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### Our Sole Contention: Rare Earth Metals

#### Bill Ibelle of Northeastern University writes in 2018 that

Bill Ibelle, 7-25-2018, "At risk in a trade war with China? The rare earth metals that make your smartphone (and your guided missile).," https://news.northeastern.edu/2018/07/25/at-risk-in-a-trade-war-with-china-the-rare-earth-metals-that-make-your-smartphone-and-your-guided-missile/, Date Accessed 8-20-2018 // JM

Rare earth metals are essential ingredients in a vast array of consumer, medical, and military products ranging from smartphones to guided missiles. The list includes MRI machines, camera lenses, hard drives, speakers, wind turbines, televisions, naval radar, headphones, lasers, drones, night vision goggles, microwaves, telescopes, electric cars, the Mars Rover, and motors of virtually any kind. And China produces more than 80 percent of the world’s supply of rare earth metals, according to [statistics](https://minerals.usgs.gov/minerals/pubs/commodity/rare_earths/mcs-2018-raree.pdf) compiled by the United States Geological Survey. The United States, in contrast, produces zero. “This is a leverage point for China,” said University Distinguished Professor of International Business and Strategy [Ravi Ramamurti](http://news.northeastern.edu/?s=ravi+ramamurti&post_type=faculty-experts), an expert in emerging markets. “President Trump says he holds all the cards, but China’s monopoly on rare earths is one of the aces.” And demand is rising. The United States’ imports of rare earth metals increased 27 percent from 2016 to 2017, according to the USGS, and maintaining that supply has been become a matter of national security, according to 2017 [testimony](https://www.energy.senate.gov/public/index.cfm/files/serve?File_id=28F4C10B-7795-48BF-8233-FEC94D955982) by Sen. Lisa Murkowski, chair of the Senate Energy and Natural Resources Committee. A [the Current] trade war could prompt China to cut off supplies of rare earth metals to American manufacturers. President Trump has already dragged rare earth elements into the conflict by including them on a list of proposed tariffs announced earlier this month. The tariffs reflect Trump’s stated goal, signed into an executive order last December, to reduce the country’s dependence on foreign sources for “critical minerals,” and therefore the diminish the risk of disruptions in the supply of materials vital for manufacturers. But efforts to find a new supply of rare earth metals, or devise technologies that supplant the need for them, are still in the early stages. China has not overtly threatened to retaliate in a trade war by limiting the supply of rare earth metals. But it has already demonstrated its ability to do so in the past. In 2010, the Chinese slapped strict quotas on rare earth exports, throwing the world economy into a panic. [Prices skyrocketed](https://www.nytimes.com/2011/05/03/business/03rare.html) four-fold in 2010, and then doubled again in the first four months of 2011. For some rare earth metals, the price increased nearly 700 percent in less than two years. “It was a warning shot. They put the squeeze on to show what they can do, and then they open the supply valve again,” said University Distinguished Professor of Engineering [Vincent Harris](http://www.ece.neu.edu/people/harris-vincent), whose [research](http://www.ece.neu.edu/news/harris-receives-8m-darpa-grant-magnets) is focused on finding alternatives to rare earth metals for military radar and communications. When China opened that supply valve, prices dropped to 2009 levels in a matter of months. They had made their point loud and clear: As former Chinese leader Deng Xiaoping said in 1992, “The Middle East has its oil, we have rare earth.”

#### Unfortunately, two roadblocks to investment still prevent REM procurement. David An explains in 2015 that:

David L. An, 2015, "Critical Rare Earths, National Security, and U.S.-China Interactions: A Portfolio Approach to Dysprosium Policy Design”, RAND Corporation, <http://www.dtic.mil/dtic/tr/fulltext/u2/a615998.pdf>, Date Accessed 8-21-2018 // JM

Contrary to the common perception, the chief deterrent to U.S. mining operations is not necessarily the strength of the environmental and labor protection laws. Most countries, including the U.S. and other developed economies, meet the environmental regulatory standards established by the World Bank. Rather, it is the endemic delays in mine permitting that is the “most significant risk to mining projects in the United States,” according to Behre Dolbear Group whose report ranked U.S. permitting delays second to last (right above Papau New Guinea) in a survey of 25 countries (Wyatt and McCurdy 2013). 106 The average time it takes to obtain mining permits in the U.S. is about seven to ten years. In contrast, Canada and Australia, both of which have similarly stringent environmental protection laws as the U.S., generally license mining operators within one or two years (Wyatt and McCurdy 2013 and Tanton 2013).107 Industry research faults overlapping regulatory bodies (local, state, and federal) that require sequential rather than concurrent process for obtaining licenses as one culprit in permitting delays (Tanton 2013). The competing and compounding jurisdictions create uncertainties regarding duplication and inconsistencies in regulatory enforcement, applications of environmental statutes, and zoning protection. These are cited as [another] top reasons that “mildly” or “strongly” deter U.S. mining investments when compared against its peer economies (South Africa, Australia, Canada, Greenland, and Sweden) that also have dysprosium (and other heavy rare earth) mining potentials (Figure 6.2) (Wilson and Cervantes 2013). Furthermore, [is] prolific litigation against proposed mining developments also plays a large role in delaying mine developments (Tanton 2013). According to the USGS, of seventeen proposed mines between 2000 and 2009, about half were subject to lawsuits, six of which never reached commercialization (Figure 6.3) (Long et al. 2010).

#### Accession to UNCLOS solves these two issues.

#### First, permits. Andrew Langer elaborates in 2012 that

Andrew Langer, 11-28-2012, "The Case for Ratification of the Law of the Sea Treaty,", https://www.realclearpolitics.com/articles/2012/11/28/the\_case\_for\_ratification\_of\_the\_law\_of\_the\_sea\_treaty\_116272-2.html, Date Accessed 8-15-2018 // JM

