# Marist SV Aff - Valley v1

## Contention 1: REM

#### This week’s acceleration of the trade war with China has exposed the need for UNCLOS. Jacob Nelly indicated this week that:

Jacob Nelly, 9-18-2018, "Rare earths and trade war: Trump exposes Achilles heel in raging tariff tussle with China," International Business Times, India Edition, https://www.ibtimes.co.in/rare-earths-trade-war-trump-exposes-achilles-heel-raging-tariff-tussle-china-780858, Date Accessed 9-19-2018 // JM

If there's one commodity that can puncture the wheels of Donald Trump's trade war juggernaut, it's the rare earths over which China has a brutal monopoly. Interestingly, Trump has exposed his Achilles heel even as he rolled out additional tariffs on Chinese goods worth $200 billion. The United States did not include rare earth elements in the latest list of goods imported from China that will bear additional levies, according to Reuters. The agency reported that rare earth metals and their compounds were included in a tariff list prepared by the U.S. Trade Representative (USTR) in July. However, they were omitted from the [final list published on Monday](https://www.ibtimes.co.in/trump-imposes-new-tariffs-200-billion-worth-chinese-goods-780812). It's not clear if China would use its rare earths monopoly as a bargaining chip with the US as the trade war worsens. Historically, China's rare earth policy has been a matter of concern for industrialised nations like Japan and the US, as well as for the European Union countries. It remains to be seen if the Chinese would retaliate and use rare earths as a strategic lever, Dylan Kelly, a resources analyst at brokerage CLSA in Sydney, told Reuters. "... obviously that's where a lot of investors have focused their attention," [he said](https://in.reuters.com/article/us-usa-trade-china-minerals/u-s-gives-rare-earths-reprieve-in-revised-200-billion-china-tariff-list-idINKCN1LY0QK?il=0). China controls more than 90 percent of the world's rare earth market, making advanced industrialized nations heavily dependent on it for the supply of these essential minerals. Technically viable alternatives to rare earth materials are currently not known. The US has rare earths reserves of more than a million tonnes but mining in the country has virtually stopped over the years over environmental and regulatory issues. Rare earths are indispensable for high-tech industries and are heavily in demand in defence systems, electric cars, wind generators, hard-disk drives, mobile communication, missile guidance and the like. [The 17 rare earth elements](https://www.ibtimes.com/there-way-fight-chinas-rare-earths-economic-warfare-248124) are lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, scandium and yttrium. The US has been mindful of its vulnerability on the rare earths front. The government last month banned the purchase of rare earth magnets from China for military and defence purposes. The move stemmed from the forethought that any Chinese retaliation on trade front could compromise the US defence interests.

#### There are two roadblocks to domestic REM investment in the status quo – the first is the permitting process. Bert Chapman writes in 2018 that the United States must:

Bert Chapman. The Geopolitics of Rare Earth Elements: Emerging Challenge for U.S. National Security and Economics. Journal of Self-Governance and Management Economics, 6 (2)(2018): 50-91. <https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1195&context=lib_fsdocs>, Date Accessed 9-11-2018 // JM

An initial critical step is expediting the permitting process for approving new mines. The U.S. has one of the longest global mining permitting processes often requiring nearly ten years to complete depending on project complexity. This is expensive from the perspectives of industry and regulators, creates uncertain outcomes, discourages investment in U.S. mining, and contributes to offshoring of mining and manufacturing and increased U.S. import dependency. Testifying before a House Natural Resources Committee Subcommittee on October 10, 2013, West Virginia Coal Association Senior Vice President and Chair Chris R. Hamilton stressed that nearly 1/3 of U.S. coal mines operating in 2008 had closed by 2013 impacting both surface and underground mines. Such actions have also affected the U.S. critical minerals industry with some laws providing opportunities to delay, stop, and require major modifications making projects become economically unfeasible due to the risk of litigation. Voluminous federal mining regulations covering three volumes and exceeding 2,200 pages in Title 30 of the 2017 Code of Federal Regulations already govern U.S. mining activity sufficiently ensuring mineral extraction industries comply with environmental regulations.

#### Fortunately, UNCLOS resolves this because Katherine Liljestrand explains in 2018 that as a non-member:

Katherine Liljestrand, 2-8-2018, "The Deep-Sea Reasons for the Accession of the United States to the 1982 Convention on the Law of the Sea," Georgetown Environmental Law Review, https://gelr.org/2018/02/08/the-deep-sea-reasons-for-the-accession-of-the-united-states-to-the-1982-convention-on-the-law-of-the-sea/, Date Accessed 9-17-2018 // JM

The 1982 Convention on the Law of the Sea is the world’s foremost international treaty with respect to the legal order for the global seas and oceans.[1] While most environmental issues covered by the United Nations Convention on the Law of the Sea (UNCLOS) have already been accepted by the United States as customary international law[2], there are two main environmental reasons why the United States should and needs to accede to the Convention with proper haste. Both of these environmental issues deal with the seabed and mineral resources in the deep sea. And while the Convention has already been signed by and transmitted to Congress by President Bill Clinton as of July of 1994[3], Congress has yet to vote on accession to the treaty.[4] The current Congress should strongly support the ascendance of the United States to UNCLOS and vote accordingly, as ascendance would put the United States in a more favorable position to influence and take part in both the present and the future of coastal shelf oil drilling and deep sea resource mining. The two main mechanisms of UNCLOS that deal with deep seabed issues are the Commission on the Limits of the Continental Shelf[5] and the Council of the International Seabed Authority.[6] While the United States remains a non-party to UNCLOS, access to these two bodies – and, subsequently, to the subject jurisdictions they cover – is denied. Firstly, the Commission on the Limits of the Continental Shelf[7] is the foremost international body which “consider[s] the data and other material submitted by coastal States concerning the outer limits of the continental shelf in areas where those limits extend beyond 200 nautical miles, and to make recommendations in accordance with article 76 . . . “[8] What this means is the Commission determines whether or not a country is able to claim its outer continental shelf (OCS) extends past the 200 nautical mile Exclusive Economic Zone (EEZ) thereby expanding its territorial rights to drill. As the United States is not currently a member of UNCLOS, the United States cannot currently claim any drilling rights over any potentially-extended continental shelf.[9] Also, as the United States is not on the Commission, the United States cannot nominate or elect experts to a seat on the Commission and thus has no say in the establishment of outer continental shelves for other countries[10], as when Russia submitted an overly expansive claim to its outer continental shelf.[11] The current administration seems to be moving forward with all hands on deck in regards to offshore oil drilling[12], so acceding to UNCLOS and nominating experts to the Commission could further those efforts. The United States needs to be on the Commission because its voice needs to be heard for the present and future of both our own extended continental shelf and the extended continental shelves of other countries. The second important environmentally-related mechanism the United States is missing out on is the Council of the International Seabed Authority and its unique process.[13] The International Seabed Authority is the primary body that deals with the Area.[14] The Area, as defined in Article I of UNCLOS, includes the seabed, ocean floor, and subsoil beyond the limits of national jurisdiction.[15] The International Seabed Authority is the international body that regulates and controls all mineral-related activities in the Area, and only parties to UNCLOS can sit on the Council.[16] The United States has a reserved, permanent spot on the Council due to having the largest economy at the time of UNCLOS’ ratification but is unable to take that spot unless it becomes a party to UNCLOS.[17] As of currently, the United States is missing out on partaking in the Authority’s defining of the future of seabed mineral mining. The International Seabed Authority issues permits to private parties – mainly companies – for the exploitation and mining of deep seabed minerals[18], such as the highly profitable polymetallic manganese nodules. It is the International Seabed Authority that determines how these permits are distributed and any restrictions on those with the permits.[19] In order for a private company to get a permit for deep sea mining, the company must be sponsored by a country to begin the application process with the International Seabed Authority. Thus [if we were to accede], United States companies [would] have no access to this process or the permits for deep sea mining. This hurts United States-based companies who could otherwise feasibly take part in the race for claiming highly valuable seabed minerals through excavation. While the United States did not deal with some of the original provisions – chiefly Article XI[20] – in the original Convention on Law of the Sea, these provisions were changed in 1994 through the Agreement on Implementation. The changes in the treaty were to the satisfaction of the United States, as President Clinton signed and transmitted the treaty to Congress as soon as the provisions in question were changed.[21] Congress should no longer delay voting in favor of the United States acceding to the United Nations Convention on the Law of the Sea. Today, the magnitude of the environmental issues relating to coastal shelf drilling and deep sea mining is great enough that it is imperative for Congress to actually initiate a vote and formally adopt the United Nations Convention on the Law of the Sea.

