Testimony before the U.S.-China Economic and Security Review Commission
Hearing on "China's Global Quest for Resources and Implications for the United States"

by

Jeffery A. Green, Esq.
President and Founder
J.A. Green & Company

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Introduction & Executive Summary

Chairman D'Amato, Chairman Blumenthal and distinguished Commissioners, I want to thank you for the opportunity to testify before the Commission on Chinese policy towards strategic and critical materials and the repercussions of this policy on the United States.

Significant public attention on the People's Republic of China ("China") has focused on big-ticket, high-visibility items, such as the apparently sudden manifestation of more superhighways, high-speed trains, and—of course—new military equipment. To support this impressive growth, China has exhibited a seemingly insatiable demand for raw materials: base metals, fossil fuels, rare earth elements (REE), and others. Many of these materials are of sufficiently high material intensity, geographic concentration, and unique applicability to warrant being labeled "strategic and critical" materials.

The Chinese government has demonstrated a forward-looking strategic and critical materials policy that considers the supply of said materials to Chinese industry a fundamental driver and multiplier of economic growth. This policy is notable for both its foresight and ancillary benefits, such as deeply integrated state-to-state relationships with key nations that can provide for Chinese demand. However, the execution of this policy poses serious security and industrial concerns for the economy and national defense of the United States and our allies.

The Logic of Strategic & Critical Materials

To lay the necessary groundwork for discussion of "strategic and critical materials", we must have a clear definition of that term. Unfortunately, current usage is inconsistent and confusing, despite attempts by the U.S. Government to establish a common framework. For example:

> *The term "materials" means substances, including minerals, of current or potential use that will be needed to supply the industrial, military, and essential civilian needs of the United States in the production of goods or services, including those which are primarily imported or for which there is a prospect of shortages or uncertain supply, or which present opportunities in terms of new physical properties, use, recycling, disposal or substitution, with the exclusion of food and of energy fuels used as such. (30 U.S.C. § 1601(b) "Materials & Minerals Policy, Research, and Development")*
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> *Strategic & critical materials: materials that would be needed to supply the military, industrial, and essential civilian needs of the United States during a national emergency, and are not found or produced in the United States in sufficient quantities to meet such need. (50 U.S.C. § 98h–3(1) "Acquisition and Development of Strategic Raw Materials")*
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> *The term "materials critical to national security" means materials— upon which the production or sustainment of military equipment is dependent; and the supply of which could be restricted by actions or events outside the control of the Government of the United States.(10 U.S.C. § 187(e)(1) "Strategic Materials Protection Board")*

In short, materials that may be characterized as strategic and critical by one part of the U.S. Government do not necessarily earn the same consideration by other U.S. Government agencies, leading at times to a myopic *"there's no problem in my program"* attitude within Executive Branch agencies. In my testimony, I choose to use the definition in Title 50, United States Code, because, in my view, it best captures a "whole supply chain" industry approach along with security and civilian demand.

With this definition in mind, we can answer what strategic and critical materials are. Now we should turn to "why are strategic and critical materials important, and how should we think about them?"

I would offer this set of guiding principles: strategic and critical materials are, first, a function of the economic policy of the state, wherein these items provide the necessary raw materials to support high value-added manufacturing and research and development (R&D). More generally, they increase revenues, job creation, and economic growth. However, per the definition in Title 50, this is not the end of the story; economic growth and high per-capita gross domestic product (GDP), which is concomitant with high value-added manufacturing and R&D, enable the equipping, training, mobilizing, and sustaining of modern military forces with increased capabilities. Therefore, strategic and critical materials, in addition to their supporting role within economic policy, fuel the defense industry and enable military modernization.

While all highly-developed economies consume strategic and critical materials, each country differs in local availability and efficiency for using strategic and critical materials. This is the basic understanding of comparative advantage and the benefits from international trade. Unfortunately, the risk to all participants increases when one country introduces market distortions to exploit this co-dependency among nations and gain a temporary absolute advantage to enable *quasi-monopolistic* price discrimination and security advantage.

The following case study of rare earth elements and other mineral activities outside mainland China demonstrates the implications of a lack of strategic materials policy by one country and a comprehensive policy by another.

Chinese Resource Policy for Materials within Mainland China: Rare Earth Case Study

History of the Rare Earth Industry

The rare earth issue presents perhaps the clearest example of the impact that Chinese resource policy has had in shaping political and economic realities in the United States and the rest of the world.