Russia and China, two of America’s most powerful strategic foes, are actively exploring the Arctic and Pacific for oil, gas and seabed mineral riches. The U.S. is not. Why? Because, Russia and China have ratified the Law of the Sea Treaty and the U.S. hasn’t. Without ratifying [UNCLOS] LOTS, the U.S. has no standing to apply for mining and drilling permits under international law. Bottom line: [there is a new Cold War taking place, and America is not winning](http://www.youtube.com/watch?v=wefHlQKZIeE&feature=youtu.be). The seabed holds trillions of dollars of mineral resources. According to RT, a Russian/English news channel, Russian Foreign Ministry official Alexander Gorban last month stated his hope that “there will never be a “war for resources” – or an even “hotter” conflict – in the Arctic Region.” In the next breath, he then went on to reiterate that Russia is indeed "…trying to fight for the Arctic shelf…” Gorban is a close Putin ally and his acknowledgement that Arctic conflict is possible demonstrates the global stakes in play. Russia is not alone in recognizing the value of the LOTS in the fight for global resource dominance. Five countries border the Arctic: Russia, the U.S. (via Alaska), Canada, Norway and Denmark (via Greenland). However, only one country is ineligible to mine or drill those [Arctic] resources -- the U.S. That’s because the U.S. is [we’re] not a member of the international body that grants title, or property rights, to countries to engage in the exploration of seabed resources. That body is called the International Seabed Authority (ISA). Admittance into that body is accomplished via ratification of the Law of the Sea Treaty. China is also utilizing LOTS and the ISA to aggressively pursue the wealth of the Arctic. According to a report by Elisabeth Rosenthal in the New York Times last month, “The Arctic has risen rapidly on China’s foreign policy agenda in the past two years,” said Linda Jakobson, East Asia program director at the Lowy Institute for International Policy in Sydney, [Australia](http://realclearworld.com/topic/around_the_world/australia/?utm_source=rcw&utm_medium=link&utm_campaign=rcwautolink). So, she said, the Chinese are exploring “how they could get involved.” China is already playing the role of the Russia of the Pacific. Right now, China is exploring U.S.-based mineral claims in the Pacific and there is nothing the U.S. can do about it. China is acting within the framework of international law and the U.S., because we have not ratified LOTS, has no standing in the International Seabed Authority to challenge China’s abuses. Another concern about [Russia](http://realclearworld.com/topic/around_the_world/russia/?utm_source=rcw&utm_medium=link&utm_campaign=rcwautolink) and [China](http://realclearworld.com/topic/around_the_world/china/?utm_source=rcw&utm_medium=link&utm_campaign=rcwautolink) centers on rare earth minerals which are found in abundance in the seabed. The U.S. requires an incredible number of military products for which rare earth minerals are essential. Those products have historically been manufactured here in the U.S., and ought to be. The U.S. also faces a serious munitions problem: today, a tremendous number of our bullets are manufactured in China…meaning that if we find ourselves cross-wise with the Chinese, they can cut off our supply of bullets. When it comes to high-end military hardware, it is essential that America be self-reliant, not reliant on China and Russia for the minerals needed for our own defense products and national security. Over 160 nations have ratified the Law of the Sea Treaty during the past 20 years. The U.S. now stands alone with [Iran](http://realclearworld.com/topic/around_the_world/iran/?utm_source=rcw&utm_medium=link&utm_campaign=rcwautolink), [Venezuela](http://realclearworld.com/topic/around_the_world/venezuela/?utm_source=rcw&utm_medium=link&utm_campaign=rcwautolink), [North Korea](http://realclearworld.com/topic/around_the_world/north_korea/?utm_source=rcw&utm_medium=link&utm_campaign=rcwautolink) and sad smattering of third world and disreputable nations in turning our backs on the greatest opportunity for wealth creation available on the globe today. In doing so, the U.S. is not losing jobs and economic opportunity to BRIC nations and the rest of the world, we are surrendering them. The Senate still has time to act to ratify LOTS and to set things right. This is the most important economic agenda item the Congress can take up – and they can still do it before the end of the year. With one vote, the [United States](http://realclearworld.com/topic/around_the_world/united_states/?utm_source=rcw&utm_medium=link&utm_campaign=rcwautolink) Senate has the power to unleash staggering economic growth and jobs creation.

#### Second, territorial lawsuits. Hideshi Ueno writes in 2012 that

Hideshi Ueno quoting Hillary Clinton, 5-23-2012, "Discussion regarding accession to UNCLOS in the United States, FROM THE OCEANS," No Publication, https://www.spf.org/oceans/analysis\_en/c1205.html, Date Accessed 8-15-2018 // JM

U.S. oil and gas companies are now ready, willing, and able to explore [the ocean]. this area. But they have made it clear to us that they need the maximum level of international legal certainty before they will or could make the substantial investments, and, we believe, create many jobs in doing so needed to extract these far-offshore resources. If we were a party to the convention, we would gain international recognition of our sovereign rights, including by using the convention's procedures, and therefore be able to give our oil and gas companies this legal certainty. Staying outside the convention, we simply cannot. The second development concerns deep seabed mining, which takes place in that part of the ocean floor that is beyond any country's jurisdiction. Now for years, technological challenges meant that deep seabed mining was only theoretical; today's advances make it very real. But it's also very expensive, and before any company will explore a mine site, it will naturally insist on having a secure title to the site and the minerals that it will recover. The convention offers the only effective mechanism for gaining this title. But only a party to the convention can use this mechanism on behalf of its companies. So as long as the United States is outside the convention, our companies are left with two bad choices – either take their deep sea mining business to another country or give up on the idea. Meanwhile, as you heard from Senator Kerry and Senator Lugar, China, Russia, and many other countries are already securing their licenses under the convention to begin mining for [REM’s] valuable metals and rare earth elements. And as you know, rare earth elements are essential for manufacturing high-tech products like cell phones and flat screen televisions. They are currently in tight supply and produced almost exclusively by China. So while we are challenging China's export restrictions on these critical materials, we also need American companies to develop other sources. But as it stands today, they will only do that if they have the secure rights that can only be provided under this convention. If we expect to be able to manage our own energy future and our need for rare earth minerals, we must be a party to the Law of the Sea Convention. The third development that is now urgent is the emerging opportunities in the Arctic. As the area gets warmer, it is opening up to new activities such as fishing, oil and gas exploration, shipping, and tourism. This convention provides the international framework to deal with these new opportunities. We are the only Arctic nation outside the convention. Russia and the other Arctic states are advancing their continental shelf claims in the Arctic while we are on the outside looking in. As a party to the convention, we would have a much stronger basis to assert our interests throughout the entire Arctic region. The fourth development is that the convention's bodies are now up and running. The body that makes recommendations regarding countries' continental shelves beyond 200 nautical miles is actively considering submissions from over 40 countries without the participation of a U.S. commissioner. The body addressing deep seabed mining is now drawing up the rules to govern the extraction of minerals of great interest to the United States and American industry. It simply should not be acceptable to us that the United States will be absent from either of those discussions. Our negotiators obtained a permanent U.S. seat on the key decision-making body for deep seabed mining. I know of no other international body that accords one country and one country alone – us – a permanent seat on its decision making body. But until we join, that reserved seat remains empty. So those are the stakes for our economy. And you will hear from Secretary Panetta and General Dempsey that our security interests are intrinsically linked to freedom of navigation. We have much more to gain from legal certainty and public order in the world's oceans than any other country. U.S. Armed Forces rely on the navigational rights and freedoms reflected in the convention for worldwide access to get to combat areas, sustain our forces during conflict, and return home safely all without permission from other countries. Now as a non-party to the convention, we rely – we have to rely – on what is called customary international law as a legal basis for invoking and enforcing these norms. But in no other situation at which – in which our security interests are at stake do we consider customary international law good enough to protect rights that are vital to the operation of the United States military. So far we've been fortunate, but our navigational rights and our ability to challenge other countries' behavior should stand on the firmest and most persuasive legal footing available, including in critical areas such as the South China Sea. I'm sure you have followed the claims countries are making in the South China Sea. Although we do not have territory there, we have vital interests, particularly freedom of navigation. And I can report from the diplomatic trenches that as a party to the convention, we would have greater credibility in invoking the convention's rules and a greater ability to enforce them. Now, I know a number of you have heard arguments opposing the convention. And let me just address those head-on. Critics claim we would surrender U.S. sovereignty under this treaty. But in fact, it's *exactly* the opposite. We would secure sovereign rights over vast new areas and resources, including our 200-mile exclusive economic zone and vast continental shelf areas extending off our coasts and at least 600 miles off Alaska. I know that some are concerned that the treaty's provisions for binding dispute settlement would impinge on our sovereignty. We are no stranger to similar provisions, including in the World Trade Organization which has allowed us to bring trade cases; many of them currently pending against abusers around the world. As with the WTO, the U.S. has much more to gain than lose from this proposition by being able to hold others accountable under clear and transparent rules. Some critics invoke the concern we would be submitting to mandatory technology transfer and cite President Reagan's other initial objections to the treaty. Those concerns might have been relevant decades ago, but today they are not. In 1994, negotiators made modifications specifically to address each of President Reagan's objections, including mandatory technology transfer, which is why President Reagan's own Secretary of State, George Shultz, has since written we should join the convention in light of those modifications having been made. Now some continue to assert we do not need to join the convention for U.S. companies to drill beyond 200 miles or to engage in deep seabed mining. That's not what the companies say. So I find it quite ironic, in fact somewhat bewildering that a group, an organization, an individual would make a claim that is refuted by every major company in every major sector of the economy who stands to benefit from this treaty. Under current circumstances, they [companies] are very clear. They will not take on the cost and risk these activities under uncertain legal frameworks. They need the indisputable, internationally recognized rights available under the treaty. So please, listen to these companies, not to those who have other reasons or claims that are not based on the facts. These companies are refuting the critics who say, "Go ahead, you'll be fine." But they're not the ones – the critics – being asked to invest tens of millions of dollars without the legal certainty that comes with joining the convention.