#### The second roadblock is failing to reach commercialization. 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, 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).

#### Luckily, codification of UNCLOS solves this. Marta Kolcz-Ryan indicates in 2009 that:

Marta Kolcz-Ryan, University of Dayton, "An Arctic Race: How the United States' Failure to Ratify the Law of the Sea Convention Could Adversely Affect its Interests in the Arctic", 2009, accessed 8 July 2018, <https://www.udayton.edu/law/_resources/documents/law_review/anarctic_race.pdf>, Date Accessed 8-27-2018 // WS

Furthermore, experts often disagree on the existing norms of international law.122 The ambiguity exists because the international customary law that applies to ocean activities is derived from numerous conventions, judicial decisions, state practice, and interpretations by international organizations. The customary law is not universally accepted, and it changes over time based on state practice.123 To obtain financing and insurance and avoid litigation risk, “U.S. companies want the legal certainty that would be secured through the Convention’s procedures in order to engage in oil, gas, and mineral extraction on our extended continental shelf.”124 Also, American companies may not use customary law to claim the right to seabed mining. There is no customary practice for dealing with seabed mining, and such practice is necessary for the formation of customary law.

#### Resolving these issues solves two industries. First, the defense industry. Dean Popps implicates that:

Dean Popps, 12-13-2017, Former US Army Acquisition Executive, "US Military Needs Rare Earth Elements for Future Wars," Warrior Maven, https://defensemaven.io/warriormaven/history/us-military-needs-rare-earth-elements-for-future-wars-1LzBW-jRi0KkSM4ZZbsUKw/, Date Accessed 9-19-2018 // JM

By the end of WWII, the US was producing a bomber an hour, a ship a day, and was feeding half the world. Combined with our unparalleled American warrior ethos, we unconditionally prevailed in a global struggle involving two massive theatres of operation. When the first atomic bomb was dropped, leading to an almost immediate surrender, our enemies took notice that the US had a weapon that was unimaginable until that moment. Six decades later, when precision munitions and stealth warplanes were unveiled, the world again took notice that the US position is one of striving to have a secret, overwhelming, strategic and tactical advantage in weapons that creates a powerful deterrent. Over a decade ago, Pentagon planners began to envision the next round of surprise super weapons, which eventually became known as the “[Third Offset](https://www.defense.gov/News/Speeches/Speech-View/Article/753482/remarks-by-d%20eputy-secretary-work-on-third-offset-strategy/)” policy. Amid fiscal constraints and our 15th year in The Long War, any endeavors for the next round of offset must thread the needle of technological superiority and self-reliance. After 25 years of misguided US globalization policies, our Achilles heel will be our failure to domestically source Rare Earth Elements (REE) for which we are wholly reliant on one of our primary adversaries: China. Every one of the current and next round of super and unimaginable US weapons relies on REEs, an exotic assortment of 17 metals and elements, that are neither mined nor processed into ores in the US. We remain completely at the mercy of foreign governments and markets for these vital supplies, which are the building blocks for every major piece of military equipment or weapons system. From the Joint Strike Fighter to the next generation [B21](https://www.defensenews.com/smr/nuclear-arsenal/2017/03/08/b-21-raider-covertly-completes-preliminary-design-review/) deep strike bomber, from avionics to computers, REEs are irreplaceably pivotal to America’s military superiority. Their unique properties, such as strong magnetic qualities at high temperatures, help precision-guided munitions pinpoint targets, facilitate GPS navigation, and allow fighter pilots to eject safely. Given REE’s undeniable military and commercial value, it is difficult to overstate their importance to our national security. The last American rare earth mine closed in 2015, leaving the U.S. government without a single domestic supplier of the rare earths and specialty metals it requires. Currently and purposefully, there is only one player in this space: China. China not only controls our nation’s access to REEs, it is one of two competitor nations [explicitly mentioned](https://www.defense.gov/News/Speeches/Speech-View/Article/753482/remarks-by-d%20eputy-secretary-work-on-third-offset-strategy/) in the Pentagon’s Third Offset strategy as presenting an incredibly dangerous situation for America’s most critical national security programs. China has already set a precedent for using REEs as geopolitical leverage. Following a dispute with Japan in 2010, the country curtailed its REE exports, spiking prices as much as [600%](http://www.businessinsider.com/molycorp-decline-in-2014-2014-9). To believe China would keep supplying us with the materials needed to defeat them is both irresponsible and naive. Nevertheless, for nearly two decades defense policymakers have insisted on ignoring this threat in favor of misplaced ideas about globalization. Consequently, our defense industrial base is growing “[increasingly brittle](http://breakingdefense.com/2017/09/industrial-base-too-brittle-for-big-war-dunford/)” with long-term consequences for military readiness, General Joseph Dunford, Chairman of the Joint Chiefs of Staff, said in recent testimony. Despite the criticality of REEs to our nation’s ability to fight and win wars, action on the issue remains stagnant. A 2016 GAO [report](http://www.gao.gov/assets/680/675165.pdf) stated that the Pentagon could not identify the REEs it needs. After three separate Pentagon offices researched the issue, there is no consensus, let alone a clear path to a stable US supply. Meanwhile, the last producing rare earths mine was sold to a Chinese mining firm for $20 million in June. The Pentagon is foolish to advertise a grand strategy of technological prowess when it doesn’t even have a secure supply of the strategic materials it needs to innovate. President Trump’s recently announced Industrial Base Review could be an opportunity to fix this problem by insisting that the Pentagon support domestic supply lines. Both the House and Senate Armed Services Committee authorization bills included additional funds for development of domestic rare earth capability, though the all-powerful Appropriations Committees have not matched this investment to date. We need to put some money toward fixing this critical supply chain issue before we get caught short and embarrassed when it’s a matter of life and death in defense of the nation. Though seemingly unimportant things like a $2 rare earth element magnet steering a billion dollar weapons platform may sound inconsequential, when our adversaries cut off our supply leveraging our greatest weakness against us, we won’t have anywhere to turn. With unpredictable international relations, we can no longer ignore our greatest strategic liability. We must act now to establish a coherent rare earth policy and end our dependence on China. When it comes to keeping America safe, we can’t take any chances. Our national security relies on our industrial, economic, and agricultural strength to win wars.