Today, China dominates all aspects of the rare earth supply chain. They produce roughly 94% of all rare earth oxides consumed world-wide, nearly 100% of commercial rare earth metal, and the vast majority of rare earth alloy and magnets. China has embargoed neighboring countries (e.g., Japan) over diplomatic disputes, frequently revises its export policies, implements strict controls on the industry nationwide, and increasingly controls export quotas for materials. These policies have resulted in a growing supply-chain dominance that has often led to relocation of industrial players to China as they seek to secure rare earth supplies. Such relocation has led to growing concern over technology transfers and intellectual property. While the global market has responded by attempting to bring new sources of supply online, to date we have seen no new production in the rare earth oxide market, and our dependence on Chinese sources has grown.

This was not always the case. Starting in the 1940s and for nearly forty years thereafter, the United States was the overwhelming leader of the rare earth industry with the Mountain Pass mine in California single-handedly providing the vast majority of rare earth materials to the rest of the world.

"There is Oil in the Middle East and there are Rare Earths in China" – Deng Xiaoping, 1992

How did this role-reversal occur? China realized the value of their abundant rare-earth reserves in the late 1970s and began taking measures to increase rare earth production steadily throughout the 1980s. Then, during the 1990s, China flooded the market by more than tripling the previous world supply of the materials.

During this time, Chinese rare earth-producing firms were largely unprofitable but were allowed to survive through direct and indirect support by the Chinese government. This backing enabled China's rare earth industry to continue to mine and export these materials at prices far below the actual costs of production.

With the additional industrial advantages of a low labor cost, questionable environmental standards, and export taxes, the impact of these efforts were swift and dramatic: within 20 years China went from producing roughly one-third to nearly all of the world's supply of rare earths. Mines in the United States and elsewhere, unable to remain profitable against cheap Chinese exports, went out of business. The United States was completely dependent on imports. With the mines shuttered, companies in the United States that refined the rare earth metals and alloys and manufactured rare earth magnets moved overseas or simply closed.

With the disappearance of the entire U.S. rare earth supply chain, the United States became further dependent on foreign suppliers for all rare earth materials, from oxides, metals, and alloy to permanent magnets and finished products. According to Government Accountability Office estimates, rebuilding this supply chain could take as long as 15 years, and some technical expertise may be permanently lost.

Export Quotas and Consolidation

As China solidified control of most aspects of the rare earth supply chain, it began to take additional anti-competitive actions to capitalize on its domination of the industry.

Despite skyrocketing demand for the materials due in part to their critical roles in high- and green technology applications — ranging from iPhones and hybrid vehicles to satellites — China began decreasing exports in 2006; officials have cited internal demand and environmental concerns as their rationale. These export constraints created supply uncertainties among key industries, fueling dramatic price increases throughout 2010-11. As a result, industries have been forced to raise prices to compensate for these uncertainties and / or relocate to China to secure a more reliable, lower-cost supply of rare earth materials.

With rare earth prices reaching unprecedented highs in June 2011, China took action to seek a stabilization of prices at higher levels and also, perhaps counterintuitively, support establishment of non-Chinese sources of supply. As demand sagged in light of difficult economic times globally and as global prices fluctuated, Baotou Steel announced that it would buy back rare earth oxides at above-market prices to support price levels. Meanwhile, the high price of rare earth materials led to an increase in smuggling and illegal mining operations across China. In response, Chinese authorities took a hard line against smugglers and cracked down on the industry as a whole. The government has also spent the last several years consolidating the industry, announcing in 2009 that it would push to reduce permitted rare earth mines from 123 to less than 10, and reduce processing firms from 73 to 20 by 2015.

China has further worked to establish tighter control over its rare earth industry through new licensing rules and environmental regulations; failure to meet these requirements would result in loss of license or facility closure. A major theme of China's official explanation for the current crackdown on rare earth producers is the negative impact the mining operations have had on the environment, which coincides with one of the two exceptions to World Trade Organization (WTO) rules governing constraints on exports or production.

Such policies seemingly ensure historically higher rare earth pricing in the long term, while also enabling future producers to capitalize on the improved economics provided by the new pricing regime. Numerous industry analysts project that between 2014 and 2016, China will become a net importer of rare earths.