#### Jay Timmons corroborates this in 2012 when he explains that

Jay Timmons, “UNCLOS Critical for US Manufacturing Competitiveness,” Ohio State University, 7/1/2012, <https://search.proquest.com/docview/1024269695/abstract/29BDC14812334EC9PQ/1?accountid=27975> // WS

Rare Earth Minerals are Vital to Manufacturing Manufacturers in the United States require access to basic inputs for the production process in order to become and remain competitive in the global economy. As manufacturing grows more high tech, "rare earth" minerals are becoming increasingly important to manufacturers and their supply chains. Rare earth minerals consist of 17 elements that are important for numerous manufacturing applications, including in the production of chemicals, defense products, consumer electronics, wind turbines, hybrid car batteries and other renewable energy products. They are also used as catalysts for petroleum refining. Until a decade ago, the United States was 100 percent self-reliant for rare earth production, with domestic companies producing enough to supply U.S. manufacturers. Over time, however, U.S. production was halted as it became economically and environmentally cost prohibitive. Companies in various countries including the United States are looking at reopening closed mines and developing new deposits, but these efforts could take a number of years to fully come on line. The deep seabed offers a new opportunity for the United States to gain steady access to these vital rare earth minerals. Polymetallic nodules are located on the deep ocean floor. These nodules typically contain manganese, nickel, copper, cobalt and rare earth minerals. However, **U.S. companies cannot actively pursue claims in the areas where these nodules are dense unless the U.S. ratifies the Law of the Sea Treaty**. Deep Seabed Development There is no doubt the world is very different today. We are a global economy, and countries are working feverishly to take our mantle of economic leadership away from us. Deep seabed mining is an emerging global industry and, indeed, a key ingredient to economic growth and competitiveness. We have companies in the United States with the means to explore and develop the resources and minerals on and in the seabeds of international waters, but they will only do so if there is a structure that contains internationally recognized agreements in place. This treaty will institute that legal framework upon which companies and countries can rely. U.S. multinational companies expect other countries to abide by international standards and rules in other areas, such as intellectual property, counterfeiting, dumping, and international financing. So do we. It, therefore, is logical that we would expect the same when determining our ability to access the resources of the seabed. The Law of the Sea Convention provides the only internationally recognized legal regime for extracting mineral resources from the ocean floor in the deep seabed, an area over which no country has sovereign rights. The International Seabed Authority (ISA) develops the rules, regulations and procedures relating to the deep seabed. The Convention guarantees the United States, and only the United States, a permanent seat on the decision-making Council of the ISA with an effective veto over decisions impacting U.S. interests. The development of deep seabed claims is incredibly expensive. **Companies in the U.S. are reluctant to invest heavily in deep seabed mining because** of the risk that **their activities would not withstand a legal challenge since the U.S. is not a party to the Convention**. Conversely, foreign companies, because their governments have joined the Convention, have access to the international bodies that grant the legal claims to operate in the deep seabed area. **The U.S. cannot represent the interests of its companies in those bodies**. Lockheed Martin, for example, has two deep seabed claims that pre-date the Law of the Sea Convention. It has continued to extend its licenses through the National Oceanic and Atmospheric Administration (NOAA). These claims will be instantly recognized by the International Seabed Authority (ISA) if the U.S. joins the Convention. However, without the U.S. becoming a party to the Convention, Lockheed Martin is unable to secure U.S. sponsorship **of** these claimsat the ISA. China's Dominance of Rare Earths Our nation's ability to access rare earth minerals may be the most pressing economic security issue we face. Today, a single country China holds a virtual monopoly on the mining and production of rare earth elements. China produces more than 90 percent of the world's supply and also consumes roughly 60 percent of that supply. Brazil, India, Malaysia and Canada are the other sources of the remaining paltry supply of rare earths. China recently imposed significant export restrictions on its rare earth production. In 2010, it announced it would cut exports of rare earth minerals by 40 percent by 2012. Just last week, Chinese officials released a white paper defending the country's export control restrictions on rare earths. Earlier this year, the U.S. joined with Japan and the European Union to file complaints with the World Trade Organization (WTO) over China's export policies on rare earths.