#### John Grady terminalizes that a lack of military readiness results in:

John Grady, 10-6-2017, "Rep. Thornberry Warns Lack of U.S. Military Readiness is Costing Lives," USNI News, https://news.usni.org/2017/10/06/rep-thornberry-warns-lack-u-s-military-readiness-costing-lives, Date Accessed 9-19-2018 // JM

Speaking before the release of the Heritage Foundation’s 2018 [Index of U.S. Military Strength](http://www.heritage.org/military-strength), the chairman of the House Armed Services Committee said the American public would be shocked to know about the same number of people died in recent military accidents than were killed by a lone gunman firing into an outdoor concert crowd in Las Vegas. Rep. Mac Thornberry, (R-Texas), said the fatal collisions of guided-missile destroyers USS Fitzgerald and USS John S. McCain that killed 17 sailors and the crash [of a Marine KC-130T aircraft](https://news.usni.org/2017/07/11/marine-aircraft-type-involved-in-monday-crash-has-good-safety-record) that killed 15 Marines and a sailor as examples of the decline of the armed forces’ capacity, capability and readiness. In the Navy, he specifically mentioned 100-hour workweeks and an unrealistic operational tempo as barriers to fielding an effective force. The Heritage Index changed the overall assessment of Navy’s overall readiness from “strong” to “marginal” because of the string of accidents, said Heritage’s Dakota Wood. Likewise, the Marine Corps readiness has been hampered by “a dramatic shortage in usable aircraft and pilots.” Overall, he said the Marine Corps is “under-strength relative to taskings.” The index said the military’s readiness in decline, leaving the armed forces capable of resolving favorably one regional conflict” but allowing an “opportunistic power” to rise in another, Wood said. As a result, the American military “has become a one-war force.” In the past, Heritage’s Index put the United States military as “marginal,” Wood said it “is trending toward weak.” He added the decline is not new. Defense spending has been falling since the end of the Cold War with the collapse of the Soviet Union in the early 1990s. Thornberry noted Congress has played a role in this decline, starting with its inability to pass a budget on time. Again this year, the government is operating under a Continuing Resolution [CR] limiting how and when the Pentagon and the services can spend the money authorized and appropriated to them. The combined defense budget for the coming fiscal year is just under $700 billion. The fiscal year began on Oct. 1; the continuing resolution covers government spending into December. “Every single day of a CR does damage.” Thornberry said the effects are “felt immediately” in maintenance and reduced training, including flight and steaming hours. He said the House, Senate and Trump administration are “moving together … to solve the problem” of declining military strength but it will not be changed overnight. Wood said a correction in the trend will take a decade or more and if it is not addressed the authors of the index see a “death spiral” from sustainability in a high-end conflict to current readiness to modernization. In answer to an audience question on the impact of the Budget Control Act of 2011, Thornberry said, “I would get rid of all the caps on defense and domestic” spending. Wood said the impact on the armed forces has “only worsened by BCA” creating “a spiral of problems.” Thornberry added there is a growing consensus in Congress not only to increase spending but eliminate the sequestration provisions of the 2011 law. Wood, in detailing the report, said it concentrates on Europe, the Middle East and Asia and deals only with hard power, which does not include quality of personnel, logistics or even cyber. By that measure to successfully resolve a major regional conflict and at least deter another, the United States would need a fleet of between 345 and 350 ships, 36 battalions of Marines, 50 Army Brigade Combat Teams and Air Force with 1,200 tactical fighters. He added, “This is not a futures document, but it is “like getting a report card of your kid in school.” The index is based on open-source documents are presented as chapter footnotes. As to why cyber was not included in the report, Wood said, “I don’t know how to measure cyber” and “can’t know its value” and “is used in combat.”

#### Second, the advanced manufacturing industry. John Pastor indicated in 2016 that:

John Pastor, 3-14-2016, "With rare earth minerals in short supply, researchers seek ways to extract them from coal," No Publication, https://vtnews.vt.edu/articles/2016/03/research-rareearth.html, Date Accessed 9-11-2018 // JM

“The majority of rare earths is produced in China as byproducts,” said Yoon, who is the director of the Center for Advanced Separation Technologies at Virginia Tech. “With the recent closure of the rare earth mine in California, the U.S. relies more heavily on imports. It will be good for the country if we can develop an advanced separation technology to extract the critical materials from coal as byproducts, particularly the high-value rare earths [are] essential for advanced manufacturing industries.” The issue of domestic production affects matters concerning development of renewable energy resources and national security, the researchers said. “Domestic supply of rare earth materials is critical for the U.S. manufacturing industry,” said U.S. Rep. Morgan Griffith, who represents Virginia’s 9th district in the U.S. House of Representatives. “As the nation moves toward electric-drive vehicles, wind farming, and other sustainable energy measures, it is important to develop a reliable source of essential materials. In addition, we will develop new, cleaner applications for coal and coal byproducts to revitalize the mining industry.”

#### Ryan McConaghy indicates in 2011 that this sector is the:

Ryan McConaghy and Devon Swezey, October 2011, "Manufacturing Growth: Advanced Manufacturing and the Future of the American Economy," thebreakthrough.org/blog/BTI\_Third\_Way\_Idea\_Brief\_-\_Manufacturing\_Growth\_.pdf, Date Accessed 9-11-2018 // JM

However, despite these relative declines, manufacturing remains a sizeable contributor to our economy and directly employs over 11.5 million people.8 Paradoxically, even as manufacturing’s relative share of employment and GDP has decreased in recent decades, manufacturing has actually become even more important to sustaining American prosperity. Manufacturing is the most capital-intensive and productive sector of the economy, and it is key to developing and commercializing new technologies. Manufacturing also has the largest employment and output multipliers of any sector of the economy, creating many indirect jobs and making it a key catalyst of broad economic growth. Moreover, a healthy manufacturing sector is central to the United States’ ability to reduce its large and persistent trade deficit. The changes in the employment, industrial focus, and workforce skills associated with the new manufacturing should be viewed as the growing pains that accompany any significant metamorphosis. The most recent evolution in manufacturing has resulted in key differences between advanced and traditional activities. These differences have profound implications for the role of manufacturing in our economy and the design of national policy toward manufacturing. New manufacturing thrives on and drives innovation. Manufacturing is a core component of the nation’s innovation ecosystem. Firms engaged in manufacturing re-invest a significant portion of revenues in research and development (R&D). Overall, the manufacturing sector comprises two-thirds9 of industry investment in R&D and employs nearly 64% of the country’s scientists and engineers.10 Manufacturers also have unique opportunities to apply new technologies for specialized functions and achieve economies of scale at the plant or firm,11 making the return on manufacturing R&D significant. The transition to advanced manufacturing will enhance the sector’s role in fostering innovation and developing and commercializing new technologies. Advanced manufacturing industries, including semiconductors, computers, pharmaceuticals, clean energy technologies, and nanotechnology, play an outsized role in generating the new technologies, products, and processes that drive economic growth. Advanced manufacturing is also characterized by the rapid transfer of science and technology into manufacturing processes and products, which in and of itself drives innovation. The research-to-manufacturing process is cyclical, with multiple feedbacks between basic R&D, pre-competitive research, prototyping, product development, and manufacturing. This opens new possibilities for product development and manufacturing.12 Because of the technological complexity of many modern, science-based industries, technology development often requires interactions among experts from many different disciplines. It is therefore supported by “geographic clustering” of related manufacturing, supply chain, research, and educational facilities. 13 According to a 2004 report by President Bush’s Council of Advisors on Science and Technology (PCAST), “design, product development, and process evolution all benefit from proximity to manufacturing, so that new ideas can be tested and discussed with those working ‘on the ground.’”14 As a result, when a high-tech manufacturing cluster forms, it often attracts the co-location of R&D activities and helps sustain the global competitiveness of the entire region. This is why Intel recently decided to build a new state-ofthe- art R&D facility near Portland, Oregon where it has long had a high-tech manufacturing presence, as well as related silicon manufacturers, suppliers, and a high-skilled workforce.15

