to electronic reporting. For both private and public sectors, those efforts can save a lot of money. Over the next five years, the Department of Treasury's paperless initiative will be saving $400 million and 12 million pounds of paper.

Other efforts at updating are a bit less fundamental, practically speaking, but in their way historic – as, for example, with efforts to ensure that the Code of Federal Regulations does not refer to, or impose obligations with respect to, nations that no longer exist, such as Yugoslavia.

We are also rethinking regulations that require use of outdated technologies such as film radiography (which is being phased out at many medical facilities).

Many of the reforms will have a significant economic impact.

Consider this one.

Since the 1970s, milk has been defined as an "oil" and subject to costly rules designed to prevent oil spills. In response to feedback from the agriculture community and the President's directive, EPA recently concluded that the rules placed unjustifiable burdens on dairy farmers -- and exempted them. The exemption gives whole new meaning to the phrase "don't cry over spilled milk." And over the next decade, the exemption will save the milk and dairy industries, including small business in particular, as much as $1.4 billion.

And that is just one example.

- Today, the Occupational Safety and Health Administration is announcing a final rule that will remove over 1.9 million annual hours of redundant reporting burdens on employers and save more than $40 million in annual costs. Businesses will no longer be saddled with the obligation to fill out unnecessary government forms, meaning that their employees will have more time to be productive and do their real work.

- OSHA plans to finalize a proposed rule projected to result in an annualized $585 million in estimated savings for employers. This rule would harmonize U.S. hazard classifications and labels with those of a number of other nations by requiring the adoption of standardized terms.

- To eliminate unjustified economic burdens on railroads, the Department of Transportation is reconsidering parts of a rule that requires railroads to install equipment on trains. DOT plans to refine the requirements so that the equipment is installed only where it is really needed on grounds of safety. DOT expects initial savings of up to $400 million, with total 20-year savings of up to $1 billion.

- EPA will propose to eliminate the obligation for many states to require air pollution vapor recovery systems at local gas stations, on the ground that modern vehicles already have effective air pollution control technologies. The anticipated annual savings? About $67 million.

- The Departments of Commerce and State are undertaking a series of steps to eliminate unnecessary barriers to exports, including duplicative and unnecessary regulatory requirements, thus reducing the cumulative burden and uncertainty faced by American companies and their trading partners. These steps will make it a lot easier for American companies to reach new markets, increasing our exports while creating jobs here at home.

- To reduce administrative burdens and increase certainty, the Department of the Interior is reviewing outdated regulations under the Endangered Species Act to streamline the process, to reduce requirements for written descriptions, and to clarify and expedite procedures for approval of conservation agreements.

- To promote flexibility, the Department of Health and Human Services will be reconsidering burdensome regulatory requirements now placed on hospitals and doctors, to ask whether these requirements are redundant and whether they really benefit patients. For example, the Department will be asking whether transplant hospitals should be required to spend time documenting blood type information that has already been entered into relevant medical databases.

It's important to note that we couldn't have come up with these and other reforms were it not for public input from the people that these rules affect. Many of the initiatives come not from Washington, but directly from the American public.

Of course, we don't only need to look back; we also need to look ahead about how we regulate in the future.

That is why in his Executive Order, the President issued a series of new directives to govern future rulemaking. Those directives are consistent with, and informed by, what we have learned about regulation in recent years.

Let me emphasize four key points.

First, the President made an unprecedented commitment to promoting public participation in the rulemaking process – with a central goal of ensuring that rules will be informed, and improved, by the dispersed knowledge of the public.

Agencies are not merely required to provide the public with an opportunity to comment on their rules; they must also provide timely online access to relevant scientific and technical findings, thus allowing them to be scrutinized.

The President's Executive Order directs agencies to act, even in advance of rulemaking, to seek the views of those who are likely to be affected. This group explicitly includes "those who are likely to benefit from and those who are potentially subject to such rulemaking." Among other things, this emphasis on early involvement is an effort to acquire relevant information and to avoid unintended harmful consequences.