#### There are two substantial benefits in mining our own REM’s.

First, the US can curb military dependence. John Adams explains in 2018:
John Adams, 7-9-2018, "Rebuild the US minerals supply chain before it’s too late," Defense News, https://www.defensenews.com/industry/2018/07/09/rebuild-the-us-minerals-supply-chain-before-its-too-late/, Date Accessed 8-21-2018 // JM

As the possibility of a full-blown trade war with China looms over the economy, it’s important to understand the pressure points that Beijing could push to exert leverage against the U.S. And [the nation’s Achilles’ heel](https://www.defensenews.com/opinion/2018/05/02/americas-critical-minerals-problem-has-gone-from-bad-to-worse/) could very well be a complete dependence on China for a growing number of key minerals and metals. If tit-for-tat tariffs don’t result in detente, Beijing could [and] cripple [America’s industrial supply chain](https://www.defensenews.com/pentagon/2017/04/25/buy-american-helps-secure-the-u-s-supply-chain-commentary/) by placing an embargo on minerals and metals exports, particularly rare earth minerals. It’s Beijing’s ace up the sleeve, and we gave it to them. Despite an abundance of minerals reserves, America has become increasingly dependent on imports to meet demand. The U.S. Geological Survey reports that America is now 100 percent import-reliant for 21 minerals, and at least 50 percent import-reliant for another 29. Most troubling is that the U.S. is now 100 percent import-dependent for all of the 17 minerals that constitute the rare-earth minerals group. And China, which controls more than 95 percent of global rare-earth minerals production, has a monopoly. Whether it’s cellphones, electric motors, batteries, aircraft, wind turbines or MRI machines, rare earths play an essential role. But it’s not just commercial manufacturing assembly lines that are vulnerable to an embargo; it’s also military hardware. Whether it’s the advanced electronics and control systems in F-22 and F-35 aircraft, night vision devices, guidance, targeting systems, or dozens of other critical defense technologies, they’re all built with rare earth components. While the U.S. has a small strategic reserve of some of these minerals — to provide a short-term supply for our military supply chain — we have allowed ourselves to become unnervingly comfortable in China’s vise. Just a few decades ago, the U.S. was the world’s largest rare earths producer. The erosion of our production and its shift to China is a complex story, but the common thread across our growing minerals-import dependence is a regulatory approach to mining that has seen investment flee despite world-class resources. For example, the U.S. possesses 13 percent of global rare-earth minerals reserves, with significant deposits in California, Alaska, Idaho, Montana and Missouri. Yet increased import reliance has become a national security issue. Previewing the upcoming release of an interagency study on defense supply chain vulnerabilities commissioned in 2017 by President Donald Trump, Under Secretary of Defense for Acquisition and Sustainment [Ellen Lord said](https://breakingdefense.com/2018/05/dod-white-house-likely-to-fight-chinese-monopoly-on-rare-earth-minerals/): “What comes up and is quite alarming … is we have an amazing amount of dependency on China. … [They] are sole sources for rare earth minerals, some energetics, different things. This is a problem for us as we move forward.” China has used its market dominance to manipulate the rare earths market before, and we can expect it to do so again. Since the 1990s, Chinese authorities have pursued an explicit policy of controlling a resource they consider “strategic and critical.” China’s manipulation of the global supply of rare earths received heightened attention in 2010, when China halted rare earths exports to Japan after a fishing dispute near a set of islands claimed by both countries. Moreover, China imposed export quotas on its rare earths production, temporarily sending global prices for rare earths skyrocketing. The crisis led then-Secretary of State Hillary Clinton to call our import dependence a “wake-up call.” In the years following the 2010 crisis, competitors to China’s monopoly of the market made inroads, but China’s grip has since strengthened. As the Government Accountability Office reported in 2016, the Defense Department’s ability to respond to a potential supply disruption “may not be sufficient” despite being a “bedrock national security issue.”

#### Jeff Green explains in 2018 that this is because:

Jeff Green, 6-26-2018, "Dangerous Dependence on China for Critical Minerals Runs Deep," No Publication, https://www.realcleardefense.com/articles/2018/06/26/dangerous\_dependence\_on\_china\_for\_critical\_minerals\_runs\_deep\_113557.html, Date Accessed 8-21-2018 // JM