#### There are two impacts to this growth. First, it creates a sustainable future. Emily Holbrook writes last week that advanced manufacturing:

Emily Holbrook, 9-14-2018, "Report: Declining Costs and Technology Are Powering Renewable Energy Demand," No Publication, https://www.energymanagertoday.com/report-declining-costs-and-technology-are-powering-renewable-energy-demand-0178816/, Date Accessed 9-16-2018 // JM

Renewable energy sources, notably [solar](https://www.energymanagertoday.com/?s=solar) and wind, are reaching price and performance parity on and off the grid, finds a new Deloitte Global report, “[Global Renewable Energy Trends](https://www2.deloitte.com/global/en/pages/energy-and-resources/articles/global-renewable-energy-trends.html).” According to the report, three key enablers — price and performance parity, grid integration and technology — allow solar and wind power to compete with conventional sources on price, while matching their performance. As technologies such as blockchain, artificial intelligence (AI), and 3-D printing continue to advance the deployment of renewables, prices will likely continue to fall, and accessibility will improve, according to the report. “Demand for renewable energy sources has grown tremendously in recent years,” says Marlene Motyka, DeloitteUS and global renewable energy leader and principal, Deloitte Transactions and Business Analytics LLP. “Governments, communities, emerging markets, and corporations increasingly understand that renewables are sustainable and affordable, and they want them included in current and future procurement plans.” According to the report, longstanding obstacles to greater deployment of renewables have receded as a result of three key enablers: Reaching price and performance parity: The unsubsidized cost of solar and wind power has become comparable or cheaper than traditional sources in much of the world. New storage options are now making renewables more dispatchable — once an advantage of conventional sources. Cost-effective and reliable grid integration: Once seen as an obstacle, wind and solar power are now viewed as a solution to grid balancing. They have demonstrated an ability to strengthen grid resilience and reliability and provide essential grid services. Smart inverters and advanced controls have enabled wind and solar to provide grid reliability services related to frequency, voltage and ramping as well or better than other generation sources. When combined with smarter inverters, wind and solar can ramp up much faster than conventional plants, help stabilize the grid even after the sun sets and the wind stops, and, for Solar PV, show much higher response accuracy than any other source. The impact of technology: Technology is accelerating the deployment of renewables: automation and advanced manufacturing are improving [improves] the production and operation of renewables by reducing the costs and time of implementing renewable energy systems; AI can fine-tune weather forecasting, optimizing the use of renewable resources; [blockchain](https://www.energymanagertoday.com/us-senate-will-tackle-blockchains-energy-efficiency-or-lack-thereof-0178114/) can enable energy attribute certificate (EAC) markets to help resolve trust and bureaucratic hurdles; and advanced materials are transforming the materials of solar panels and wind turbines. Already among the cheapest energy sources globally, solar and wind have not even run the full course of their enabling trends yet. According to Deloitte, as costs continue to fall and accessibility increases, the demand for renewables is growing rapidly, driven by the following stakeholders: Smart renewable cities: Most of the world’s population now lives in growing cities, some of which have taken a [proactive “smart” approach](https://www.energymanagertoday.com/new-report-analyzes-evolution-of-smart-cities-0178739/) to managing their infrastructure with connected sensor technology and data analytics. The focus of more advanced smart cities is to enhance quality of life, competitiveness and sustainability. Solar and wind are at the intersection of these goals because they contribute to depollution, decarbonization and resilience while enabling clean electric mobility, economic empowermentandbusiness growth. Community energy: Building on the original trend toward “community solar,” the addition of storage and management systems give communities more flexibility when implementing renewables. On-grid communities can now be powered independently from the grid, and in off-grid areas, community-owned partnerships enable electrification and reinvestment of profits. Emerging markets: The cumulative capacity of emerging markets to develop renewable energy is on the verge of surpassing that of the developed world, as emerging markets have helped bring down the cost of renewables and are innovating in ways that benefit the developed world. Corporate involvement: Corporations are procuring renewables in new ways, with many large corporations pursuing Power Purchase Agreements (PPAs) and smaller corporations turning to aggregation. Furthermore, two-thirds of Fortune 100 companies currently have set renewable energy targets and are leading global corporate procurement, signaling an important commitment from the private sector. “Wide-scale integration of renewable energy sources is no longer a question of if, but when,” adds Motyka. “Countries such as China, the United States and Germany have already reached price parity for certain renewable sources. With prices continuing to drop, developed countries and emerging markets alike have the ability to integrate renewables into their grid systems to ensure competitive advantage.”

#### That’s important because the:

John Drexhage, June 2012, “The role of minerals and metals in a low carbon economy”, International Council on Mining & Metals, Date Accessed 9-20-18 // JM

The wide-scale introduction of [carbon capture system] CCS, as anticipated in IEA scenarios towards the middle of the 21st century, would similarly increase the demand for many metals. A 2011 study into metal requirements of low carbon energy by R. Kleijn et al estimates that applying CCS technology would increase metal requirements by 10–30% compared with the current electricity mix. This is due to the additional infrastructure needed to capture, transport and store CO2 emissions. The exact trajectory and proliferation of these different low carbon power generation and storage options is not yet fully known. However, according to expert assessments, their uptake is crucial for making the transition to a low carbon economy. Each option will have a different mineral and metals profile and further work is required to understand the potential implications on metals demand if these technologies are introduced at a large scale.

#### That’s huge as CCES indicates these systems:

Center for Climate and Energy Solutions, 2017, "Carbon Capture — Center for Climate and Energy Solutions," https://www.c2es.org/content/carbon-capture/, Date Accessed 9-18-2018 // WS

Carbon capture, use, and storage technologies can capture more than 90 percent of carbon dioxide (CO2) emissions from power plants and industrial facilities. Even as nations diversify their energy portfolios, fossil fuels are expected to meet a majority of the world’s energy demand for several decades. Accelerating deployment of carbon capture technology is essential to reduce emissions from these power plants, and from industrial plants like cement and steel manufacturing. More than half of the models cited in the [Intergovernmental Panel on Climate Change’s Fifth Assessment Report](https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_full.pdf) required carbon capture[ is also required to] for a goal of staying within 2 degrees Celsius of warming from pre-industrial days. For models without carbon capture, emissions reduction costs rose 138 percent.