Second, the new Executive Order specifically directs agencies to take steps to harmonize, simplify, and coordinate rules. It emphasizes that some sectors and industries face redundant, inconsistent, or overlapping requirements. In order to reduce costs and to promote simplicity, it requires greater coordination. The order also explicitly connects the goal of harmonization with the interest in innovation, directing agencies to achieve regulatory goals in ways that promote that interest.

Third, the Executive Order firmly stresses the importance of quantification. It directs agencies "to use the best available techniques to quantify anticipated present and future benefits as accurately as possible" – and to proceed only on the basis of a reasonable determination that the benefits justify the costs

Fourth, the Executive Order directs agencies to identify and to consider flexible approaches that reduce burdens and maintain freedom of choice for the public. Such approaches may include, for example, public warnings, appropriate default rules, or provision of information "in a form that is clear and intelligible."

The reference to "appropriate default rules" signals the possibility that important social goals can be obtained through simplification – as, for example, in the form of automatic enrollment. We know that automatic enrollment plans in the domain of savings can greatly increase participation. With respect to savings, the Administration has taken numerous steps to promote such plans.

We also know that simplification of existing requirements can often promote compliance and participation and that complexity can have serious unintended consequences. In many domains – including education, where we have radically simplified the Free Application for Federal Student Aid form – we have taken strong steps toward greater simplicity. Indeed, we have recently issued a call to all agencies to reduce reporting burdens on small business and to eliminate unjustified complexity.

Reflecting a clear commitment to these principles, the lookback plans are now being offered to the public for comments and ideas. Agencies will be carefully assessing the available evidence and those comments before they finalize their plans.

Finally, this pragmatic, cost-effective, evidence-based approach to regulation is what has informed our practices for the past two and a half years.

We have launched initiatives that have helped drive highway deaths to their lowest level in sixty years; promoted airline safety while protecting passengers from tarmac delays, overbooking, and hidden charges, in part through disclosure policies; sharply reduced the risk of salmonella from eggs; dramatically increased the fuel economy of the fleet, thus promoting energy independence while saving consumers a lot of money; and protected against air pollution that kills thousands of people each year.

At the same time, and there is absolutely no contradiction here, we are eliminating unnecessary regulatory burdens and tens of millions of hours in annual red-tape.

The focus of the plans released today is on continuing scrutiny of costly requirements, with close reference to evidence and data – and to the experience and wisdom of the American people.

To protect taxpayer dollars, and our future safety and prosperity, we will change the regulatory culture of Washington by constantly exploring what is working and what isn't. Agencies are creating teams to continue to review their rules – to make sure that this is not just a one-time event.

The announcement of today's plans is unquestionably a defining moment. But it is just the start. And I hope that this process might inaugurate a broader, less polarized, more evidence-based conversation about how we might promote economic growth and job creation while protecting the health and safety of the American people. I know that you will be participating in that conversation.

When Alexander Hamilton inaugurated another and even larger conversation, with a series of papers that came to be known as The Federalist, he wrote, The Federalist No. 1:

"It has been frequently remarked that it seems to have been reserved to the people of this country, by their conduct and example, to decide the important question, whether societies of men are really capable or not of establishing good government from reflection and choice, or whether they are forever destined to depend for their political constitutions on accident and force."

Of course the current process does not of course have anything like the momentousness of the decisions made by We the People in the late 1700s.

But the process is also in its way an effort not to depend on accident and force, but to promote good government by reason and choice. In that sense, it might be seen as an effort, in one domain, to honor our founders' extraordinary achievement.

Thank you.

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Federal Register
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Friday, January 21, 2011

Presidential Documents

Title 3—

The President

Executive Order 13563 of January 18, 2011

Improving Regulation and Regulatory Review

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to improve regulation and regulatory review, it is hereby ordered as follows:

Section 1. *General Principles of Regulation.* (a) Our regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation. It must be based on the best available science. It must allow for public participation and an open exchange of ideas. It must promote predictability and reduce uncertainty. It must identify and use the best, most innovative, and least burdensome tools for achieving regulatory ends. It must take into account benefits and costs, both quantitative and qualitative. It must ensure that regulations are accessible, consistent, written in plain language, and easy to understand. It must measure, and seek to improve, the actual results of regulatory requirements.