While this will provide much needed relief in the market, it should be approached with caution. It is critical to consider the eventual markets for new sources of supply. As previously noted, much of the world's current rare earth metal, alloy and magnet production takes place in China, with the vast majority of production occurring in Asia.

Securing Global REE Resources

While it has consolidated its rare earth industry at home, China has also been working to secure additional resources abroad. On numerous occasions during the 2000s, Chinese firms have sought to take an equity stake in, or outright acquire, rare earth mines and mining companies across the globe. Two key examples of this are the bids that Chinese firms have previously made on the two companies now positioned to provide the first sources of rare earth supply outside China: Molycorp and Lynas.

Chinese state-owned enterprises (SOEs) attempted to buy the Mountain Pass rare earth mine as part of a 2005 China National Offshore Oil Company (CNOOC) bid to acquire Unocal Corporation for $18.5 billion. CNOOC eventually gave up on the deal in the face of stiff opposition from U.S. political leaders who raised strong concerns over transfer of oil reserves; however, little attention was paid on Capitol Hill or within the Executive Branch to the inclusion or implications of the sale of the rare earth resource.

Four years later, another Chinese SOE, the China Non-Ferrous Metal Mining Company (CNFMM), attempted to acquire a 52% stake in Lynas. In return the Chinese firm would secure funding for development of Lynas' Mt. Weld mine, the largest single deposit of rare earths in the world. However, after an extended review by the Australian government's Foreign Investment Review Board, CNFMM rescinded its offer when the government requested a number of changes to the deal before it would be allowed to go through — in particular that the proposed percentage ownership to be held by CNFMM be less than 50%.

These are just two examples of Chinese attempts to develop and secure rare earth supplies; similar cases have occurred in Brazil, Malawi, the Philippines, South Africa and elsewhere around the world.

In addition to mining operations, Chinese firms have also sought out and acquired the downstream, value-added manufacturing firms elsewhere in the supply chain. In 1985, General Motors founded Magnequench to fabricate neodymium iron-boron magnets and other components for munitions and military equipment. This company developed the methods to mass produce rare earth permanent magnets for the primary applications we use today: miniaturized motors, generators, audio speakers, and sensors.

This company was sold in 1996 to the Sextant Group, which was owned by two Chinese SOEs: San Huan New Material and the China National Non-Ferrous Metals Import and Export Corporation. Though the head of Sextant had promised to keep Magnequench open in the United States, the company was shuttered in 2004, and all of the company's machine tools, computers, and other equipment were sent to China, leaving hundreds of U.S. workers jobless. The loss of the intellectual property developed and utilized by Magnequench essentially terminated the lead held by the United States in the rare earth permanent magnet industry.

More broadly, China's rare earth oxide production dominance has resulted in the dismantling of the United States' rare earth supply chain in two ways. First, by establishing export restrictions on rare earths, China can effectively set two prices: one for rare earth buyers inside China and another for buyers outside China. As export restrictions continue to tighten and encompass a growing range of products, there is an added implicit threat: not only is it cheaper for companies in China to buy rare earths, companies outside China may not have access to them at all. Second, simply by being the largest single marketplace in the world, China has enormous leverage over companies looking to sell their products. Often the most

effective means of selling cars or televisions in China is partnering with a domestic Chinese firm and accepting the associated risk of unintended technology transfer.

The pattern has been too consistent to ignore. In the last year, both Nissan and Toyota have indicated they will move some electric motor and battery manufacturing to China. Honda has said it plans to move electric motor manufacturing plants to the China for the first time. Showa Denko, one of the world's leading rare earth alloy manufacturers, is establishing production in China and leading neodymium iron boron magnet manufacturer, Hitachi Metals, is reportedly considering establishing Chinese production. Even General Motors is only allowed into China's market on the condition that it establish a venture with China's largest automaker to jointly develop an electric vehicle for sale in China.

Raw Materials and Politics by Other Means

Many of these market perturbations may have gone largely unnoticed if not for an international incident that occurred off the coast of the Senkaku Islands in September of 2010. Two Japanese Coast Guard vessels attempted to stop and inspect a Chinese fishing trawler in disputed waters. The Chinese captain refused and attempted to flee, colliding with both Japanese ships in the process. The trawler was eventually stopped, and the captain and crew were detained.