#### Adam Vaughan terminalizes this 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,%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.

#### Second, it lowers pharmaceutical drug costs. Scott Gottlieb indicates in 2018:

Scott Gottlieb, 7-13-2018, "FDA Budget Matters: Investing in Advanced Domestic Manufacturing," No Publication, https://blogs.fda.gov/fdavoice/index.php/2018/07/fda-budget-matters-investing-in-advanced-domestic-manufacturing/, Date Accessed 9-16-2018 // JM

The U.S. is the current pioneer for advanced manufacturing. Our investments in educating engineers and establishing a research base for the development of domestic facilities will ensure that we maintain our lead in the world. Many U.S. universities have already established advanced manufacturing academic programs that train on these approaches. Some are funded through grants from the FDA that were authorized in 21st Century Cures. These approaches have also been applied with success to other fields, such electronic devices and chemical industries. Producing more drugs domestically doesn’t just mean more American jobs. It could also reduce import costs for manufacturers and increase security of our supply chain. Continuous manufacturing technologies could save 30 percent in manufacturing costs. This estimate does not include the savings from potential future technologies. That totals $60 billion per year in savings in the United States. This can help reduce drug costs. PCAST estimates that “Continuous manufacturing may reduce manufacturing costs, which currently consume as much as 27 percent of the revenue for many pharmaceutical companies, by up to 40 to 50 percent.” One example of promising investment in these technologies is recent efforts by General Electric to “launch prefabricated manufacturing units for producing virus-based gene and cell therapies, novel anti-cancer treatments and vaccines.” Innovations like these could make it more feasible for small, innovative biotech companies to enter the market and compete against larger pharmaceutical companies, especially for gene and cell-based cancers. This could provide a broader array of innovation, and infuse more competition into these promising therapeutic areas. The agility of continuous manufacturing platforms should ultimately reduce costs of drug manufacturing and could provide savings to our health system. But the efficient adoption of these approaches will require a paradigm change in the regulation of manufacturing. And that will require an investment to write new principles for how the FDA oversees these tasks. This is the opportunity before the FDA, and the heart of the proposal in the President’s budget.

#### Kevin Outterson concludes in 2015 that:

Kevin Outterson, 1-30-2015, "The Puzzle Of Antibiotic Innovation," No Publication, https://www.healthaffairs.org/do/10.1377/hblog20150203.044374/full/, Date Accessed 9-18-2018 // JM

Dame Sally Davies, the Chief Medical Officer of England, warns that we are approaching an [antibiotic apocalypse](http://www.theguardian.com/society/2013/jan/23/antibiotic-resistant-diseases-apocalyptic-threat). A former chief economist at Goldman Sachs [estimates](http://amr-review.org/sites/default/files/AMR%20Review%20Paper%20-%20Tackling%20a%20crisis%20for%20the%20health%20and%20wealth%20of%20nations_1.pdf) that unless dramatic action is taken now, antimicrobial resistance could kill 50 million people a year and cause $100 trillion in cumulative economic damages. In the US, dire warnings have issued from the [Centers for Disease Control and Prevention](http://www.cdc.gov/drugresistance/threat-report-2013/) (CDC), the [President’s Council of Advisors on Science and Technology,](http://www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_carb_report_sept2014.pdf) and the President himself through an Executive Order on [Combating Antibiotic-Resistant Bacteria](http://www.whitehouse.gov/the-press-office/2014/09/18/executive-order-combating-antibiotic-resistant-bacteria) in September 2014 (summary [here](http://theincidentaleconomist.com/wordpress/the-obama-plan-for-combatting-antibiotic-resistance-is-out/)). The President’s [new budget](http://www.whitehouse.gov/the-press-office/2015/01/27/fact-sheet-president-s-2016-budget-proposes-historic-investment-combat-a) asks for $1.2 billion to be spent on antibiotic resistance. But last week, the science press breathlessly celebrated the discovery of a new antibiotic, teixobactin, cultured from soil samples collected in a grassy field in Maine (the study was published in [Nature](http://www.nature.com/nature/journal/v517/n7535/full/nature14098.html)). Crisis over? Not so fast. Teixobactin has only been studied in mouse models, not humans. The point estimate failure rate for antibiotics from early discovery stage to actual drug approval for humans is 97 percent (only 3 percent survive – see the [Eastern Research Group, Inc. study](http://aspe.hhs.gov/sp/reports/2014/antibacterials/rpt_antibacterials.cfm), page 3-9). After approval, most antibiotics fail in the marketplace for commercial and safety reasons; antibiotics suffer [market withdrawals](http://www.ncbi.nlm.nih.gov/pubmed/24088160) at triple the rate of all other drugs. The Price-Volume Model But let’s assume that teixobactin makes it through 5-10 years of clinical trials and is approved by the Federal Drug Administration (FDA) with great fanfare. Hundreds of millions will have been invested in these clinical trials. How will the company see a profit on their investment? A [recent study](http://aspe.hhs.gov/sp/reports/2014/antibacterials/rpt_antibacterials.cfm)conducted by the Eastern Research Group for the US Government suggests the company will lose money, even on a “successful” antibiotic. Under the existing “price-volume” model, drug companies make money by selling drugs, either with high prices, high volumes, or both. The [October 2014](http://content.healthaffairs.org/content/33/10.toc) Health Affairs issue on specialty drugs highlighted many examples, including the new drugs for Hepatitis C. For antibiotics, the price-volume model is broken. For excellent clinical reasons, new antibiotics are adopted very slowly. Hospital stewardship programs rightly control the use of new drugs to delay resistance. This is good news for patients, but terrible news for the companies trying to sell an innovative new antibiotic. Imagine if the new iPhone 6 could not be sold until all of the existing iPhone models were completely exhausted first. Due to the threat of resistance, antibiotic innovation cannot be based on high volume of sales. As Scott Podolsky notes in his new book, [The Antibiotic Era](https://jhupbooks.press.jhu.edu/content/antibiotic-era), the US over marketed antibiotics in the 1950s and 1960s, leading to the crisis today. Looking Beyond High Prices High prices are also not a likely solution, as antibiotics are more substitutable than many drug classes, and many generic antibiotics remain effective competitors. Higher prices would also give companies an incentive to overmarket, while worsening access to these drugs for millions of patients around the world who need effective antibiotics. For all the concern about future deaths from resistance, it is clear that more people die today from susceptible bacterial infections than resistant ones, meaning that improving access will save more lives. In an [article](http://content.healthaffairs.org/content/34/2/277.abstract) published in this month’s Innovation issue of Health Affairs, my colleagues and I lay out alternatives to the price-volume model for antibiotic innovation. Fixing the business model is urgent if we want antibiotics to make it out of the lab and into the patients who need them.