Secretary of the Interior, Ryan Zinke, determined that the United States’ economic and military security depend upon 35 essential minerals. Unfortunately, our nation is import-reliant on 30 out of 35. Most alarmingly, we rely on one country — China — for our supply of 12 critical minerals, including the rare earth elements necessary for a little-known, but critical component, of electronic warfare systems: the traveling wave tube. The traveling wave tube amplifies and transmits wave frequencies. It is used in radar, satellite communications, electronic countermeasures, and other sophisticated military technologies. Systems with traveling wave tubes detect enemy advances before the first shots have been fired and provide commanders with the information they need to make informed decisions on the battlefield. Without these devices, we would lose our ability to both detect and respond to new threats in real time. Producing these wave tubes requires no fewer than 46 elements on the periodic table. Of these, the U.S. is import-reliant on 27, many of which are sourced from China. Alarmingly, the U.S. is nearly 100 percent [import-reliant](https://minerals.usgs.gov/minerals/pubs/mcs/2018/mcs2018.pdf) on minerals in the rare earth element group, a market almost exclusively cornered by the Chinese. In 2018, the U.S. Geologic Survey [reported](https://minerals.usgs.gov/minerals/pubs/commodity/rare_earths/mcs-2018-raree.pdf) that the United States imported 11,000 tons of rare earth elements. Our dependence on China’s rare earth mineral production should cause pause. We have gifted China robust trade leverage should they chose to use it. In 2010, during a geopolitical spat over disputed waters, [China cut its exports of rare earth elements to Japan](https://www.nytimes.com/2010/09/23/business/global/23rare.html). China could easily cripple American supply chains and significantly limit our ability to produce advanced radar and weapon systems by limiting or disrupting the supply of any one of these minerals. Allowing a non-allied foreign nation to control such a broad swathe of critical minerals is a significant security threat to the U.S. and its warfighters. So, what can be done? Our import dependence on China’s rare earth mineral production isn’t due to a lack of domestic resources. The U.S. is blessed with domestic reserves of 1.4 million metric tons. We can and should encourage production here at home. The U.S. must enact policies to galvanize the defense industrial base. Three recent provisions in the Fiscal Year 2019 National Defense Authorization Act (NDAA) are good examples of the steps Congress and this administration should take to ensure that our radar and electronic warfare systems are not held hostage by foreign and adversarial nations. First, the House version of the NDAA included [Sec. 873](https://www.militarytimes.com/news/pentagon-congress/2018/05/10/house-panel-adopts-716-billion-defense-authorization-plan/) prohibiting the acquisition of sensitive materials from non-allied nations. The provision, which the Administration [strongly supported](https://www.whitehouse.gov/wp-content/uploads/2018/05/saphr5515r_20180522.pdf) in its Statement of Administrative Policy issued May 22, forbids the acquisition of tungsten components, samarium-cobalt magnets, and neodymium-iron-boron magnets from non-allied nations including China, Russia, North Korea and Iran. These minerals have a broad range of aerospace and defense applications including bullets, missiles, and aircraft turbine engines. Promoting domestic production of these minerals should be a high national security priority. While a good first step, and one long overdue, Sec. 873 addresses just a small percentage of America’s import dependence for essential military components. In next year’s NDAA, Congress should consider expanding this provision, with input from the technical experts at the Department of Defense, to include other critical minerals essential to national security. Second, Congress recognized that although exotic and lesser-known minerals make up the bulk of critical minerals, some of the more abundant and basic materials are also critical to defense production and the production of these materials is also insufficient. [Sec. 343](https://docs.house.gov/meetings/AS/AS00/20180509/108275/BILLS-115-HR5515-T000238-Amdt-FCEB2.pdf) of the House-passed NDAA would mandate that eight minerals — including copper, molybdenum, gold, nickel, lead, silver, and certain fertilizer compounds — should be added to the critical minerals list. Expanding the list of critical minerals and prohibiting acquisition of these materials from adversarial nations will help stimulate domestic investment in strategic materials and shore up supply chain vulnerabilities. Finally, the House adopted Rep. Mark Amodei’s (R-NV) amendment to the NDAA, which will significantly reduce the mine permitting process from 10 years to two years. This is an important step and will incentivize private-sector domestic exploration, production and technological innovation. Congress and this administration must continue to remove regulatory barriers that dissuade investment in critical minerals production. When the House and Senate begin conference negotiations for the FY19 NDAA, policymakers must ensure that these provisions are included in the final bill. Furthermore, the U.S. must continue seeking proactive solutions to improve the defense industrial base. With these policy changes and robust investment in promising advanced manufacturing companies, the United States can reduce its reliance on non-allied foreign nations for critical minerals and ensure the security of our men and women in uniform.

#### John Caves indicates that this:

John P. Caves Jr., January 2010, “Avoiding a Crisis of Confidence in the U.S. Nuclear Deterrent,” Strategic Forum, No. 252, <https://www.files.ethz.ch/isn/112063/SF252.pdf>, Date Accessed 8-22-2018 // JM

Perceptions of a compromised U.S. nuclear deterrent as described above would have profound policy implications, particularly if they emerge at a time when a nuclear-armed great power is pursuing a more aggressive strategy toward U.S. allies and partners in its region in a bid to enhance its regional and global clout. A dangerous period of vulnerability would open for the United States and those nations that depend on U.S. protection while the United States attempted to rectify the problems with its nuclear forces. As it would take more than a decade for the United States to produce new nuclear weapons, ensuing events could preclude a return to anything like the status quo ante. The assertive, nuclear-armed great power, and other major adversaries, could be willing to challenge U.S. interests more directly in the expectation that the United States would be less prepared to threaten or deliver a military response that could lead to direct conflict. They will want to keep the United States from reclaiming its earlier power position. Allies and partners who have relied upon explicit or implicit assurances of U.S. nuclear protection as a foundation of their security could lose faith in those assurances. They could compensate by accommodating U.S. rivals, especially in the short term, or acquiring their own nuclear deterrents, which in most cases could be accomplished only over the mid- to long term. A more nuclear world would likely ensue over a period of years. Important U.S. interests could be compromised or abandoned, or a major war could occur as adversaries and/or the United States miscalculate new boundaries of deterrence and provocation. At worst, war could lead to state-on-state employment of weapons of mass destruction (WMD) on a scale far more catastrophic than what nuclear-armed terrorists alone could inflict.

#### Second, the US economy can transition to green technology. Emmanuel Apergis explains in 2016 that:

Emmanuel Apergis, 12-30-2016, “The role of rare earth prices in renewable energy consumption: The actual driver for a renewable energy world,” Professor at the University of Kent, Date accessed 8-20-18 //WS

The attention to the determinants of renewable energy consumption has increased over the last few years. The current paper received insights from the political drive that pushes forward a green economy, in- augurating a new era for the renewables with steps being taken by the Declaration of Stockholm, the Convention of Rio, the Kyoto Protocol and the promising Paris Agreement. It becomes evident that the impact of rare earth prices, which are the materials needed for building renewable energy equipment, such as wind turbine magnets and phosphor lightings, are crucial in determining future renewable diffusion and, in particular, future consumption, given that the main stimulus for investors to develop renewable energy sources is the cost of production. This study investigated the relationship between rare earth prices and energy consumption from renewables for thirteen regional categories. Cointegration relationships denoted that in the long-run, rare earth prices drove energy consumption for renewables in the majority of regions and the income classification regions under investigation. It becomes evident that the results provide additional insight into energy related policy-making by recommending the need for a global agreement on the control of rare earth materials if the world community wishes to establish a green energy environment, provided that only a handful of countries really control those materials. In addition, the results call for policies to mitigate the price effects through recycling and substitution options. The former option indicates that to reuse such materials could be a viable solution that can smooth out prices over time, while the latter option signifies that the replacement of such materials goes hand-in-hand with efficiency issues. If efficiency cannot be maintained, then shortages and monopolistic condition will continue to exert a strong effect on their prices, and, therefore, on the future of renewable energy consumption. The importance of certain rare earth materials prices to affect the consumption from renewable energy sources indicates the potential presence of renewable energy shortages and price increases in the future, which are expected, in turn, to affect many sectors in advanced economies, including not only large economic value adding industries, but also many defence products and industries. Moreover, price developments for rare earth materials could motivate current and future research which can lead to new discoveries that could substitute for these materials in many strategic applications, especially in relevance to the renewable energy industry (nevertheless, their special character of those materials increases the likelihood that this substitution may not be easily substitutable across many applications). While substitution could not be easily feasibly, recycling could be alternatively the best route forward for such elements, which is highly likely to smooth out any impact on the renewable energy industry. Finally, given that only a handful of countries have currently an effect on prices, potential factors that smooth out price developments could be either **the opening of new mines across the globe**, or making the mining processes more efficient, or more importantly inducing governments across the globe to cooperate with both mineral producing countries and import dependent countries. The last [This]option seems to **gain high importance given the rapid rise of emerging economies as a key driver behind the explosion of demand for** energy and minerals for **renewable energy** technologies, along with stronger population and economic growth, potential rising prosperity levels and changing consumption patterns. All these developments are expected to lead to a growing share of global energy demand that may be met by renewable energy due to concerns about climate change and growing concerns about energy security. At the same time, to establish higher security levels of raw materials for renewable energy must turn to be a policy priority. Import dependent countries must increase access to foreign supply and measures to reduce their import dependence.