In response, the Chinese first demanded the release and return of the trawler's crew. When the request was denied, China broke off all high-level diplomatic communications with Japan and cut off shipments of rare earths to Japan. While the "embargo" was officially denied by the Chinese government, the impact was immediate: suddenly an obscure set of elements were headline news and maintaining a reliable supply was a national security necessity. Furthermore, this action highlighted a critical supply chain vulnerability, making abundantly clear that Chinese dominance in rare earths poses an economic and national security concern for U.S. allies — and the United States itself.

General Characteristics of the REE Market

Overall, the REE market contains high barriers to entry, lacks transparency, astronomically high start-up costs, and reflects relatively small demand when compared to commodities such as copper. The Department of Energy's *2011 Critical Materials Strategy* addresses the lack of transparency in the REE market, citing internal industry characteristics as the root cause. Rare earth oxides (REOs) are not traded on major exchanges, so transactions tend to occur between independent parties and are therefore not formally recorded. The characteristic opacity of the market creates price volatility, which has been cited as more concerning to investors than higher prices. Adding to market uncertainty is the inability to predict Chinese political moves that affect REO supply and, in turn, price. This, of course, was the case when the Chinese announced a 40% decrease in REO export quotas, causing REO prices to skyrocket. China's future REO supply is also unclear due to a lack of information on reserves, future consumption, and production capability.

The *2011 Critical Materials Strategy* also addresses the capital required to break into the REE market. At a rate of nearly $50 million for just the exploratory stage, market entry is extremely challenging. In such a small market, worth only about $3 billion in sales for 2010, prospective suppliers are particularly challenged by market uncertainty.

The U.S. REE market in particular faces supply chain uncertainty that, with new domestic production, could result in strengthening Chinese industry. Even with new domestic production of rare earths and processing to rare earth oxide, limited capability exists to process such oxides to alloy, metal, and magnets. Without such capability and with uncertain commercial demand for value-added rare earth products in the United States, it is possible that much of the new domestic production could be destined

for export to China and Japan. As the U.S. rare earth supply chain has atrophied, much of the production of rare earth containing products has already migrated to Asia, ultimately limiting the users of rare earth products by U.S. manufacturers, who instead tend to import rare earth products.

In examining this global issue, it is important to address the actions U.S. allies have taken to address the REE market and dominant Chinese control. The WTO and the European Union (EU) have been particularly active in supporting U.S. rare earth interests and have repeatedly pressured China to lift its export restrictions and comply with international trade obligations. In July 2011, the WTO, with support from the United States, the EU, and Mexico, issued a ruling affirming that China violated global trade laws when it restricted export of a variety of non-rare earth materials. The EU's European Commission issued a raw materials strategy of its own in an effort to sustain a global supply of these materials for the future.

It should also be noted that a WTO case for rare earths and other materials is not a panacea. While an expectation certainly exists for countries to comply with their WTO obligations, a successful trade case does not necessarily benefit all parties equally. For example, a WTO case requiring removal of export quotas on rare earths might drive down global prices, which would benefit consumers of rare earths. However, this downward price adjustment might dissuade non-Chinese companies from entering the market, preventing further diversification of sources of REE supply.

Other Strategic & Critical Materials with Similar Trends

Within mainland China, there are a host of other materials which have tended to follow this trend of increasing export quotas and even WTO action. One such material, which was formerly mined in the United States, is fluorspar.

Fluorspar comes in two grades based on the concentration of calcium fluoride (above or below 97%), with China accounting for approximately 50% of world production. The highest grade, acid-grade, "is the primary feedstock for the manufacture of virtually all fluorine-bearing chemicals and is also a key ingredient in the processing of aluminum." (U.S. Geological Survey) This material has previously been the subject of study by several Department of Defense (DOD) reports regarding material shortfalls during peacetime supply disruptions, and DOD recently identified it as a Top 10 material shortfall based on planning assumptions. (*Strategic and Critical Materials 2011 Report on Stockpile Requirements*)

Responsibility for fluorspar is also under the same Chinese agency as rare earths, the Ministry of Industry and Information Technology (MIIT). In a September 2011 article in the *Shanghai Securities News*, MIIT released an interim planning document labeling fluorite (the mineral form of fluorspar) a "non-renewable precious resource" and implemented controls to deliberately decrease production, year over year, "for the protection of resources [and the] environment."