## Extra Cards

#### Donald Neill indicates that:

Donald Neill & Elizabeth Speed, Strategic Analysis Section, September 2012, “The Strategic Implications of China's Dominance of the Global Rare Earth Elements,” <http://cradpdf.drdc-rddc.gc.ca/PDFS/unc121/p536767_A1b.pdf>, Date Accessed 9-11-2018 // JM

The US and its allies are very much caught in a cleft stick of their own cutting. China captured the global REE market because it was allowed to do so. The resulting damage to US and allied national security interests is therefore entirely predictable. By and large, the single largest consumers of REE are the automotive, chemical and wind power industries, which together consume the lion’s share of the REE produced worldwide. The result of growing consumption – particularly in the clean energy industry, which is being driven by the (heavily subsidized) demand for wind turbines, hybrid electric vehicles, and low-wattage lighting – is likely to be persistent and worsening shortages in REE and REE-containing products that are crucial to [harm] advanced military weapons, surveillance, communication and other electronic systems. Defence systems, however, consume only a small proportion, both in terms of cost and of volume, of all REE materials and products produced and traded on an annual basis. The strategic problem is that the policy responses to the looming shortages – which are being designed and implemented in the defence and security domains – are not aligned with the principal drivers of the shortages, which lie in the clean energy and environmental domains. In the view of the authors, unless there are changes to the trends that have led to REE shortages – Chinese industrial policies and practices, growing consumption as a result of the pursuit of green energy, and market forces and regulatory burdens that have induced REE producers and consumers to relocate to China – it may be extremely challenging for governments to rectify the situation.

#### This is important because Nicholas Trebat indicated in 2017 that:

Carlos Aguiar de Medeiros & Nicholas M. Trebat, July-September/2017, Transforming natural resources into industrial advantage: the case of China’s rare earths industry,” Brazilian Journal of Political Economy, vol. 37, pp. 504-526, <http://www.scielo.br/pdf/rep/v37n3/1809-4538-rep-37-03-504.pdf>, Date Accessed 9-11-2018 // JM

Green technologies, furthermore, increasingly important as substitutes for fossil fuels, require relatively large quantities of REEs. Wind turbines contain up to 2 tons of rare earths. While a conventional Ford sedan requires around half a kilogram of rare earths, Ford’s hybrid cars use anywhere from 1-4.5 kg4 . Toyota’s Prius uses 1 kg of neodymium and 100-200g of dysprosium (Jepson, 2012, p. 10). Though alternatives exist5 , renewable energy and defense technologies today are dependent on rare earths and will likely remain so in the future, making REE supplies a question of national security for the US and the EU. “The United States defines rare earth as critical for its economy as well as its national defence [...] Neodymium, Europium, Terbium, Yttrium and Dysprosium are highlighted by the US Department of Energy as particularly critical for green energy production” (UNCTAD, 2014, p. 32). REEs are among a group of 14 raw materials singled out by the European Parliament as resources “of high economic significance for EU industry” and “vital to numerous high-tech applications and the development of green technologies” (Grieger, 2013).

#### Aaron Mehta argued in 2018 that:

Aaron Mehta, 5-23-2018, "America’s industrial base is at risk, and the military may feel the consequences," Defense News, https://www.defensenews.com/pentagon/2018/05/22/americas-industrial-base-is-at-risk-and-the-military-may-feel-the-consequences/, Date Accessed 9-13-2018 // JM

Underneath the rosy picture of a strong U.S. defense industry lies a demographic challenge for the workforce and contraction issues, a new government study has concluded. The annual Industrial Capabilities report, quietly released May 17 by the Pentagon’s Office of Manufacturing and Industrial Base Policy, found that America’s defense industry continued to outperform other industrial sectors in fiscal 2017. However, long-term trends “continue to threaten the health of the industrial base, limit innovation, and reduce U.S. competitiveness in the global markets,” the report states. The greatest challenge that could harm domestic defense capabilities is the demographics of the workforce. Only 39 percent of the current workforce is under the age of 45. And while jobs in the aerospace and defense sectors are seen positively by the majority of young professionals, only 1.5 percent of 25- to 34-year-olds in the U.S. have a science degree. Taken together, the challenge is obvious to the authors of the report: Aerospace and defense companies are “faced with a shortage of qualified workers to meet current demands as well as needing to integrate a younger workforce with the ‘right skills, aptitude, experience, and interest to step into the jobs vacated by senior-level engineers and skilled technicians’ as they exit the workforce.” The report notes that the Department of Defense had a trio of meetings with the [Aerospace Industries Association](https://www.defensenews.com/newsletters/tv-next-episode/2018/04/30/the-impact-of-new-arms-export-rules/) in FY17 to address workforce issues, with promises for those dialogues to continue in the future. The report also describes what it sees as the biggest threats to the industrial base for different domains of warfare. According to the Pentagon, the biggest risk for the aerospace sector is its ability to “sustain the design and manufacturing skills and capabilities needed for future aircraft design and manufacture.” Specifically, the authors of the report are concerned that “foreign dependency, single or sole sources, and financial viability continue presenting a risk for the aircraft” puts [lower-tier suppliers](https://partner-mco-archive.s3.amazonaws.com/client_files/1527002508.pdf) at risk in the defense and aerospace sector. For the ground vehicle sector, the Pentagon is concerned that a lack of innovation over the last decade has [led to stagnation](https://www.defensenews.com/land/2018/02/15/next-gen-combat-vehicle-prototyping-to-be-accelerated/), and hence “any new combat vehicle design will face cost, schedule, and performance challenges.” And notably, the authors warn that around the world, combat vehicles are slowly approaching parity with the U.S. at a time that “the lack of new development programs for tracked systems is challenging the U.S. ability to innovate in this su

#### The impact is huge – Steve Lippman concludes in 2007 that:

Steve Lippman, Daniel Rosan and Adam Seitchik, 5-3-2007, Why Lower Drug Prices Benefit Institutional Investors: an application of universal ownership theory, Trillium Asset Management, <https://www.trilliuminvest.com/pdf/tamc_drugprices_draft1_4-06.pdf>, Date Accessed 9-16-2018 // JM

One way that demand could expand as drug prices fall is through a reduction in consumer co-payments. Average co-payments for prescription drugs have risen sharply as employers have responded to steady increases in prices. For instance, between 2000 and 2005, co-payments for preferred drugs rose 69% and those for non-preferred drugs doubled.44 A reduction in drug prices could stem this trend of higher co-payments, or even lead to lower nominal co-pays over time. As the real cost of co-payments falls as a percentage of employee income, the demand for prescription drugs would increase. More affordable drugs would also expand access for workers currently left out of the system. The number of companies in labor-intensive industries such as retail offering prescription drug benefits would likely increase. Similarly, coverage within state sponsored plans might improve. The broader the fall in drug prices, both in terms of companies participating and medicines covered, the more powerful the likely impact on coverage and ultimately demand. If pharmaceutical companies believed that lower prices would increase their profitability, then they would presumably have already cut prices, and not spend millions of dollars lobbying against government-imposed price cuts. Thus it is unlikely that cuts in pricing would be profit enhancing or even revenue-neutral to the pharmaceutical companies themselves, but it is quite likely that there would be at least some positive revenue impact.45 This would allow for cuts in drug prices to become a positive-sum game overall: having a smaller negative impact on drug industry profits than it does on profitability elsewhere in the economy. The dynamic impacts of lower drug prices could extend well beyond the direct economic benefits of higher utilization. Better access to needed pharmaceuticals would result in a healthier, more productive workforce. The productivity losses from employee health problems are significant, and improved medical care would increase production, revenue and profitability in a broad cross-section of industries.46 It is estimated that the lost economic output resulting from the combination of not working, sick days, and inferior productivity on the job totaled $260 billion in 2003 – roughly 2.4 percent of gross domestic product.47 Unsurprisingly, workers without health benefits or with minimal health benefits are less productive on the job than those with comprehensive benefits. Health Economics reported that the net benefits to employers from having workers take prescription medicines for their chronic illnesses are substantial and result because prescription medications substantially lower absenteeism among chronically ill workers.48 As a more specific example, the Journal of Occupational and Environmental Medicine looked at the economic toll of depression. They found it is high relative to that associated with other acute and chronic illnesses, and that this economic burden is disproportionately attributable to indirect costs, such as absenteeism from work. Absence from work directly impacts both patients and their employers, and treatment of the disease clearly lessens this burden. 49 Lowering the price of pharmaceuticals provides consumers and employers an opportunity to allocate more resources towards health, while at the same time diverting resources to other goods and services. This investment has the potential to yield long-term economic payoffs for individuals, families, employers and the economy as a whole due to the improved health and productivity of the workforce.50 Affordable prescription pharmaceuticals help guard the health of Americans and sustain a healthy American economy.