#### Eric Savitz of Forbes indicated in 2012 that with:

Eric Savitz, 6-8-2012, "Rare Earth Minerals: An End To China's Monopoly Is In Sight," Forbes, https://www.forbes.com/sites/ciocentral/2012/06/08/rare-earth-minerals-an-end-to-chinas-monopoly-is-in-sight/#2e7131f4532c, Date Accessed 8-22-2018 // JM

North America is finally waking up to the consequences of a continued Chinese monopoly and has quietly invested significant money and resources into mining rare earth minerals domestically. In fact, there are currently 35 rare earth projects at various stages in development outside of China (according to advisory firm Technology Metals Research). The most mature operation is right here in North America – Molycorp‘s Mountain Pass, California mine. Several other mines are also progressing nicely in the Northeast Corridor of Canada. A major shift is taking place, and it’s possible that 15-20 percent of rare earth minerals could be mined outside of China by the end of 2020. In addition to loosening China’s stranglehold on the market, even a 10 percent shift in market share would have a positive ripple effect on the U.S. manufacturing and technology sectors: An increase in U.S. high-tech production could spur the revival of other domestic manufacturing. Many U.S. companies are already relocating portions of their high-tech production from China to North America for cost savings – mainly due to high logistics and rising labor costs. Add to that the multitude of unpredictable global supply risks – like we saw with the Japan earthquake and tsunami **–** a new and steady source of domestic rare earth minerals could accelerate a U.S. manufacturing revival [would be accelerated]. New electronics suppliers will push product innovation. There’s been a woeful lack of innovation coming out of China and Japan over the past few years. Instead of new genre-defining products, the most highly sought-after products we see every holiday season tend to be the “latest and greatest” – third and fourth generations of already existing products. Without major competition from new suppliers trying to make a splash in the tech scene, the big boys are able to maintain the status quo. Increased competition will create more products and lower prices**: a welcome win for innovation-starved consumers.** More consumer-friendly prices. An upswing in U.S. high-tech manufacturing also has the potential to drive product prices down. **The obvious reasons: logistic costs and supply risk**. Beyond saving on transportation costs, U.S. companies will be able to strike longer deals with suppliers – thus locking in better terms. Domestic sources must operate under U.S. business regulations, making them a more predictable and reliable source of supplies.

#### Adrian Nixon furthers that:

Adrian Nixon, et al, Editors at Investor Intel, 10-10-2013, "More please: The critical contributions of Rare Earth Elements to the ‘new’ economy," Investor Intel, https://investorintel.com/sectors/technology-metals/technology-metals-intel/please-critical-contributions-rare-earth-elements-new-economy/, Date Accessed 8-22-2018 // JM

Let me begin by clarifying, I am not an environmentalist, unless it makes sense economically. Irrespective of the deeply divided political squabbling in the US about the importance of renewable energy and clean technology to long-term economic and environmental challenges, there is a strong consensus among governments, the corporate sector, and investors that renewable energy will drive economic growth. However, even the most optimistic among us regarding this developing industry (still very much in its early stages) must acknowledge one harsh reality: the sector faces challenges. Exceptional challenges. Long-established, highly profitable reigning industries (with tremendous influence among influencers), coupled with challenging financing hurdles are obviously obstacles to clean-tech expansion. But another drawback for clean technology is one that hasn’t received enough attention. In order to transition towards a cleaner, healthier and more robust economy fueled by renewable energy and clean technology, rare earth elements (or REEs, subdivided into two categories; light rare earth elements or LREEs, and the more-valuable heavy rare earth elements or HREEs) have to be mined. REEs are needed to produce the requisite green energy infrastructure and associated products. That is a bit of an understatement. Rare earth elements (metals, oxides, phosphors and other REE derivatives) are absolutely essential ingredients for creating the technologies that reduce US and global dependence on hydrocarbon energy sources. As most InvestorIntel readers are already aware, thanks to Publisher, Editor-in-Chief and ‘Queen of Rare Earths’ Tracy Weslosky, what makes rare earths ‘rare’ is not the relative scarcity (i.e. oil). Rare earth elements are considered rare because they occur, widely dispersed in the earth’s crust, rather than in concentrated ores. REEs (and graphite and, soon, graphene will) provide critical contributions to renewable energy technology, including in solar power, wind turbines, lithium-ion batteries, and all electric motors. Some wind turbines contain over 500 pounds of rare earth elements. Each and every Prius that rolls off the Toyota assembly line in Tokyo carries almost 30 pounds of REEs (Tesla Motors wasn’t able to respond by the publication deadline of this article). More people need to know that without rare earth elements, it would be completely impossible to manufacture the building blocks that operate these technologies. According to industry experts, with more supply, demand for REEs will increase. And, obviously, more REEs will be required as these technologies (still in their respective early stages) become more and more mainstream. Wind turbines and electric vehicles, in particular, rely on rare earths neodymium and dysprosium. A recent study conducted by a US private research university concluded that global demand for neodymium and dysprosium will outstrip supply over the medium- and mid-term if worldwide production does not increase by 8% for neodymium and 14% for dysprosium. The conclusion? Present rare earth production is not increasing at a sustainable level. The problem of future access to rare earth resources is exacerbated by China’s recent imposition of REE export quotas, which caused some users of REEs to charge REE surcharges to their customers. A shrinking supply of REEs guarantees higher costs for industries desperate to be more cost-competitive and that are striving to improve performance, while lowering price (remember, the world expects the price of a particular technology to come down over time). The end result? This conundrum could set back wind and solar at a time when we need to advance them. Who, in their right mind, could say we do not need more energy diversity — especially in the long term?

#### This shift to green tech will significantly reduce emissions as Jakes Thompson indicates in 2017 that America could cut Green House Gas emissions by 80% by 2050 if America shifted toward clean energy.