While government agencies highlighted the criticality of fluorspar, major foreign end-users, like Solvay S.A. (Belgium) and Arkema, have begun negotiating exclusive off-take agreements or outright purchasing mines to guarantee supply. U.S. companies have been slow to move on this issue. Such is the vertical integration of most of the industry that perhaps only 700,000 to 800,000 metric tons of fluorspar was freely traded in 2010.

Although more commonly affiliated with pencils, graphite is another material with exciting new potential applications for both the consumer electronics and clean energy fields. Presently, the main U.S. applications involve the steel industry, but lithium-ion batteries in hybrid and electric vehicles promise to be a major driver of future graphite demand. For defense purposes, graphite is also an ablative material for missiles and bombs, is a lubricant for small arms ammunition, and is used to produce ceramic armor

tiles. Nuclear reactors also use high grades of graphite, and this use is the subject of increasingly intense development in China as the country attempts to diversify its energy portfolio.

The most exciting new, potential use of graphite is based on a form of it called graphene, a single layer of hexagonal rings of carbon. Discovered in 2004, graphene is the thinnest material ever developed, is 200 times stronger than steel, and conducts electricity and heat better than copper. Some have touted this as the material that may replace silicon-based electronics, enabling advanced products like a high-definition television as thin as paper or a full-size digital newspaper that could be folded to fit in your pocket.

Approximately 73% of global production originates in China and about 77.5% of global reserves of graphite are located in China (U.S. Geological Survey).

Another element, vanadium, has seen a dramatic spike in world-wide demand owing to a relatively minor change in China's building codes. In 2005, China began requiring new buildings to use certain types of steel rebar that contained vanadium, which increases steel's strength. This one change created a 40% increase in world-wide vanadium demand practically overnight and is yet another material of increasing importance to development of the Chinese economy.

In addition to these actions in the rare earth market, China identified five strategic materials as reserve priorities for the country. As reported by the *China Economic News*, these materials included cadmium, cobalt, copper, manganese, and petroleum. The combined cost of this Chinese stockpile is approximately $2.7 billion and most notably includes both fuel and non-fuel resources — like combining the Strategic Petroleum Reserve and the National Defense Stockpile. What makes these commodities unique is that none of them appear in great quantities in mainland China.

Chinese Resource Policy for Materials outside Mainland China: Future Action?

Where the trends in the rare earth market have been described as manipulative or predatory, a better description is, perhaps, a "China first" policy, namely, protecting Chinese-based miners and manufacturers at the expense of global competition to retain overwhelming market share. This motif, if not necessarily the method, is repeated for several other commodities not predominantly found in China.

This is not to necessarily say that the acquisition of these materials overseas is part of deliberately executed strategy orchestrated by the Chinese government —though one could be forgiven for thinking so considering China's "Going Out" Strategy (1999). However, the cumulative result of the profit motives for Chinese SOEs and the supply chain worries of the Chinese government is, in effect, a *de facto* effort to gain exclusive access to strategic and critical materials necessary to fuel Chinese economic growth.

This strategy also may not necessary be as overt as was evidenced by Magnequench and other activities. Considering that Chinese GDP growth had consistently remained in the double digits for several years with the financial crisis being a significant outlier, the shift in mid-2010 to consistent single-digit growth as part of a state policy to limit asset price increases and constrain inflation will necessarily affect commodity prices. Short-term speculation about Chinese monetary policy aside, elevated interest rates and other limitations on construction will place structural obstacles to the consumption of strategic and critical materials in China. Though this might be interpreted as a welcome reprieve, more likely it will return to the quiet acquisition policy mirrored in the pre-Senkaku period of the rare earth industry.

One of the areas already addressed by this Commission is Chinese investment in the energy sectors of South America, Africa, and elsewhere. This has played an important role in U.S. foreign policy and United Nations action addressing the humanitarian crisis in Darfur and other areas. Again, the mixture of

profit motives by Chinese SOEs and strategic and critical resource risk plays an important role, in addition to a larger trend of attempting to separate business from local politics.