#### James Clad indicates in August that:

James Clad, 8-6-2018, "Rare Earth Minerals," InsideSources, https://www.insidesources.com/rare-earth-minerals-think-competitiveness-not-tariffs/, Date Accessed 9-11-2018 // JM

It is not far-fetched to see in China’s monopoly of the global rare earth minerals market something like a “nuclear option,” employable as and when the trade tariffs conflict escalates further. Rare earth minerals (REM) have become critical to the production of such products as wind turbines and electric engines, and to dominant U.S. defense technologies like smart bombs and night-vision goggles. The various minerals counted as REM, which include yttrium and neodymium, remain essential to a dizzying variety of advanced technologies in which, until the early 1990s, the United States had long been the world’s largest developer. Since then the Chinese have come to dominate the rare earth marketplace. Astonishingly, not a single American rare earths mine remains in operation today. Glaring vulnerabilities like this sound a drumbeat for a coherent effort to rebuild the U.S. industrial base, and to reduce self-imposed impediments to strategic American competitiveness. In this quest, the decline of U.S. mining should stand as both warning and a call for action. Its decline exemplifies the varied challenges facing U.S. industry. As a former defense official focused on China’s strategic assertiveness, I have a view of the market and production vulnerabilities that favor that country’s across-the-board challenge to the United States. Despite our bottomless appetite for minerals and metals indispensable to the manufacture of smart phones, lithium-ion batteries and solar panels, we impose many obstacles to mining those very same minerals. The result: mining investment and minerals production has gone elsewhere.

bsector.”

## New Cards

#### Card 5

Bert Chapman. The Geopolitics of Rare Earth Elements: Emerging Challenge for U.S. National Security and Economics. Journal of Self-Governance and Management Economics, 6 (2)(2018): 50-91. <https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1195&context=lib_fsdocs>, Date Accessed 9-11-2018 // JM

REE’s have become critically important to U.S. economic development and national security. A 2014 assessment by the National Center for Policy Analysis maintains REEs support more than $298 billion in revenue from downstream economic activity, 535,000 U.S. jobs, and over $33 billion in payrolls. 73 Relying on unreliable and even hostile foreign suppliers of REEs such as Afghanistan, China, and others is geopolitical folly of the highest order! The U.S. must ensure that it provides effective regulatory, research and development, and tax incentives to its REE industry to ensure it can meet continually increasing economic and national security needs for REEs and structure government acquisition of these resources so they only come from U.S. companies or from companies or governments with whom the U.S. has a defense treaty alliance

#### Card 6

Donald Neill & Elizabeth Speed, Strategic Analysis Section, September 2012, “The Strategic Implications of China's Dominance of the Global Rare Earth Elements,” <http://cradpdf.drdc-rddc.gc.ca/PDFS/unc121/p536767_A1b.pdf>, Date Accessed 9-11-2018 // JM

The US and its allies are very much caught in a cleft stick of their own cutting. China captured the global REE market because it was allowed to do so. The resulting damage to US and allied national security interests is therefore entirely predictable. By and large, the single largest consumers of REE are the automotive, chemical and wind power industries, which together consume the lion’s share of the REE produced worldwide. The result of growing consumption – particularly in the clean energy industry, which is being driven by the (heavily subsidized) demand for wind turbines, hybrid electric vehicles, and low-wattage lighting – is likely to be persistent and worsening shortages in REE and REE-containing products that are crucial to advanced military weapons, surveillance, communication and other electronic systems. Defence systems, however, consume only a small proportion, both in terms of cost and of volume, of all REE materials and products produced and traded on an annual basis. The strategic problem is that the policy responses to the looming shortages – which are being designed and implemented in the defence and security domains – are not aligned with the principal drivers of the shortages, which lie in the clean energy and environmental domains. In the view of the authors, unless there are changes to the trends that have led to REE shortages – Chinese industrial policies and practices, growing consumption as a result of the pursuit of green energy, and market forces and regulatory burdens that have induced REE producers and consumers to relocate to China – it may be extremely challenging for governments to rectify the situation.

#### Card 7

Donald Neill & Elizabeth Speed, Strategic Analysis Section, September 2012, “The Strategic Implications of China's Dominance of the Global Rare Earth Elements,” <http://cradpdf.drdc-rddc.gc.ca/PDFS/unc121/p536767_A1b.pdf>, Date Accessed 9-11-2018 // JM

Should the US and its allies decide to offer competition to dilute or eliminate China’s de facto REE monopoly, they have between them the expertise and the resources to do so; the only problems are cost and time. China’s REE are cheaper and they are already available. Securing non-Chinese supplies will likely be a lengthy and expensive process; and creating the industrial infrastructure to turn REO into metals, alloys, and finished components and products, takes time. Near-term shortages are probably unavoidable, and China will use the regulatory and taxation ‘taps’ to best advantage. As this paper was going to press, for example, Beijing announced a first set of export quotas of 10,546 tonnes for 2012, similar to the 2011 quota. F 175F However, as only 49% of the 2011 quota was actually subscribed, it is clear that deteriorating end-user demand is playing at least as significant a role in depressing global REE prices as China’s quota and regulatory policies. The key factor in approaching the problem of REE shortages is accepting that because in most military and civilian applications only very small quantities of REE are required, availability tends to be more important than price. The REE market is thus vulnerable to monopolization, enabling the monopolist to drive out of business any private company that tries to compete by the simple expedient of opening the tap a little wider. The same argument applies to REE as to oil; if the rare earths are truly a “critical strategic material,” then cost is less important than availability, and government intervention in the market may be justified in order to secure access to stable supplies. Until domestic or allied sources of supply, or alternative non-REE-dependent technologies, are developed and operational, China’s ability to limit or even deny access to the REO, rare earth metals, and finished REE-bearing components required by advanced US defence systems poses a threat to key military capabilities of the US and its key Western and Asian allies. Given Beijing’s ability to manipulate market forces to its advantage, there is no means of compelling China to provide access to these critical strategic materials; thus, there is no near-term alternative for the US and its allies to developing, as rapidly as possible, domestic sources of defence-critical rare earths. This could necessitate market intervention in the form of subsidies, regulatory exemptions, and price and purchase guarantees.