Jake Thompson, 9-19-2017, “NRDC ’80 by 50’ Report: Dramatically Boosting Clean Energy Can Cut Greenhouse Gas Pollution 80% for a Safer Climate Future”, NRDC, <https://www.nrdc.org/media/2017/170919>, Date Accessed 8-21-2018 // SV

WASHINGTON – In the face of President Trump’s climate retreat, the Natural Resources Defense Council today released an ambitious blueprint to dramatically increase energy efficiency, cut greenhouse gas pollution 80 percent from 1990 levels, raise wind and solar power generation to 70 percent, and usher in a clean energy future for the United States by 2050. And it delivers benefits seven times the cost. The heavily researched report, “[America’s Clean Energy Frontier: The Pathway to Safer Climate Future](https://www.nrdc.org/resources/americas-clean-energy-frontier-pathway-safer-climate-future),” relies on existing technologies and envisions curtailing energy use 50 percent through efficiency and electrification gains; raising fuel economy of gasoline-powered cars to 80 miles per gallon (and 100 mpg for fleetwide); expanding wind and solar energy 13-fold; strengthening the electricity grid; electrifying buildings and cars to run with renewable energy; and a steep decline in nuclear power by 2050 through plant retirements. NRDC’s analysis breaks new ground compared to other comparable reports.. In 2015, more than 190 countries came together and approved the landmark Paris climate agreement. Ratified in 2016, the Paris agreement commits countries to collectively work to limit global temperature rise to less than 2 degrees Celsius—and aim toward a 1.5 degree-limit—which is needed to avoid severe climate damages. NRDC teamed with the internationally recognized Energy + Environmental Economics consulting firm anddetermined America could curb greenhouse gas emissions 80 percent by 2050—required to reach the goal of holding global warming to a 2-degree increase—largely by substantial increases in clean energy. Furthermore, the report notes that major contributions to curbing climate change can be made, and are being accomplished today, from multiple actions at the city, regional and state levels, as well as by businesses, communities and individual citizens. Even so, the report contends, a national economy-wide approach—like the now-stalled federal Clean Power Plan that cuts power plant carbon pollution—will be needed for ultimate success in warding off severe climate damages. The report makes several dozen recommendations, including these overarching ones: Policymakers should: accelerate and expand proven clean energy technologies, such as wind and solar power systems, energy efficiency, and electric vehicles and heat pumps. The federal government should: move ahead on a bipartisan basis to support stronger energy efficiency standards, tax incentives, and energy innovation research and development. States should: continue to support and expand renewable energy and energy efficiency portfolio standards that set goals for clean energy deployment. Cities should: implement policies that support local sustainability actions and scale up clean energy and energy efficiency. Businesses should: work to reduce their greenhouse gas footprints and invest in clean energy. Individual Americans and communities can: implement energy efficiency measures in their homes and offices, work with non-profits supporting clean energy and help hold elected officials accountable so they will support clean energy advances. The U.S. also should: continue work to reduce other pollution contributing to climate change, such as methane and hydrofluorocarbons, or HFCs. “The world is telling us in every way possible that it’s time to cut the fossil fuel pollution driving climate change and threatening our future. We have the solutions in hand, as NRDC’s report shows. But if we fail to act, we will doom our children and future generations to a world of deadly and dangerous climate impacts,” said Roland Hwang, director of NRDC’s Energy and Transportation program. “That cannot happen. We have an obligation to leave them a healthy and stable world.”

#### This is massive, as Adam Vaughan explains in 2009 that

Adam Vaughan, 5-12-2009, "Cleaner air from reduced emissions could save millions of lives, says report," Guardian, [https://www.theguardian.com/environment/2009/may/12/emissions-pollution-premature-deaths, Date Accessed 8-21-2018 // WS](https://www.theguardian.com/environment/2009/may/12/emissions-pollution-premature-deaths%2C%20Date%20Accessed%208-21-2018%20//%20WS)
Tackling climate change by cutting greenhouse gas emissions could save millions of lives because of the cleaner air that would result, according to a recent study. Researchers predict that by 2050, about 100 million premature deaths caused by respiratory health problems linked to air pollution could be avoided through measures such as low emission cars. The economic benefits of saving those lives in developing countries such as China and India could also strengthen the negotiating hand of the UK and Europe at a crucial UN climate summit in Copenhagen this December. Johannes Bollen, one of the authors of the report for the Netherlands Environment Agency, said the **[approximately] 100 million early deaths could be prevented by cutting global emissions by 50% by 2050[.]**,a target consistent with those being considered internationally. The reports warns that if governments continue with business-as-usual energy use, then population growth, ageing demographics and increased urbanisation will cause premature deaths from pollution to increase by 30% in OECD countries, and 100% outside the OECD. The study also has implications for which technologies are chosen to reduce CO2 and other greenhouse gases. The study points out that while carbon capture and storage technology can capture CO2, it does not usually trap other air pollutants. Last month, the energy and climate minister, Ed Miliband, put "clean coal" at the centre of UK energy policy by pledging no new coal-fired power stations would be built without at least partial CCS.

## Extra Cards

#### Emmanuel Apergis indicated in a 2016 study on:

Emmanuel Apergis, 12-30-2016, “The role of rare earth prices in renewable energy consumption: The actual driver for a renewable energy world,” Professor at the University of Kent, Date accessed 8-20-18 //WS

The attention to the determinants of renewable energy consumption has increased over the last few years. The current paper received insights from the political drive that pushes forward a green economy, inaugurating a new era for the renewables with steps being taken by the Declaration of Stockholm, the Convention of Rio, the Kyoto Protocol and the promising Paris Agreement. It becomes evident that the impact of rare earth prices, which are the materials needed for building renewable energy equipment, such as wind turbine magnets and phosphor lightings, are crucial in determining future renewable diffusion and, in particular, future consumption, given that the main stimulus for investors to develop renewable energy sources is the cost of production. This study investigated the relationship between rare earth prices and energy consumption from renewables for thirteen regional categories. Cointegration relationships [he] denoted that in the long-run, rare earth prices drove energy consumption for renewables in the majority of regions and the income classification regions under investigation. It becomes evident that the results provide additional insight into energy related policy-making by recommending the need for a global agreement on the control of rare earth materials if the world community wishes to establish a green energy environment, provided that only a handful of countries really control those materials. In addition, the results call for policies to mitigate the price effects through recycling and substitution options. The former option indicates that to reuse such materials could be a viable solution that can smooth out prices over time, while the latter option signifies that the replacement of such materials goes hand-in-hand with efficiency issues. If efficiency cannot be maintained, then shortages and monopolistic condition will continue to exert a strong effect on their prices, and, therefore, on the future of renewable energy consumption. The importance of certain rare earth materials prices to affect the consumption from renewable energy sources indicates the potential presence of renewable energy shortages and price increases in the future, which are expected, in turn, to affect many sectors in advanced economies, including not only large economic value adding industries, but also many defence products and industries. Moreover, price developments for rare earth materials could motivate current and future research which can lead to new discoveries that could substitute for these materials in many strategic applications, especially in relevance to the renewable energy industry (nevertheless, their special character of those materials increases the likelihood that this substitution may not be easily substitutable across many applications). While substitution could not be easily feasibly, recycling could be alternatively the best route forward for such elements, which is highly likely to smooth out any impact on the renewable energy industry. Finally, given that only a handful of countries have currently an effect on prices, potential factors that smooth out price developments could be either the opening of new mines across the globe, or making the mining processes more efficient, or more importantly inducing governments across the globe to cooperate with both mineral producing countries and import dependent countries. The last option seems to gain high importance given the rapid rise of emerging economies as a key driver behind the explosion of demand for energy and minerals for renewable energy technologies, along with stronger population and economic growth, potential rising prosperity levels and changing consumption patterns. All these developments are expected to lead to a growing share of global energy demand that may be met by renewable energy due to concerns about climate change and growing concerns about energy security. At the same time, to establish higher security levels of raw materials for renewable energy must turn to be a policy priority. Import dependent countries must increase access to foreign supply and measures to reduce their import dependence.