On the other hand, metals have not received nearly as high a public profile, despite increasingly similar trends. Among these commodities, cobalt is among the more noteworthy strategic and critical materials. Typical applications for cobalt and its alloys are the turbine blades for jet aircraft, orthopedic implants, and prosthetic limbs, among others. Approximately 46% of global reserves are located in the Democratic Republic of Congo (DRC) (U.S. Geological Survey), and many companies are reluctant to invest due to ongoing instability in the country. The Dodd-Frank Financial Reform legislation also has an additional reporting requirement for only U.S.-listed companies to certify that their products are "conflict free", specifically with regard to the DRC.

However, approximately 90% of China's imported cobalt originates in the DRC and neighboring Zambia, with the flagship agreement between China and the DRC known as Sicomines — Sino-Conglais des Mines. This joint venture between three Chinese SOEs (68% share) and the DRC state mining company (32% share) was funded by loans from the Chinese Export-Import Bank, separate SOE. Six of the nine billion dollars for this deal was allocated for infrastructure improvements with the other three used to upgrade the mining facilities. This agreement would allow for the extraction and shipment of 10.6 million tons of copper and 626,629 tons of cobalt to China, and in the event that profits from the mining operations were insufficient, China has demanded guaranteed repayment of its infrastructure investments. Among the concerns raised by advocacy groups and others include environmental compliance and transparency, especially in light of government corruption and a poor security environment.

This combination of joint ventures and state-backed loans is just one of the main methods used by Chinese firms in the bid and proposal process to developing countries when negotiating mining agreements. However, another tool often used by Chinese firms with more established foreign firms, many of which badly needed capital through the 2008-09 financial crisis, is to take an equity stake in the company.

South Africa produces almost 40% of global chromium ore, and chromium has no substitutes in the use of super alloys, stainless steel, and other defense products to increase metal hardness and corrosion resistance (U.S. Geological Survey). Since 2005, multiple Chinese companies have taken an equity position in or formed joint ventures with South African chromium miners and ferrochrome processors, including Sinosteel (50% of a joint venture with Samancor; 60% holding in Asa Metals) and Jiuquan Iron & Steel (also known as "Jisco"; 26.1% holding in Inter-national Ferro Metals [IFM], with off-take of 50% of ferrochrome production). When asked about some of these activities on the part of Chinese mining companies, a senior economist with the South African Department of Mineral Resources insisted that South Africa is a free market, but the United States should "be more aggressive like the Chinese."

Unfortunately, this pattern is slowly repeating itself for a number of metals across the African continent, some of which simply do not occur in economically viable deposits elsewhere in the world: platinum group metals, manganese, tantalum, tungsten, vanadium, titanium sands, and others.

With this being said, there is significant backlash to the increasing Chinese presence in Africa. The primary grievances can be categorized as follows: (1) Chinese companies importing labor instead of hiring host nation personnel; (2) quality control, sustainment, and environmental compliance on infrastructure projects; (3) Chinese laborers tending to remain in country after completion of the project; and (4) labor-management conflict.

Concluding Observations & Geostrategic Consequences:

Recalling the *Logic of Strategic & Critical Materials* of this testimony, the case study of rare earths has shown an increasing tendency by the Chinese government to control production and exports to first gain a dominant position and then, once achieved, extract rents from the United States and the rest of the global market. Similarly, when considering those strategic and critical materials not predominantly concentrated in China, Chinese SOEs, sometimes with financial guarantees from the Chinese state, are working towards gaining a similar foothold in a variety of niche commodities.

The question remains, then, "How does this actually shape the geostrategic reality the United States and our allies are likely to face in the coming decades?"

The first and most obvious area where this will have an impact for the United States is the purely "economic" field. The basic availability for certain strategic and critical materials will be significantly reduced in the near future if current trends continue; this is the view of most experts in the rare earths field, increasingly in the metals arena, and even within parts of the U.S. Government (see the Department of Energy's *2011 Critical Materials Strategy*). This does not necessarily mean that these strategic and critical materials will be completely unobtainable, but U.S. companies would be fiercely competing against the rest of the world's manufacturers for raw materials at artificially high prices. Those countries with direct, cheaper access would necessarily have a competitive advantage that does not bode well for U.S. companies.

The current status of the green technology market shows some of these trends, as major applications like wind turbines and hybrid cars rely on rare earth materials and specialty metals. Increasing raw material costs have encouraged many companies to shift their manufacturing bases from their home countries, including the United States, to China. In so doing, they no longer incur the extra costs associated with shipping materials to the manufacturing facility and other export duties and value-added taxes. However, as a part of this transition, China has required the foreign firms to form a joint venture with a local Chinese company and transfer some of their proprietary technology.