#### Card 9

Gary P. Pisano and Willy C. Shih, 10-17-2012, "America Needs a Manufacturing Renaissance," HBS Working Knowledge, https://hbswk.hbs.edu/item/america-needs-a-manufacturing-renaissance, Date Accessed 9-11-2018 // JM

The rough and tumble of international competition means we should expect industries to come and go. Even if this is sometimes painful, it is, in fact, a healthy process by which resources flow to their most productive uses. When a commons erodes, however, it represents a deeper and more systematic problem. It means the foundation upon which future innovative sectors can be built is crumbling. When the semiconductor production business moved to Asia in the 1980s, it brought with it a whole host of capabilities—electronic-materials processing, deposition and coating, and sophisticated test and assembly capabilities—that formed an industrial commons needed to produce a whole host of advanced, high-valued-added electronic products such as flat-panel displays, solid-state lighting, and solar PV. In this book, we will examine the dynamics that underlie both the rise and decline of commons, and the consequence of those declines. Our argument is built around three core themes. Theme 1: When a Country Loses the Capability to Manufacture, It Loses the Ability to Innovate Innovation and manufacturing are often viewed as residing at the opposite ends of the economic spectrum—innovation being all about the brain (knowledge work) and manufacturing all about brawn (physical work). Innovation requires highly skilled, highly paid workers, and manufacturing requires low-skilled, low-paid workers; innovation is a high-valued-added specialty, and manufacturing is a low-value-added commodity; innovation is creative and clean, and manufacturing is dull and dirty. Such a view of manufacturing is a myth and is based on a profound misunderstanding of how the process of innovation works and the link between R&D and manufacturing. R&D is a critical part of the innovation process, but it is not the whole thing. Innovation is about moving the idea from concept to the customer’s hands. For some highly complex products (flat-panel displays, PV cells, and biotechnology drugs, to name a few) the transfer from R&D into production is a messy affair, requiring extremely tight coordination and the transfer of learning between those who design and those who manufacture. If you do not understand the production environment, you have a harder time designing the product. In these settings, there are strong reasons to co-locate R&D and production. It is a lot easier for an engineer to walk across the street to the plant or drive down the road than to fly halfway around the world to troubleshoot a problem. This helps to explain why the American company Applied Materials, a leading maker of equipment for manufacturing semiconductors and solar panels, moved its chief technical officer from the United States to China.14 Because most of its large customers are now in China, Taiwan, and South Korea, it makes sense for the company to do its research close to the factories that use its equipment. Applied Materials is now moving much of its manufacturing operations to Asia as well. In chapter 4, we will offer a framework for determining when it matters whether R&D and manufacturing are located near each and when it does not. Theme 2: The Industrial Commons Is a Platform for Growth The industrial commons perspective suggests that a decline of competitiveness of firms in one sector can have implications for the competitiveness of firms in another. Industries and the suppliers of capabilities to the industries need each other. Kill a critical industry, and the suppliers probably will not survive for long; other industries in the region that depend on those suppliers will then be jeopardized. When the auto industry declines, it causes an atrophy of capabilities (such as casting and precision machining) that are also used in industries such as heavy equipment, scientific instruments, and advanced materials. The unraveling of a commons is a vicious circle. As capabilities erode, it is harder for companies that require access to stay in business. They are forced to move their operations or their supplier base to the new commons. As they move, it is harder for existing suppliers to sustain themselves. Ultimately, they must either close shop or move their operations. Even worse, the loss of a commons may cut off future opportunities for the¶ emergence of new innovative sectors if they require close access to the same capabilities. Four decades ago, when US consumer electronics companies decided to move production of these “mature” products to Asia, who would have guessed that this decision would influence where the most important component for tomorrow’s electric vehicles—the batteries—would be produced? But that is what happened.15 The offshoring of consumer electronics production (often contracted to then-little-known Japanese companies such as Sony and Matsushita) led to the migration of R&D in consumer electronics to Japan (and later to South Korea and Taiwan). As consumers demanded ever-smaller, lighter, and more powerful (and power hungry!) mobile computers and cell phones, electronics companies were pushed to innovate in batteries. In the process, Asia became the hub for innovation in the design and manufacturing of compact, high-capacity, rechargeable, lithium ion batteries, a technology that was invented in America. This explains why Asian suppliers have become the dominant source of the lithium ion battery cells used in electric vehicles.

#### Card 10

Harlan Russell Green, 6-27-2010, "Economic Interdependence Is Good," No Publication, http://populareconomicsweekly.blogspot.com/2010/06/economic-interdependence-is-good.html, Date Accessed 9-11-2018 // JM

How interdependent we have become! The lessons of this recession and the ongoing recovery, is that going it alone won’t work—whether when drilling oil wells, or evading financial regulations. We even have to thank our dependence on foreign trade with Asia, and our government-aided auto industry, for what is leading this recovery—the manufacturing sector. Economic interdependence is becoming the norm in this decade—private industry (via innovation) and governments (via regulation) are becoming more interdependent. One can no longer exist without the other. And what affects one sector now affects the overall economy. The bursting housing bubble almost caused the worldwide collapse of the financial system because financial markets are now interconnected. The BP Gulf oil disaster is an example of nature’s interconnectedness. A toxic spill has become toxic to all states in the Gulf region. Overall industrial production in May surged 1.2 percent, following a 0.7 percent boost the month before. The latest number was stronger than the consensus forecast for 1.0 percent. Manufacturing has been robust over the last three months with this component gaining 0.9 percent in the two latest months and jumping 1.2 percent in March.

#### Card 11

Sree Ramaswamy, James Manyika, Gary Pinkus, Katy George, Jonathan Law, Tony Gambell, and Andrea Serafino, November 2017, "Making it in America: Revitalizing US manufacturing," McKinsey & Company, https://www.mckinsey.com/featured-insights/americas/making-it-in-america-revitalizing-us-manufacturing, Date Accessed 9-16-2018 // JM

sThe biggest upside potential is found in advanced manufacturing industries—areas in which the United States should have a competitive advantage but instead runs a large trade deficit. With Asian, European, and luxury carmakers gaining market share and domestic OEMs sourcing more heavily from Mexico for SUVs and pickup trucks sold in the United States, imports have risen in recent years. But foreign carmakers are expanding some US production of both parts and finished cars—and since car production is already starting from a large base, even a small percentage increase adds significant value. Aerospace is another industry with significant potential. Its domestic production remains strong, global market growth is expected to be robust, and import competition remains relatively weak. Computer and electronics industries could also make a contribution, given that domestic content has stabilized recently and demand is expected to stay strong. By contrast, we find limited prospects for growth in industries such as basic consumer goods, where domestic production has already been hollowed out. In addition to boosting its value added by $530 billion, the manufacturing sector could add 2.4 million jobs on top of current trends by realizing the stretch scenario. Furthermore, the positive effects would ripple into services and other industries, potentially creating another $170 billion of direct value added and almost one million jobs in industries that provide inputs to manufacturing. Adding together the manufacturing and upstream effects, the total potential benefit to the economy could be $700 billion in additional annual value added and 3.3 million net new jobs.