#### This is empirically proven as Nicole Jones of Yale University indicates in 2013 that:

Nicola Jones, 2013, "A Scarcity of Rare Metals Is Hindering Green Technologies," Yale E360, https://e360.yale.edu/features/a\_scarcity\_of\_rare\_metals\_is\_hindering\_green\_technologies, Date Accessed 8-21-2018 // WS

With the global push to reduce greenhouse gas emissions, it’s ironic that **several energy**- or resource-**saving technologies aren’t being used to the fullest simply because we don’t have enough raw materials to make them.** For example, says Alex King, director of the new Critical Materials Institute, every wind farm has a few turbines standing idle because their fragile gearboxes have broken down. They can be fixed, of course, but that takes time — and meanwhile wind power isn’t being gathered. Now you can make a more reliable wind turbine that doesn’t need a gearbox at all, King points out, but you need a truckload of so-called “rare earth” metals to do it, and there simply isn’t the supply. Likewise, we could all be using next-generation fluorescent light bulbs that are twice as efficient as the current standard. But when the U.S. Department of Energy (DOE) [tried to make that switch](http://ecmweb.com/lighting-amp-control/energy-department-grants-two-year-extension-700-series-t-8-fluorescent-lamps) in 2009, companies like General Electric cried foul: they wouldn’t be able to get hold of enough rare earths to make the new bulbs. The move toward new and better technologies — from smart phones to electric cars — means an ever-increasing demand for exotic metals that are scarce thanks to both geology and politics. Thin, cheap solar panels need tellurium, which makes up a scant 0.0000001 percent of the earth’s crust, making it three times rarer than gold. High-performance batteries need lithium, which is only easily extracted from briny pools in the Andes. In 2011, the average price of ‘rare earth’ metals shot up by as much as 750 percent. Platinum, needed as a catalyst in fuel cells that turn hydrogen into energy, comes almost exclusively from South Africa. Researchers and industry workers alike woke with a shock to the problems caused by these dodgy supply chains in 2011, when the average price of “rare earths” — including terbium and europium, used in fluorescent bulbs; and neodymium, used in the powerful magnets that help to drive wind turbines and electric engines — shot up by as much as 750 percent in a year. The problem was that China, which controlled 97 percent of global rare earth production, had clamped down on trade. A solution was brokered and the price shock faded, but the threat of future supply problems for rare earths and other so-called “critical elements” still looms. That’s why the Critical Materials Institute, located at the DOE’s Ames Laboratory, was created. The institute opened in June, and the official ribbon-cutting was in September. Its mission is to predict which materials are going to become problems next, work to improve supply chains, and try to invent alternative materials that don’t need so many critical elements in the first place. The institute is one of a handful of organizations worldwide trying to tackle the problem of critical elements, which organizations like the American Physical Society [have been calling attention to](http://www.aps.org/about/pressreleases/elementsreport.cfm) for years. “It’s a hot topic in Europe right now,” says Olivier Vidal, coordinator of a European Commission project called ERA-MIN — one of a handful of European initiatives that are now ramping up. “It’s really urgent,” says King. “We’re facing real challenges today — we need solutions tomorrow, not the day after.” Despite the high cost and high demand of metals critical for energy technologies, very little of this metal is recycled: In 2009, it was estimated that less than one percent of rare earth metals was recovered. Ruediger Kuehr, head of the Solving the E-waste Problem (StEP) initiative in Bonn, says that 49 million tons of e-waste are produced each year, from cell phones to refrigerators. Of that, perhaps 10 percent is recycled. It’s ridiculous to simply throw so much valu able material away, says Diran Apelian, founding director of the Metal Processing Institute in Worcester, Massachusetts. “There’s something like 32 tons of gold in all the world’s cell phones,” says Apelian. “There’s a huge goldmine in our urban landfills.”

#### David An explains that:

David L. An, 2015, "Critical Rare Earths, National Security, and U.S.-China Interactions: A Portfolio Approach to Dysprosium Policy Design”, RAND Corporation, <http://www.dtic.mil/dtic/tr/fulltext/u2/a615998.pdf>, Date Accessed 8-21-2018 // JM

Secondly, should the status quo not change, in a major future contingency with China (e.g., Taiwan Straits, South China Sea, or the Korean peninsula), the impact of dysprosium [REM] shortfall will likely be felt indirectly and in lagged time (DoD 2013a). This is because deployed weapons systems and munitions at the beginning of the conflict will not need the materials immediately since the magnets and other dysprosium-laced components will already have been integrated into them. However, the need for dysprosium/critical rare earths will become acute beginning in the latter stages of the conflict as destroyed or damaged platforms need to be repaired and depleted smart munition stocks need to be replenished. Without a domestic supply stream or a contingency supply, the shortage of spare parts/replacement components or potential substitution with inferior components could degrade military capabilities [are degraded]. Even post-conflict, the U.S. would face challenges securing adequate supplies of said materials to rebuild its military forces (DoD 2013a). The immediate short term consequences of policy action or inaction will be undiscernible because most of the U.S. policy options discussed here will likely not be impactful until close to the end of the fifteen fiscal year planning period. Not much can be done immediately in the aftermath of China’s systematic consolidation of the industry. However, the ground work for more comprehensive U.S. rare earth industry revitalization and vulnerability reduction has been laid down by initiatives by both Congress and the White House in recent years which are reviewed next.