There is a close link between these economic consequences driven by strategic and critical materials and the defense market. One very real recent example bridging these two distinct realms is receiving increased collective attention from Congress and the Administration: the General Electric-Aviation Industry Corp. (AVIC) joint venture. This joint venture would supply avionics for China's planned commercial airliner to challenge the Boeing 737 and Airbus A320 families, but AVIC is also a SOE that produces fighters, bombers, and 90% of the aviation weapon systems used by the Chinese military. Other items that bridge the civilian and defense sectors include the most recent National Defense Authorization Act, which required an analysis of and mitigation steps for counterfeit electronic parts in the defense supply chain.

However, the question to which I believe the Commission would like at least a partial response addresses how strategic and critical materials policy might affect the security of the United States and our allies. China truly shocked the world with its aggressive behavior over the Senkaku Islands incident with Japan. In short, the economic leverage derived from strategic and critical materials policy, which is at best an anticompetitive nuisance, has the demonstrated potential to be translated into diplomatic leverage to build the case for the territorial gain — or ultimately present less powerful neighboring states with a *fait accompli* without alternative.

Similar such events are, unfortunately, increasingly likely with multiple regional claimants, but so long as careful steps are taken to avoid unnecessary confrontation and especially escalation, this should be a manageable risk. This is one of the many reasons why the President's strategic focus on East Asia — as outlined in the DOD's new Defense Strategic Guidance — is most welcome.

Under a truly worst-case, lowest-probability scenario which would mirror U.S. policy prior to our entry into World War II and longstanding Japanese export policy, China could perhaps threaten to prohibit or actually prohibit the export of raw materials or other finished products which it deemed included in "offensive weaponry" or in support of "offensive military action" around the world. Considering the early reports from the counterfeit parts legislation, the prevalence of raw earth materials in U.S. weapon systems and platforms, and other investments by SOEs in strategic and critical materials around the globe, such a scenario would present extreme supply challenges to the United States and our allies.

However gloomy this may sound, there are a number of U.S. Government agencies slowly realizing the importance of strategic and critical materials policy in economic and national security terms. That said, in the absence of a deliberately thought-out plan, *inactivity has become our plan*, and domestic industries and the ability to manage our supply chain are fading.

In closing, I wish to offer several policy-based recommendations that may begin to better formulate a national strategic and critical materials policy. These recommendations should be immediately considered by committees of jurisdiction within Congress for potential inclusion in future legislation, and I believe they will bring us one step closer to the realization that Chinese policymakers have already internalized: the intersection of national security, economics, and resource policy.

Recommendations:

1. Require a U.S. government-wide definition of "strategic and critical" materials, and encourage a common definition with key allies.

2. Require Federal agencies to use existing tools to incentivize strategic and critical materials extraction and manufacture in the United States, including but not limited to the following: stockpile arrangements (traditional, off-take, vendor-managed inventories, buffer stocks); Defense Production Act (Title III) use; grants, tax credits or other incentives; and streamlined permitting between the states and Federal government and among Federal agencies.

3. After failing to meet in 2010 and thus failing to comply with 10 U.S.C. §187(b) and 10 U.S.C. §187(c), require the Department of Defense's Strategic Materials Protection Board to issue recommendations.
    a. This statutory model should be copied across the Executive Branch to generate information required to feed an interagency working group.

4. Acknowledge that *Reduce, Reuse, Recycle, and Substitute* alone, however politically palatable, is a woefully inadequate policy to address strategic and critical materials policy because it tacitly embraces current market conditions, thereby encouraging states to follow what have been described as predatory practices in the rare earth market.

5. Create a strategic and critical materials development fund to foster the development and manufacture of United States and allied nation-based strategic materials for the U.S. defense market to offset high barriers to entry, long-lead times, and foreign predatory practices.

6. Pursue World Trade Organization (WTO) action with the European Union, Japan, and others to bring about successful Chinese compliance in line with our common WTO obligations.
    a. Require the U.S. Trade Representative to issue a report on China's compliance with WTO obligations specifically related to strategic and critical materials.

Thank you for this opportunity to speak, and I look forward to your questions.