(b) This order is supplemental to and reaffirms the principles, structures, and definitions governing contemporary regulatory review that were established in Executive Order 12866 of September 30, 1993. As stated in that Executive Order and to the extent permitted by law, each agency must, among other things: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor its regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public.

(c) In applying these principles, each agency is directed to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. Where appropriate and permitted by law, each agency may consider (and discuss qualitatively) values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts.

Sec. 2. *Public Participation.* (a) Regulations shall be adopted through a process that involves public participation. To that end, regulations shall be based, to the extent feasible and consistent with law, on the open exchange of information and perspectives among State, local, and tribal officials, experts in relevant disciplines, affected stakeholders in the private sector, and the public as a whole.

(b) To promote that open exchange, each agency, consistent with Executive Order 12866 and other applicable legal requirements, shall endeavor to provide the public with an opportunity to participate in the regulatory process. To the extent feasible and permitted by law, each agency shall afford the public a meaningful opportunity to comment through the Internet on any proposed regulation, with a comment period that should generally

be at least 60 days. To the extent feasible and permitted by law, each agency shall also provide, for both proposed and final rules, timely online access to the rulemaking docket on regulations.gov, including relevant scientific and technical findings, in an open format that can be easily searched and downloaded. For proposed rules, such access shall include, to the extent feasible and permitted by law, an opportunity for public comment on all pertinent parts of the rulemaking docket, including relevant scientific and technical findings.

(c) Before issuing a notice of proposed rulemaking, each agency, where feasible and appropriate, shall seek the views of those who are likely to be affected, including those who are likely to benefit from and those who are potentially subject to such rulemaking.

Sec. 3. *Integration and Innovation.* Some sectors and industries face a significant number of regulatory requirements, some of which may be redundant, inconsistent, or overlapping. Greater coordination across agencies could reduce these requirements, thus reducing costs and simplifying and harmonizing rules. In developing regulatory actions and identifying appropriate approaches, each agency shall attempt to promote such coordination, simplification, and harmonization. Each agency shall also seek to identify, as appropriate, means to achieve regulatory goals that are designed to promote innovation.

Sec. 4. *Flexible Approaches.* Where relevant, feasible, and consistent with regulatory objectives, and to the extent permitted by law, each agency shall identify and consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public. These approaches include warnings, appropriate default rules, and disclosure requirements as well as provision of information to the public in a form that is clear and intelligible.

Sec. 5. *Science.* Consistent with the President's Memorandum for the Heads of Executive Departments and Agencies, "Scientific Integrity" (March 9, 2009), and its implementing guidance, each agency shall ensure the objectivity of any scientific and technological information and processes used to support the agency's regulatory actions.

Sec. 6. *Retrospective Analyses of Existing Rules.* (a) To facilitate the periodic review of existing significant regulations, agencies shall consider how best to promote retrospective analysis of rules that may be outmoded, ineffective, insufficient, or excessively burdensome, and to modify, streamline, expand, or repeal them in accordance with what has been learned. Such retrospective analyses, including supporting data, should be released online whenever possible.

(b) Within 120 days of the date of this order, each agency shall develop and submit to the Office of Information and Regulatory Affairs a preliminary plan, consistent with law and its resources and regulatory priorities, under which the agency will periodically review its existing significant regulations to determine whether any such regulations should be modified, streamlined, expanded, or repealed so as to make the agency's regulatory program more effective or less burdensome in achieving the regulatory objectives.

Sec. 7. *General Provisions.* (a) For purposes of this order, "agency" shall have the meaning set forth in section 3(b) of Executive Order 12866.

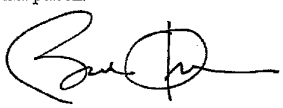
(b) Nothing in this order shall be construed to impair or otherwise affect:

(i) authority granted by law to a department or agency, or the head thereof; or

(ii) functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(c) This order shall be implemented consistent with applicable law and subject to the availability of appropriations.

(d) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.



THE WHITE HOUSE,
January 18, 2011.

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